UWSB MERITO IN POZNAŃ
Branch Office in Chorzów

Kamil Kaczmarek

# Artificial intelligence in enterprise: Theoretical foundations and practical applications in the era of digital transformation

**Bachelor thesis**

**Field of study: Marketing and sales**
**Specialization: E-commerce and sales in new media**
**Album number: 117789**

**Scientific director:**
**Ph.D. Michał Kucia, prof. UWSB MERITO**

CHORZÓW 2024

TABLE OF CONTENTS

# Introduction

The era of digital transformation signifies a significant shift in the operational and strategic frameworks of enterprises worldwide. The integration of Artificial Intelligence (AI) and Large Language Models (LLMs) lies at the core of this transformation, particularly within the domains of marketing and sales. The purpose of this study is to explore the theoretical underpinnings of AI and its practical applications, shedding light on how these technologies can be utilized to redefine marketing strategies and enhance customer engagement.

The emergence of AI and LLMs has brought about a new era of data-driven decision-making and personalized customer experiences. By harnessing the capabilities of these technologies, businesses not only have the ability to automate routine tasks but also gain deeper insights into consumer behavior, market trends, and the effectiveness of marketing campaigns. The analytical power of AI in processing large datasets and generating predictive models enables enterprises to gain a more nuanced understanding of market dynamics, thereby facilitating informed strategic decision-making.

The objective of this project is to articulate the transformative potential of AI and LLMs in the marketing field, demonstrating how these technologies can be employed to achieve operational excellence and gain a competitive advantage. Through a comprehensive examination of advanced prompting techniques using GPT-4, as detailed in chapter 3.1, this study provides a roadmap for effectively leveraging AI to create compelling marketing narratives, enhance brand visibility, and foster meaningful customer relationships.

Furthermore, this investigation delves into the practical aspects of implementing AI within the marketing framework, highlighting the challenges and opportunities that arise during the journey of digital transformation. It discusses the intricacies of developing AI-powered solutions, from the initial ideation phase to the final deployment, and emphasizes the importance of continuous learning and adaptation to keep up with the rapidly evolving technological landscape.

Additionally, this thesis presents a case study and practical example that demonstrate the successful integration of AI in marketing strategies. This narrative serves as evidence of the potential of AI to revolutionize the way businesses approach marketing, showcasing the innovative use of LLMs in content creation, customer engagement, and sales optimization.

Through this example, the thesis highlights the practical implications of AI in driving business growth and enhancing customer satisfaction.

In essence, this work argues that the integration of AI and LLMs in marketing is not simply a technological upgrade, but a strategic necessity for businesses aiming to thrive in the digital era. It suggests that the judicious application of AI in marketing strategies can open up new avenues for innovation, enabling businesses to navigate the complexities of the digital marketplace with agility and foresight.

The thesis represents the profound evolution of marketing in the digital era, highlighted by the pivotal significance of AI and LLMs. It encourages stakeholders across the breadth of the business landscape to adopt these technologies, not solely for the purpose of enhancing operational efficiency, but also as catalysts for strategic innovation. Through presenting a comprehensive overview of the capabilities of AI and its practical applications in marketing, this study aims to inspire a novel generation of marketing strategies that are well-informed, groundbreaking, and aligned with the imperative of digital transformation.

# CHAPTER I

# The use of Artificial Intelligence in marketing and sales

## 1.1 Definition and evolution of Artificial Intelligence and Machine Learning

Artificial Intelligence (AI), a concept present since antiquity[1], has evolved significantly over the decades. Its formal research trajectory can be traced back to the 1950s, marked by pivotal contributions such as Alan Turing's introduction of the Turing Test and John McCarthy's coining of the term "Artificial Intelligence" during the Dartmouth Summer Research Project in 1956. This period laid the groundwork for understanding AI as the endeavor to formulate machines that can replicate aspects of human intelligence.[2]

AI, as elucidated by Shankar (2018), encompasses a broad spectrum of entities including programs, algorithms, systems, and machines, all demonstrating facets of intelligence. This intelligence, as characterized by Huang and Rust (2018), is reflected in machines mirroring specific elements of human cognition. Furthering this notion, Syam and Sharma (2018) articulate AI as the process whereby machines mimic intelligent human behavior.[3]

The conception of AI is inherently interdisciplinary, amalgamating principles from computer science and linguistics to forge computational systems capable of performing tasks traditionally requiring human cognitive prowess. This fusion aims to create entities that not only mimic human intelligence but also exhibit the ability to learn, adapt, and execute complex tasks.[4]

The essence of AI can be distilled into the ability of computational entities to replicate innate human capabilities. As Huang & Rust (2021) and Kaplan & Haenlein (2019) posit, AI is fundamentally about a system's proficiency in comprehending external data,

[1] S. H. Ather: *A History of Artificial Intelligence*. https://ahistoryofai.com/antiquity/ (access 5.02.2024)
[2] L. Ma, B. Sun: *Machine learning and AI in marketing – Connecting computing power to human insights*. "International Journal of Research in Marketing", 2020, p. 482
[3] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 26
[4] R. Saputra, M. I. P. Nasution, B. Dharma: *The Impact of Using AI Chat GPT on Marketing Effectiveness: A Case Study on Instagram Marketing*. "Indonesian Journal of Economics and Management", 2023, p. 603

assimilating knowledge from this data, and utilizing these insights to achieve specific objectives through flexible adaptation.[5]

Duan, Edwards, and Dwivedi (2019) further refine this understanding by describing AI as the capacity of machines to learn from experiences, adjust to new inputs, and perform tasks akin to human actions.[6] This definition underscores the dynamic and evolutionary nature of AI, highlighting its capacity to adapt and evolve.

The application of AI extends beyond theoretical frameworks into practical domains, including in scientific research. Here, AI's utility as a tool for data analysis and literature review is increasingly recognized and harnessed, underscoring its growing prominence and relevance in academic and scientific inquiry.[7]

Nevertheless, defining AI solely as "intelligence exhibited by machines" is an oversimplification that overlooks the nuanced and multifaceted nature of AI. Recognizing the broad scope of this definition is crucial to prevent confusion, misinterpretations, and potential exploitation. As the understanding of AI continues to evolve, it is essential to appreciate its complexity and the diverse interpretations that it encompasses.[8]

Contemporary forms of online interaction have evolved into sophisticated platforms capable of emulating human communication by mimicking and reproducing a repository of human language. This evolution is epitomized by chatbots, which introduce conversational intelligence as an innovative interface for digital commerce. These chatbots exemplify modern AI applications, reflecting its prevalence and functional versatility in various digital communication realms.[9]

This technological evolution is a hallmark of Industry 4.0, a transformative era characterized by the integration of various groundbreaking technologies. This paradigm shift is driven by advancements in Artificial Intelligence, Data Analytics, the Internet of Things, Cloud technology, Robotics, Blockchain technology, 3D printing, cryptocurrencies,

---

[5] E. Hermann: *Leveraging Artificial Intelligence in Marketing for Social Good—An Ethical Perspective*. "Journal of Business Ethics", 2021, p. 45

[6] M. D'Arco, et al.: *Embracing AI and Big Data in customer journey mapping: from literature review to a theoretical framework*. "Innovative Marketing", 2019, p. 102

[7] B. Burger, et al.: *On the use of AI-based tools like ChatGPT to support management research*. "European Journal of Innovation Management", 2023, p. 234

[8] A. De Bruyn, et al.: *Artificial Intelligence and Marketing: Pitfalls and Opportunities*. "Journal of Interactive Marketing", 2020, p. 4

[9] O. Romanenko, L. Alaverdian, G. Basova: *Use of chatbots in the trade of building materials*. "Marketing and Digital Technologies", 2022, p. 15

among other emergent innovations (Ustundag, 2018). These technologies are collectively reshaping industries, redefining traditional practices, and setting new benchmarks for operational excellence.[10]

In this context, the prowess of AI is particularly noteworthy. Currently, AI demonstrates its extraordinary capabilities by manipulating the properties of electromagnetism to analyze written texts with astonishing precision, often producing results that are virtually indistinguishable from human output. This remarkable ability underscores the innovative spirit of AI development and its profound impact on various sectors.[11]

However, despite the progress and adoption of AI, challenges persist, particularly in corporate realms grappling with digitalization strategies that integrate advanced technologies like AI, Internet of Things (IoT), and cloud computing. The anticipation of a new phase of the Industrial Revolution is palpable, with AI at its forefront, shaping the future of industry and technology.[12]

The pervasive presence of AI also has other challenges and implications: its integration into our economies and societal structures is prompting significant transformations. Moreover, the advent of AI-driven decision-making has ignited a debate about potential risks and the need for greater transparency in AI's decision-making processes (Fine Licht et al., 2020). As AI continues to evolve, its impact on various facets of life becomes increasingly profound, necessitating a careful consideration of its benefits and potential repercussions.[13]

There is also a thing like Machine Learning (ML) - crucial part of AI. Let's briefly delve into what ML encompasses within the realm of AI. At its core, ML focuses on devising models and algorithms that empower computers to learn from data sets. This process involves enabling these systems to enhance their performance based on previous

[10] D. Paschek, A. Mocan, A. Draghici: *Industry 5.0 – The Expected Impact Of Next Industrial Revolution*. 2019, p. 126
[11] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 1
[12] D. Paschek, A. Mocan, A. Draghici: *Industry 5.0 – The Expected Impact Of Next Industrial Revolution*. 2019, p. 125
[13] S. G. Naqvi, et al.: *Cyber-physical Systems and Artificial Intelligence: The Role of Cyber Security, Machine Learning, Threats and benefits to Modern Economies and Industries*. "Pakistan journal of humanities and social sciences", 2023, p. 1513

experiences, all without the need for explicit programming for each specific task.[14] This aspect of AI is analogous to human cognitive abilities, as it involves systems acquiring and processing knowledge from data, thereby mimicking human reasoning and understanding.

Artificial intelligence and machine learning (AI/ML) serve as pivotal tools in cybersecurity, significantly enhancing the ability to identify potential organizational risks and provide pertinent recommendations to security analysts. By utilizing a comprehensive knowledge base, AI/ML systems are not only adept at preserving institutional knowledge, but also proficient in automating repetitive tasks and facilitating the training of new analysts. This integration of AI/ML into security operations drastically reduces response times—from several hours to mere seconds—thereby augmenting the capacity of analysts to manage thousands of incidents daily.

Moreover, the utilization of AI and ML is instrumental in automating mundane tasks, thus allowing cybersecurity analysts to augment their operational scope and promptly address an increased volume of incidents. These technologies play a vital role in identifying potential risks throughout an organization and offering essential guidance to security analysts. By harnessing the capabilities of AI/ML, organizations can significantly curtail response times, transforming them from a protracted duration of hours to a mere few seconds. This efficiency not only bolsters the productivity of analysts but also empowers them to adeptly handle a multitude of incidents each day.[15]

In the realm of academic enhancement, Digital Writing Assistants (DWAs) such as Grammarly, WordTune, and Perusall leverage artificial intelligence to refine the quality of students' compositions. These innovative tools, as noted by studies from Fitria (2021), Cavaleri & Dianati (2016), and O'Neill & Russell (2019), are widely recognized by students for their efficacy in bolstering academic performance. The application of AI in these DWAs demonstrates the versatile nature of AI/ML technologies in contributing to various sectors beyond cybersecurity.[16]

---

[14] A. Jain: *Types of Machine Learning*. https://www.geeksforgeeks.org/types-of-machine-learning/ (access 5.02.2024)
[15] K. M. Bresniker, et al.: *Grand Challenge: Applying Artificial Intelligence and Machine Learning to Cybersecurity*. "Computer", 2019, p. 46
[16] M. Perkins: *Academic integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond*. "Journal of University Teaching and Learning Practice", 2023, p. 2

The evolution of AI in recent years has led to the advent of tools specifically designed to foster the generation of original text. Prominently known as Large Language Models (LLMs), these systems are capable of producing extensive volumes of novel text based on brief input prompts. The significance of LLMs has been increasingly acknowledged since 2017, following the introduction of transformer-based machine learning models, as highlighted by Vaswani et al. (2017).[17] These models have consistently outperformed their predecessors in language-related tasks, showcasing the progressive sophistication of AI/ML technologies and their profound impact across different domains. The implications and applications of LLMs will be further explored in a subsequent section of this thesis.

The exploration of AI has been predominantly centered around machine learning techniques since the 1990s. Machine learning, as defined by Mitchell (1997), is the ability of a computer program to learn from experience E concerning a certain class of tasks T, and performance measure P. This learning is evident when there's an improvement in performing tasks T, evaluated by P, with an increasing experience E. Machine learning, initially distinct, has become integral to AI research, emerging as a dominant paradigm and a subfield of AI, as recognized by Goodfellow, Bengio, and Courville (2016).[18] Nevertheless, comprehending machine learning's role within the realm of AI is crucial, and recognizing the presence of deep learning is imperative — a notion that will be succinctly elucidated in the subsequent table.

Table 1: Essential definitions

| Term | Definition |
|---|---|
| Artificial Intelligence | according to McCarthy, Minsky, Rochester, and Shannon (1955), pertains to the challenge of enabling a machine to exhibit behavior that would be considered intelligent if it were displayed by a human being |
| Machine Learning | as defined by Mitchell (1997), refers to the capability of a computer program to enhance its performance in a specific class of tasks, denoted as T, by learning from experience E. The performance of |

[17] M. Perkins: *Academic integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond*. "Journal of University Teaching and Learning Practice", 2023, p. 3
[18] L. Ma, B. Sun: *Machine learning and AI in marketing – Connecting computing power to human insights*. "International Journal of Research in Marketing", 2020, p. 482

| | |
|---|---|
| | the program, as evaluated by measure P, is expected to improve with the accumulation of experience E |
| Deep Learning | as described by LeCun, Bengio, and Hinton (2015), involves the utilization of representation-learning techniques that encompass multiple levels of representation. These representations are achieved by combining simple yet non-linear modules, each of which transforms the representation at one level into a slightly more abstract representation at a higher level |
| Neural Networks | as defined by Chirag (2022), are computational frameworks that mimic the human nervous system, consisting of an input layer, multiple hidden layers, and an output layer. These networks process information by assigning weights to inputs, integrating biases, and utilizing activation functions to produce outputs[19] |

*Source: Own elaboration based on: L. Ma, B. Sun: Machine learning and AI in marketing – Connecting computing power to human insights. "International Journal of Research in Marketing", 2020, p. 483 and Chirag: Overview of Neural Network. "International Journal of Advanced Research in Science, Communication and Technology", 2022, p. 531*

Machine learning methodologies are multifaceted, extending beyond mere data analysis. They are employed for normative purposes like decision support and automation, predictive tasks to foresee future events, diagnostic aims to understand why events happen, and descriptive functions analyzing past occurrences. This branch of AI, machine learning, empowers computers to gain knowledge autonomously, without explicit programming, but through exposure to data sets. This exposure enables them to make and refine predictions with new data. The interplay between big data and machine learning is crucial; effective data utilization is essential for developing intelligent systems. Machine learning's ability to predict future events hinges on this synergy.[20]

The growing volume of accessible data, enhanced computational speeds, and advancements in algorithms have propelled these systems' capabilities in statistical analysis. This analysis predominantly focuses on the formal structure of texts, often sidelining their underlying meaning. However, the incorporation of machine learning with other technologies like Natural Language Processing (NLP), which will be discussed later, can

[19] Chirag: *Overview of Neural Network*. "International Journal of Advanced Research in Science, Communication and Technology", 2022, p. 531

[20] S. G. Naqvi, et al.: *Cyber-physical Systems and Artificial Intelligence: The Role of Cyber Security, Machine Learning, Threats and benefits to Modern Economies and Industries*. "Pakistan journal of humanities and social sciences", 2023, p. 1513

augment its understanding and analytical capabilities, transcending mere statistical data processing.[21]

Despite these advancements, the ecological ramifications of AI and machine learning represent a burgeoning concern and are garnering increasing attention. Today, numerous corporations, educational institutions, and individuals are leveraging AI algorithms to develop models for specific tasks. Yet, the process of training and implementing these models requires significant electricity, leading to increased demand for power generation. This surge in electricity consumption contributes to higher carbon emissions and environmental pollution. While AI's indirect influence on the environment is becoming more recognized globally, it's a facet that requires deeper acknowledgment and sustainable approaches in AI development.[22]

Furthermore, this topic may be subjected to a more profound philosophical examination, which will be a case in the last chapter. Throughout history, the concept of agency has predominantly been interpreted within the confines of cultural context. Unlike the singular influence exerted by natural phenomena such as sea waves, a distinct form of agency has emerged, characterized by its capacity to generate a multitude of effects without the inherent ability to refine or evolve these influences. Traditionally, society has perceived such an agency as an elemental or even mystical force, maintaining profound interactions with various entities, ranging from animals and perceived spiritual beings—gods, natural forces, angels, demons, souls, ghosts, to spirits embodying good and evil. In contemporary times, the challenge has shifted towards understanding and integrating artificial agents, products of human creation. These entities have assumed the role of demiurges within this agency paradigm, illustrating a decoupling of effective action from the prerequisite of intelligence and comprehension.[23]

The utility of AI extends to addressing challenges presented by voluminous data sets, uncertain environmental conditions, and the inherent limitations of managerial cognition

[21] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 1
[22] X. Wu, R. Duan, J. Ni: *Unveiling Security, Privacy, and Ethical Concerns of ChatGPT*. "Journal of Information and Intelligence", 2023, p. 8
[23] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 5

when responding to external contingencies. In these contexts, AI emerges as a robust solution, navigating complexities with efficiency and precision.[24]

To ensure the functionality and efficacy of artificial intelligence, it is crucial to utilize data sets of impeccable quality, devoid of contaminants. The introduction of regulatory frameworks, exemplified by the General Data Protection Regulation (GDPR), has underscored the importance of not only maintaining pristine and high-caliber data but also adhering to stringent data protection statutes. In response to these imperatives, a multitude of corporations are currently navigating the complexities of data management and comprehension, engaging in an extensive initiative widely recognized as the "big data mission".[25]

Machine learning methodologies have the capacity to process extensive volumes of unstructured data, benefiting from flexible modeling frameworks that enhance predictive precision. However, these methodologies are not devoid of limitations, particularly in the realms of model transparency and interpretability. This duality presents a challenge; while the ability to manage and analyze vast datasets is invaluable, the complexity of such models often leads to a lack of clarity in the decision-making processes they embody.[26]

Despite some viewpoints asserting the non-essential nature of "clean" data, AI, as characterized by Kaplan and Haenlein (2019), presents a sophisticated framework for understanding external data sources, integrating the knowledge gleaned from these sources, and demonstrating a dynamic adaptability. This adaptability is paramount, as it highlights AI's capacity to not only process and learn from structured, high-quality data but also to tackle and interpret information that may extend beyond its original training parameters. The interplay between machine learning's adeptness in managing unstructured data and AI's ability to comprehend and adjust to novel information underpins the foundation of progressive data analysis and deployment.[27]

---

[24] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation.* "The TQM Journal", 2020, p. 809

[25] A. Mari: *The Rise of Machine Learning in Marketing: Goal, Process, and Benefit of AI-Driven Marketing*. 2021, p. 9

[26] L. Ma, B. Sun: *Machine learning and AI in marketing – Connecting computing power to human insights*. "International Journal of Research in Marketing", 2020, p. 481-482

[27] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 26

There is more to say: AI is not just an auxiliary tool; it is pivotal in facilitating strategic decision-making. It possesses the unique capability to generate autonomous strategic decisions, demonstrating remarkable adaptability and functionality even in scenarios characterized by incomplete data.[28]

AI's integration into the four distinct stages of analytical capability progression signifies a transformative shift in organizational processes. This integration amplifies the capacity for comprehensive analysis, elevates the accuracy of diagnostic procedures, and refines the precision of prognostications, thereby ushering in a new era of enhanced organizational efficiency and foresight.[29]

Artificial intelligence and machine learning (AI/ML), as previously noted, have proven to be pivotal in augmenting threat detection mechanisms within organizations. This technological advancement significantly fortifies the expertise of security professionals, thereby enhancing their ability to identify and mitigate potential threats effectively. By drastically reducing the time to respond to threats—from hundreds of hours to mere seconds—these technologies substantially increase the efficiency of analysts, who are now equipped to manage thousands of incidents daily. AI/ML systems, endowed with a comprehensive knowledge base, not only preserve organizational knowledge but also exploit it to automate mundane tasks and streamline the training process, thus optimizing operational workflows.

Tracing the role of AI back to its roots in cybersecurity reveals its foundational impact, particularly in the evolution of pattern-recognition systems that alert analysts to potential security breaches within their networks. These sophisticated tools are engineered to process and address such events instantaneously. However, the ambition of these systems transcends simple reactionary measures. The goal is to emulate the intricate cognitive patterns and analytical strategies of cybersecurity professionals, thereby automating complex operations and enhancing the overall security infrastructure.

To realize substantial advancement in cybersecurity, it's essential to harness AI and ML for automating routine activities, thus enabling analysts to efficiently manage and promptly respond to an increased volume of incidents. Acknowledging the dynamic and

[28] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation.* "The TQM Journal", 2020, p. 805
[29] Ibidem, p. 808

ever-evolving nature of the cybersecurity landscape is crucial. AI systems are required to continuously evolve, integrating the knowledge of analysts' strategies, successes, and failures. This relentless adaptation is imperative for staying ahead of novel tactics and techniques. Initially, AI and ML will enhance and expedite the labor-intensive tasks of threat identification and mitigation. Eventually, they are anticipated to progress toward the complete automation of these pivotal tasks, marking a significant leap in the field of cybersecurity.[30]

The integration of AI into tangible entities, such as robots, enables these machines to embody certain physical characteristics, thus facilitating a more interactive and immersive experience.[31] As AI technology becomes increasingly sophisticated, these robots are poised to assume pivotal roles in the lives of consumers, serving as primary service providers, companions, caretakers, or even alternatives to pets, as indicated by Wirtz et al. (2018). However, the integration of AI in robots is not devoid of challenges. Research, including that conducted by Mende et al. (2019), reveals that human interactions with AI-equipped robots often induce discomfort, resulting in compensatory behaviors - and that's something we will discuss later. Identifying scenarios where AI-augmented robots are perceived negatively by customers, and determining whether these perceptions improve over time, is essential for the broader acceptance and integration of these technologies.[32]

Further advancements in AI enable the creation of sophisticated robotic entities that surpass simple task execution, epitomized e.g. by the AI character Dorian in the television series Almost Human. Dorian is not just a robot, but a multifaceted entity equipped with advanced features such as facial recognition, biometric scanning, non-numeric stimulus analysis including DNA, rapid reading, multilingual proficiency, and the capacity to measure fluid temperatures. This level of sophistication allows for adaptability across diverse contexts, mirroring the capabilities of another AI, Jarvis. Industry experts forecast the advent of such advanced robots, capable of fulfilling a wide array of customer needs, ranging from in-home services and security to medical assistance. These robots are not just

[30] K. M. Bresniker, et al.: *Grand Challenge: Applying Artificial Intelligence and Machine Learning to Cybersecurity*. "Computer", 2019, p. 46
[31] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 29
[32] Ibidem, p. 37

functional; they are designed to form emotional bonds with users, potentially standing in for human or animal companions.[33]

On the practical application spectrum, AI's integration into robots can range from highly advanced systems to more task-specific embodiments. An instance of the latter is the robotic barista, such as the one operational at Tipsy Robot in Las Vegas. This AI application straddles the boundary between virtuality and reality, possessing a physical form yet confined to a narrow operational range and specific tasks, such as beverage preparation. For example, Café X features a robotic barista capable of serving up to 120 cups of coffee per hour, as noted by Hochman (2018). These applications exemplify the versatility of AI integration, demonstrating both its wide-ranging potential and its current real-world utilizations.[34]

Some of the ethical challenges have already been mentioned and will be mentioned later as well, but there are also criticisms worth mentioning right now in this definitional, theoretic chapter. Luis Perez-Breva, a distinguished figure at the MIT School of Engineering, highlights a prevalent misconception in the retail sector regarding the essence of artificial intelligence. He critiques the conflation of mere data analysis with genuine artificial intelligence and customer profiling. Contrary to popular belief, inundating machines with data does not inherently bestow intelligence upon them or any individual. Instead, the true prowess of artificial intelligence lies in its capacity for large-scale correlation, enabling machines to process vast arrays of data, both structured and unstructured. This capability allows for the optimization of decision-making processes, surpassing the limits of human capability in algorithm implementation (Paniagua-Vega, 2019; Ivanaj, 2019). In AI-enhanced systems, the potential for machines to learn and improve autonomously, without external intervention, is evident. However, the deployment of artificial intelligence technology exhibits a marked disparity, particularly in China, where its development is not only uneven but also associated with significant costs. Predominantly, enterprises in developed regions have harnessed artificial intelligence

[33] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 34
[34] Ibidem, p. 33

technology, indicating that its universal application is still an aspiration rather than a reality, warranting serious consideration and strategic planning across diverse regions.[35]

Machine learning methodologies have often been critiqued for their lack of transparent interpretability, particularly in terms of causal relationships. This opacity is further compounded by the technologies' unverified ability to accurately capture and respond to the nuances and dynamic nature of individual consumer behavior.[36]

The integration of AI into academic research introduces a set of ethical considerations, given its proficiency in performing a wide array of scholarly functions. AI's capabilities encompass the generation of textual content, conducting detailed literature reviews, and formulating insightful questions for discussion. Furthermore, AI is adept at:

1. Drafting text in diverse formats,
2. Undertaking comprehensive literature searches,
3. Generating thought-provoking discussion questions,
4. Composing introductory and concluding sections,
5. Selecting fitting titles for the generated text,
6. Identifying relevant keywords,
7. Summarizing content succinctly, and
8. Compiling reference lists in the desired format.

By executing specific commands within ChatGPT, one can:

1. Produce an article characterized by a low similarity index, and
2. Convert the article into various expressions by integrating additional commands.[37]

However, it's critical to recognize that AI is not a panacea, particularly as organizations increasingly pivot towards AI-driven operations. The distinctiveness and depth of human insight might continue to provide a substantial competitive advantage.[38] It is advocated that AI's most effective role is to augment, rather than supplant, human capabilities. This approach ensures that AI contributes to efficiency and innovation in various tasks, while the

[35] X. Yang, et al.: *Application of Artificial Intelligence in Precision Marketing*. "Journal of Organizational and End User Computing", 2021, p. 214
[36] L. Ma, B. Sun: *Machine learning and AI in marketing – Connecting computing power to human insights*. "International Journal of Research in Marketing", 2020, p. 482
[37] G. Baloğlu, K. Çakali: *Is Artificial Intelligence a New Threat to the Academic Ethics?: Enron Scandal Revisited By ChatGPT*. "İşletme", 2023, p. 143
[38] A. Mari: *The Rise of Machine Learning in Marketing: Goal, Process, and Benefit of AI-Driven Marketing*. 2021, p. 13

essential functions of oversight and decision-making remain the domain of human expertise, maintaining a harmonious balance that capitalizes on the strengths of both AI and human intervention.[39]

In conclusion, a thorough exploration uncovers the progression and varied nature of Artificial Intelligence (AI) and Machine Learning (ML), which have experienced a significant evolution over time. The origins of AI can be traced back to the research conducted in the 1950s, and it encompasses a wide range of algorithms, systems, and machines that exhibit intelligence in various forms. This interdisciplinary field combines principles from computer science and linguistics, aiming to replicate the cognitive abilities of humans, including learning, adaptation, and the execution of complex tasks.

The defining characteristic of AI lies in its capacity to interpret vast amounts of data, assimilate knowledge from it, and subsequently apply the insights gained to achieve specific objectives. This dynamism and evolutionary nature of AI make it a powerful tool with broad practical applications across multiple domains, including scientific research. However, it is crucial to acknowledge the challenges associated with integrating AI into societal and economic structures, with particular emphasis on the necessity of transparency in the decision-making processes of AI systems.

The progression of AI has led to the emergence of sophisticated online interactions, exemplified by the development of chatbots equipped with conversational intelligence. These advancements play a pivotal role in the era of Industry 4.0, reshaping industries and establishing new benchmarks for operational standards. Nevertheless, there exist challenges that impede the seamless incorporation of AI into corporate digitalization strategies, which must be addressed in order to fully harness the transformative potential of AI.

ML, a fundamental component of AI, encompasses a diverse array of models and algorithms that enable computers to learn from data without explicit programming. Its significance in the realm of cybersecurity cannot be overstated, as ML techniques greatly enhance threat detection capabilities and automate various tasks, thus revolutionizing response times and overall efficiency.

[39] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 39

This comprehensive overview provides an in-depth examination of AI and ML, covering their historical evolution, theoretical foundations, practical applications, and persisting challenges in integrating these technologies across various sectors of life and industry. The profound impact of AI and ML on digital transformation and the contemporary societal and industrial landscape cannot be understated, highlighting the need for continued exploration and refinement of these technologies.

## 1.2 Definition and evolution of Large Language Models

The unveiling of ChatGPT by OpenAI in December 2022 marked a significant advancement in the realm of AI, as it introduced a dynamic conversational interface that was globally recognized for its powerful contextual learning and generative capabilities. This innovation stood on the shoulders of its predecessors, such as GPT and BERT, which demonstrated commendable performance in a variety of natural language processing (NLP) tasks. However, these earlier models required meticulously processed inputs, a limitation that ChatGPT addressed through its enhanced interactive capabilities. ChatGPT's proficiency is evident in its ability to handle a broad spectrum of tasks, e.g. legal inquiries, compose code segments with detailed annotations, summarize texts, and provide in-depth explanations of complex concepts. The model's strength lies in generating responses that are extensive, coherent, and aligned with human knowledge, signifying a leap forward in the evolution of AI interfaces.[40] It is feasible to engage in the process commonly referred to as "fine-tuning" and construct bespoke models, akin to those delineated in the literature, for instance, the inquiry presented in "Better Call GPT" – a comparative analysis of LLMs and legal practitioners in the context of scrutinizing legal contracts, with a particular emphasis on evaluating their efficacy, rapidity, and economic viability, especially considering our prior discourse centered around legal consultations.[41]

Presently, AI is broadly delineated into two distinct types: weak AI and strong AI. Weak AI (alternatively called ANI), as defined by Russell and Norvig (2016), simulates intellectual processes, mimicking intelligence through its capacity to analyze extensive data

[40] X. Wu, R. Duan, J. Ni: *Unveiling Security, Privacy, and Ethical Concerns of ChatGPT*. "Journal of Information and Intelligence", 2023, p. 1
[41] L. Martin, et al.: *Better Call GPT, Comparing Large Language Models Against Lawyers*. 2024, p. 1

sets, as Jarrahi (2018) notes. Such AI systems, including Machine Learning (Brynjolfsson and McAfee, 2014) and Natural Language Processing (Jarrahi, 2018), are integrated into daily life, automating decision-making where rationality is paramount and offering predictive insights, as illustrated by IBM's Watson. In contrast, strong AI (also called AGI and/or ASI, what will be explained in next page), which would entail machines attaining consciousness and genuine cognitive abilities (Russell and Norvig, 2016), remains a theoretical concept for now, unattained in practical applications (Paschen et al., 2019).[42]

The prowess of AI systems like ChatGPT is rooted in the properties of electromagnetism, enabling the processing of text with outcomes often indistinguishable from human-generated content. These LLMs have attracted considerable attention, yet it is crucial to recognize their limitations. As noted by Bishop (2021), these models do not possess the ability to think, reason, or comprehend in the manner of science-fiction AI or cognitive processes observed in the human brain and mind.[43] For now. Presently, the discourse surrounding advanced computational intelligence is dominated by the emergence of concepts such as Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI), as depicted in Figure 1.

Figure 1: Difference between current Artificial Intelligence (AI), Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI)


*Source: Own elaboration based on: "What is artificial general intelligence (AGI)?" by H. Guinness, https://zapier.com/blog/artificial-general-intelligence/ (access on February 6, 2024)*

AGI, otherwise known as Artificial General Intelligence, is characterized by its human-like cognitive abilities and its capacity to perform a diverse range of tasks without

[42] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation*. "The TQM Journal", 2020, p. 798
[43] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 1

the need for specific instruction. The existing form of AI, more commonly referred to, albeit rarely, as Artificial Narrow Intelligence (ANI), demonstrates proficiency in executing tasks that it has been specifically trained for, but it reveals a notable deficiency when confronted with activities that fall outside its programmed domain. In stark contrast, the emergence of Artificial General Intelligence (AGI) signifies a fundamental shift, granting systems the ability to transcend this limitation. Such systems possess not only the capability to master a particular skill set, such as navigating a specific computer game, but also the aptitude to transfer and apply the acquired competencies to different contexts. This is exemplified by their ability to excel in an entirely distinct computer game, effectively utilizing and recalling the skills acquired from previous experiences. This development heralds the rise of a more advanced level of intelligence, known as Artificial Super Intelligence (ASI). ASI is characterized by its capabilities that surpass human intelligence, representing a significant leap beyond current AI technologies.[44]

Going back to LLMs, their strength lies in their capacity to perform statistical operations on formal structures, focusing on the form rather than the meaning of texts. This approach to semantics, still being explored by neuroscience, has seen significant strides owing to the exponential growth in data, computational power, and algorithmic advancements, marking a distinctive phase in the evolution of AI.[45]

The evolution of AI, particularly the development of models like ChatGPT, has been guided by a deep exploration of their theoretical foundations. This involves the formulation of mathematical and computational models aimed at emulating human language acquisition and generation. Over recent years, the landscape of expansive language models has broadened to include not only BERT and XLNet but also ChatGPT and BLOOM. These models, built on the transformer architecture, demonstrate a profound capability to undertake a wide array of natural language processing tasks. This proficiency is achieved through a systematic process of pre-training and fine-tuning, ensuring that the models can

[44] H. Guinness: *What is artificial general intelligence (AGI)?* https://zapier.com/blog/artificial-general-intelligence/ (access 6.02.2024)
[45] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 1

effectively engage in the nuanced and multifaceted tasks of language processing, a testament to the continual evolution of AI in mimicking human cognitive abilities.[46]

LLMs, including GPT-3.5 and GPT-4, which underpin ChatGPT, stand at the vanguard of the paradigmatic transformation in natural language processing. These models are characterized by their adeptness in generalizing proficiently across both zero-shot and few-shot contexts (Table 2). This transformative phase is characterized by the pre-training of these models on extensive text corpora, which are then refined by aligning the models with human instructions. This methodological approach has demonstrated the exceptional abilities of LLMs in language comprehension, generation, interaction, and logical reasoning, as elucidated by Ouyang et al. in 2022.[47]

Table 2: Few Shot Learning vs. Zero Shot Learning - simplified approach

| Few Shot | Zero Shot |
|---|---|
| few-shot learning is like teaching someone to identify birds using only a few pictures | zero-shot learning is like asking someone to find a bird they've never seen before, just by describing its features |

*Source: Own elaboration based on: "Few-shot and Zero-shot Learning: From Meta-learning to Semantic Embeddings" by L. Foster, https://medium.com/@lfoster49203/few-shot-and-zero-shot-learning-from-meta-learning-to-semantic-embeddings-ae12dc450025 (access on February 6, 2024)*

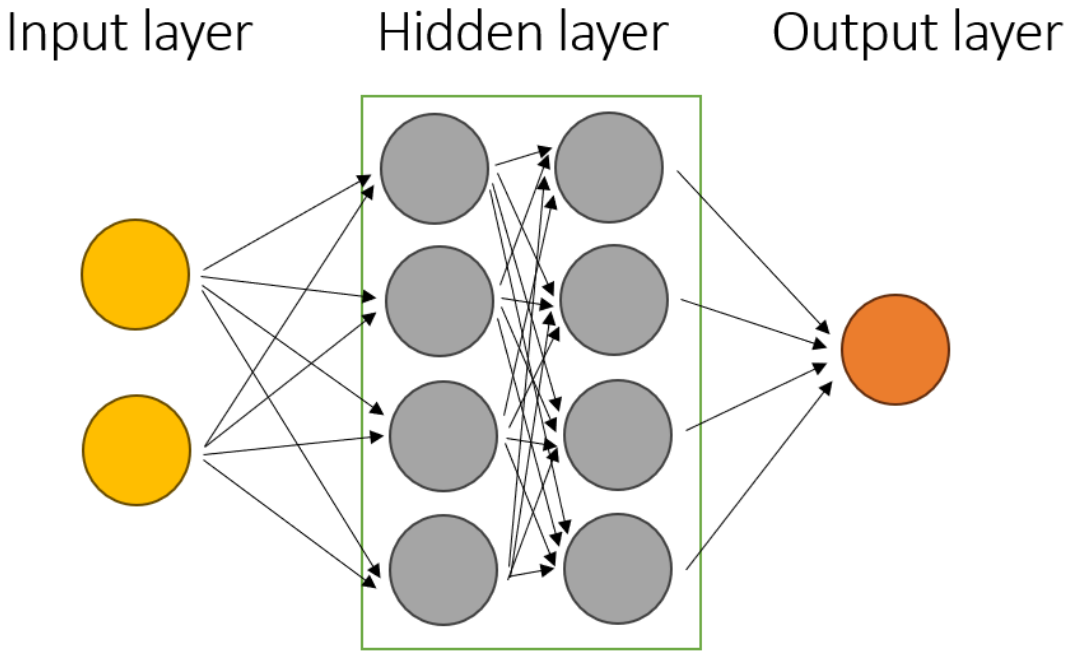
Few-shot learning (FSL) involves teaching a model to make accurate predictions by training it on a very small dataset. It's akin to learning a complex concept with only a handful of examples. In contrast, zero-shot learning (ZSL) is akin to understanding a concept without direct examples, instead relying on the model's ability to infer and generalize from related knowledge.[48]

Elsewhere, Raihan Saputra et al. write that OpenAI's 2023 revelations further illustrate the capabilities of ChatGPT, which is an expansive language model powered by artificial intelligence. Launched in November 2022, ChatGPT is a chatbot designed by OpenAI

[46] A. Bahrini, et al.: *ChatGPT: Applications, Opportunities, and Threats*. "Systems and Information Engineering Design Symposium", 2023, p. 2
[47] W. Sun, et al.: *Is ChatGPT Good at Search? Investigating Large Language Models as Re-Ranking Agent*. "Conference on Empirical Methods in Natural Language Processing", 2023, p. 1
[48] L. Foster: *Few-shot and Zero-shot Learning: From Meta-learning to Semantic Embeddings.* https://medium.com/@lfoster49203/few-shot-and-zero-shot-learning-from-meta-learning-to-semantic-embeddings-ae12dc450025 (access 6.02.2024)

(OpenAI, L.L.C., San Francisco, CA, USA) to interact through a text-based interface, understanding and responding to inputs. Built on the generative pre-trained transformer (GPT) architecture, this model processes natural language via neural networks (Figure 2). As described by Brown et al. in 2020, the GPT framework tailors responses based on the contextual nuances of the text inputs, demonstrating a human-like proficiency in generating text.[49]

Figure 2: Simplified neural network architecture of ChatGPT




*Source: Own elaboration based on: "Artificial intelligence" by D. Schipper, https://www.sciencelearn.org.nz/resources/3224-artificial-intelligence (access on February 6, 2024)*

In the context of ChatGPT, the aforementioned neural network diagram epitomizes the underlying framework that facilitates the chatbot's comprehension and generation of text that resembles that of human-like nature:

1. The initial layer, denoted as the Input Layer, serves as the interface through which ChatGPT acquires and assimilates user input. Each constituent within this layer represents a distinct component of the input data, encompassing individual words or phrases extracted from the user's message.

[49] R. Saputra, M. I. P. Nasution, B. Dharma: *The Impact of Using AI Chat GPT on Marketing Effectiveness: A Case Study on Instagram Marketing*. "Indonesian Journal of Economics and Management", 2023, p. 603

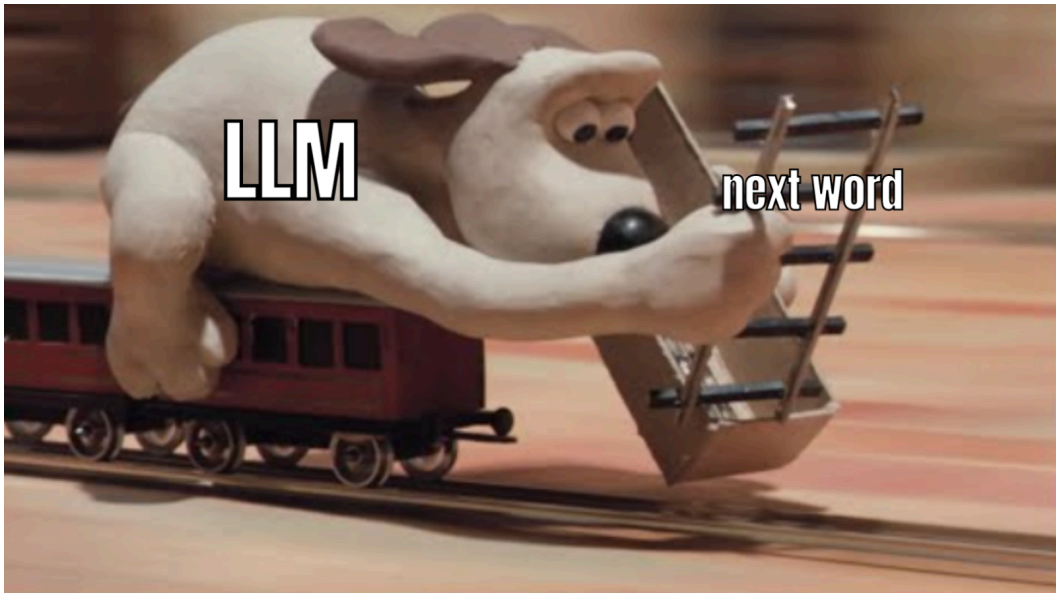
2. The subsequent stratum, referred to as the Hidden Layer (also called Black Box), constitutes the crux of ChatGPT's computational prowess, wherein intricate operations are executed to discern contextual nuances and semantic significance. This layer is pivotal to the model's capacity to generate well-structured and pertinent responses.
3. Lastly, the Output Layer serves as the culmination of ChatGPT's computational processes, wherein the outcomes of its analysis are rendered in the form of a textual response that is subsequently transmitted back to the user.

The surge in interest in transformer networks during the latter part of 2022 and early 2023 underscores the significance of these neural network variants. Trained on a vast array of textual data, including literature, articles, and web pages, these models predict the next word in a sentence by analyzing the context of preceding words, a process detailed by Vaswani et al. in 2017. The incorporation of an attention mechanism allows the model to focus on particular aspects of the input, enhancing its contextual understanding. Post-training, these models undergo fine-tuning with task-specific datasets, enabling them to adapt to the unique requirements and textual patterns of tasks such as language translation or text summarization. Consequently, models like GPT-3 and similar variants excel in various language-based tasks, including question answering, text completion, and sentiment analysis, by generating coherent and contextually appropriate responses from a given prompt or initial text.[50]

LLMs, which solely anticipate the subsequent word in a sentence, often elicit jests among Internet users within the AI realm, manifesting humorously the performance of LLMs, as evidenced in the illustration below (Figure 3).

[50] B. Burger, et al.: *On the use of AI-based tools like ChatGPT to support management research*. "European Journal of Innovation Management", 2023, p. 234

Figure 3: Just-in-Time prediction in LLMs




*Source: Internet meme, author unknown*

The meme illustrated in Figure 3 utilizes the character Gromit from "Shaun the Sheep" to metaphorically exemplify the operational principle of LLMs. In this context, Gromit amusingly assumes the role of laying down tracks on the path of an approaching train he's sitting on, thereby symbolizing the manner in which LLMs anticipate each subsequent word in a sentence precisely when it is required. This portrayal functions as an easily comprehensible visual analogy for the forward-looking and sequential nature of language generation in LLMs, ultimately resonating with the AI community due to its straightforwardness and cleverness.

At this point, it is necessary to look at what "transformer networks" mentioned earlier means. Transformer networks, conceptualized by Vaswani et al. in 2017, represent a neural network architecture that leverages self-attention mechanisms. These mechanisms are instrumental in processing sequential data, a critical component in natural language processing tasks. By focusing selectively on different parts of the input data, transformer networks exhibit a remarkable proficiency in understanding and generating language, thus playing a pivotal role in the advancements of natural language processing methodologies.[51]

[51] B. Burger, et al.: *On the use of AI-based tools like ChatGPT to support management research*. "European Journal of Innovation Management", 2023, p. 238

The exponential growth in data availability, computational speed, and algorithmic sophistication has empowered LLMs to master statistical operations focusing on the structural aspects of texts. This contrasts starkly with human semantic processing, a complex area that continues to be probed by the frontiers of neuroscience. While humans delve into the deeper meanings and nuances of language, LLMs operate primarily on the syntactical structure, revealing a distinct yet complementary approach to understanding and generating language.[52]

LLMs exhibit an extraordinary command over vast expanses of knowledge, courtesy of their training on comprehensive web-derived datasets. This training endows them with a breadth of information that often surpasses the knowledge scope of an average individual, enabling them to display a seemingly authoritative stance. The profound capabilities of these models hold significant potential for enhancing the effectiveness of simulations, thereby extending the boundaries of what can be achieved through AI.[53]

In the realm of general-purpose language models, a common architecture prevails in the form of stacked recurrent Transformers, each comprising millions of parameters capable of learning and adapting. Prior to deployment in practical scenarios, these models undergo rigorous pretraining on extensive corpora, such as the English Wikipedia. This process equips them with a foundational understanding of language, setting the stage for further fine-tuning and application across a spectrum of language-based tasks.[54]

LLMs have consistently proven their versatility and efficacy across a spectrum of applications. Their evolution and the breadth of their capabilities mark a significant advancement in technology, particularly in the realm of natural language processing (NLP) and beyond[55]:

1. LLMs, notably, have evolved to exhibit human-like proficiency in a range of NLP tasks. This evolution is pivotal, positioning LLMs as integral components in the development of personalized technologies. Their ability to process and understand language at a nuanced level underlines their significance in this domain.

[52] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 1
[53] L. Wang, et al.: *A Survey on Large Language Model based Autonomous Agents*. "arXiv.org", 2023, p. 25
[54] X. Pan, et al.: *Privacy Risks of General-Purpose Language Models*. "IEEE Symposium on Security and Privacy", 2020, p. 1316
[55] S. Wu, et al.: *BloombergGPT: A Large Language Model for Finance*. "arXiv.org", 2023, p. 1

2. The transformative impact of LLMs, particularly those based on transformer neural networks, is evident in text analysis both within academic circles and practical implementations. Leading models such as OpenAI's GPT-4 and Anthropic's Claude demonstrate a profound capacity to comprehend, represent, and generate text with a remarkable resemblance to human language. These LLMs have not only excelled in traditional tasks but have also shown an unprecedented ability to generalize their learned "knowledge" across new and diverse contexts, scenarios, and tasks, thereby setting a new benchmark in NLP.
3. Intriguingly, despite not being explicitly designed to mimic human cognitive and psychological processes, LLMs have, through extensive training on large datasets of human-generated text, exhibited emergent properties akin to human cognition. This includes capabilities like understanding the mental states of others (theory of mind), exhibiting cognitive biases in decision-making, and engaging in semantic priming. Moreover, these models have shown proficiency in generating persuasive content, effectively tailored to specific psychological traits such as personality characteristics and moral values.[56]
4. The research conducted in this realm has brought to light fascinating findings, particularly the ability of LLMs like models under ChatGPT to infer psychological dispositions from individuals' social media content. Remarkably, this level of inference is achieved without the models being explicitly trained for such analysis, underscoring the adaptability and potential depth of understanding that LLMs can attain.[57]
5. Furthermore, the scope of LLMs' expertise extends into the realm of code intelligence. Models that have been extensively pretrained on vast collections of source code have shown significant advancements, enriching the field of code intelligence. This demonstrates the broad applicability of LLMs, not just in understanding and generating human language, but also in interpreting and working with programming languages.[58]

---

[56] H. Peters, S. C. Matz: *Large Language Models Can Infer Psychological Dispositions of Social Media Users*. "arXiv.org", 2023, p. 1
[57] Ibidem, p. 5
[58] Y. Wang, et al.: *CodeT5+: Open Code Large Language Models for Code Understanding and Generation*. "Conference on Empirical Methods in Natural Language Processing", 2023, p. 1

6. LLMs, such as OpenAI's ChatGPT-4 Turbo, have profoundly influenced various sectors, including higher education.[59]

In the realm of Language Model Models (LLMs), there exists a range of competing models, comprising both proprietary and open-source initiatives. Among these contenders, the GPT-4 variations persist as the foremost model in terms of performance. Recent attention has also been directed towards Mistral, which has garnered significant interest due to its innovative characteristics. It is imperative to acknowledge that this discussion will be limited to the top ten proprietary contenders as outlined by the LMSYS Chatbot Arena Leaderboard, as of 9 February 2024.[60] This selection emphasizes the ever-changing nature of the field, with numerous models vying for supremacy.

Table 3: The first 10 leading models according to LMSYS Chatbot Arena Leaderboard

| Rank | Model | Arena Elo | Organization | License | Knowledge Cutoff |
|---|---|---|---|---|---|
| 1 | Updated GPT-4 Turbo (GPT-4-0125-preview) | 1253 | OpenAI | Proprietary | 2023/4 |
| 2 | GPT-4 Turbo (GPT-4-1106-preview) | 1252 | OpenAI | Proprietary | 2023/4 |
| 3 | Bard (Gemini Pro) | 1224 | Google | Proprietary | Online |
| 4 | GPT-4-0314 | 1190 | OpenAI | Proprietary | 2021/9 |
| 5 | GPT-4-0613 | 1162 | OpenAI | Proprietary | 2021/9 |
| 6 | Mistral Medium | 1150 | Mistral | Proprietary | Unknown |
| 7 | Claude-1 | 1149 | Anthropic | Proprietary | Unknown |
| 8 | Claude-2.0 | 1132 | Anthropic | Proprietary | Unknown |

[59] E. C. Garrido-Merchán, et al.: *Real Customization or Just Marketing: Are Customized Versions of Chat GPT Useful?* "arXiv.org", 2023, p. 1
[60] L. Zheng, et al.: *LMSYS Chatbot Arena Leaderboard*. https://huggingface.co/spaces/lmsys/chatbot-arena-leaderboard (access 9.02.2024)

| | | | | | |
|---|---|---|---|---|---|
| 9 | Gemini Pro (Dev API) | 1120 | Google | Proprietary | 2023/4 |
| 10 | Claude-2.1 | 1119 | Anthropic | Proprietary | Unknown |

*Source: Own elaboration based on: "LMSYS Chatbot Arena Leaderboard" by L. Zheng, et al., https://huggingface.co/spaces/lmsys/chatbot-arena-leaderboard (access and update as of February 9, 2024)*

The aforementioned leaderboard originates from the LMSYS Chatbot Arena, which serves as an innovative platform for assessing LLMs based on human preferences. Through the utilization of over 200,000 human votes, this platform employs the Elo rating system, a conventional approach utilized in the realm of chess, to rank LLMs according to their skill levels. The Elo score within the Arena serves as a comparative metric, reflecting the collective evaluation of participants who engage in anonymous and randomized Q&A sessions with the various models. The leaderboard effectively demonstrates the competitive advantage of diverse proprietary LLMs, with OpenAI's GPT-4 variants asserting their dominance by securing the highest positions. This prominence underscores their exceptional conversational capabilities, as rated by humans, as of the most recent update in April 2023. Consequently, this ranking offers valuable insights into the current landscape of LLMs and their perceived efficacy in interacting with human users.

LLMs, such as the latest iteration, GPT-4 Turbo, the flagship GPT-4 or the most default GPT 3.5 in ChatGPT, are recognized for their sophisticated text generation capabilities that closely resemble human language and their proficiency in handling multiple tasks with exceptional effectiveness (Garrido-Merchán et al., 2023; Peng, 2023). OpenAI's GPT-4 Turbo, a recent advancement in this domain, is distinguished by its refined capabilities and efficiency, especially when compared to its predecessor, GPT-3 (Peng et al., 2023).[61]

The architecture of GPT-4 Turbo retains the foundational transformer structure while integrating several optimizations aimed at enhancing speed and overall performance. This model is specifically engineered to manage complex queries with remarkable precision and rapidity, making it particularly suitable for real-time applications. The core of GPT-4 Turbo's ability to comprehend and generate human-like text lies in its advanced training

[61] E. C. Garrido-Merchán, et al.: *Real Customization or Just Marketing: Are Customized Versions of Chat GPT Useful?* "arXiv.org", 2023, p. 2

algorithms and a comprehensive collection of linguistic and factual data. This repository spans a broad spectrum of human knowledge and the intricacies of language (OpenAI, 2023). A pivotal aspect of GPT-4 Turbo's development and its exceptional performance is the application of Reinforcement Learning from Human Feedback (RLHF) (Christiano et al., 2017). This training approach involves refining the model based on feedback from human trainers. Initially, the model generates responses based on its pretraining, which are then evaluated by humans who provide ratings or improved versions of the responses. The model is subsequently retrained to prioritize responses that align with human preferences. This iterative process ensures that the model's outputs are not only accurate but also contextually appropriate, solidifying GPT-4 Turbo's standing as the most advanced model to date.[62]

LLMs have been increasingly recognized for their diverse applications, extending beyond conventional writing tasks to include the facilitation of learning and creative expression. These models are instrumental in enhancing writing and composition courses for students, providing innovative outputs, and offering insights into the integration of these technologies by academic faculty. Particularly noteworthy is their role in supporting English as a Foreign Language (EFL) learners and improving Automated Writing Evaluation (AWE), demonstrating their multifaceted utility in educational contexts.

The capabilities of LLMs extend to artistic domains, evidencing their versatility. Notably, research has shown their proficiency in generating poetry (Gunser et al., 2021; Köbis & Mossink, 2021) and computer programming codes (Biderman & Raff, 2022). Furthermore, advancements by organizations like OpenAI, exemplified by the development of the Dall·E 2 and 3 AI systems, have illustrated the potential of these models to create and modify complex digital artwork. This is achieved through the interpretation of natural language prompts provided by users, marking a significant leap in the field of creative artificial intelligence.[63]

However, the employment of LLMs necessitates stringent measures to ensure the integrity and appropriateness of the input and output. This includes rigorous validation and

[62] E. C. Garrido-Merchán, et al.: *Real Customization or Just Marketing: Are Customized Versions of Chat GPT Useful?* "arXiv.org", 2023, p. 4
[63] M. Perkins: *Academic integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond.* "Journal of University Teaching and Learning Practice", 2023, p. 10

purification of user-provided cues, alongside context-aware filtration and encoding of output. Such measures are essential to prevent the potential manipulation of cues, ensuring that the interaction with these models remains constructive and aligned with ethical standards.[64]

Ethical and legal considerations are paramount in the deployment of LLMs, encompassing issues related to copyright, data source reproduction rights, and the implications of AI training methodologies. Recent legal proceedings and cases of plagiarism underscore these concerns. Moreover, the human aspect, such as the utilization of underpaid contractors for content annotation, necessitates critical examination. These individuals, often working in challenging conditions for meager wages, face significant mental health risks. The broader implications for educators, who must adapt curricula in response to AI integration, and the potential risks associated with medical diagnostics, highlight the need for a comprehensive approach to AI implementation. This approach must address not only the technical aspects but also the human, financial, and environmental costs associated with these systems (Cowls et al., 2021).[65]

Furthermore, the privacy risks associated with general-purpose language models are a growing concern. The ability of these models to capture sensitive information from plain text and the potential for this information to be reverse-engineered by adversaries poses a significant threat. This vulnerability could lead to the exposure of sensitive data and subsequent harassment of individuals. Despite the recognition of this privacy risk, there is a notable gap in published attacks and systematic evaluations, particularly concerning mainstream industry-level language models. This lack of comprehensive scrutiny underscores the urgency for increased attention to the security dimensions of NLP tools, to safeguard their future utilization and the privacy of individuals they may impact.[66]

In summary, the incorporation of AI in the fields of marketing and sales, particularly through the utilization of LLMs, signifies a groundbreaking shift in the way businesses comprehend and interact with their consumers. LLMs, exemplified by advancements like

[64] X. Wu, R. Duan, J. Ni: *Unveiling Security, Privacy, and Ethical Concerns of ChatGPT*. "Journal of Information and Intelligence", 2023, p. 11
[65] L. Floridi: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. "Philosophy & Technology", 2023, p. 4
[66] X. Pan, et al.: *Privacy Risks of General-Purpose Language Models*. "IEEE Symposium on Security and Privacy", 2020, p. 1314

ChatGPT, have surpassed conventional boundaries of digital communication by offering unparalleled capabilities in generating text that closely resembles human language. This advancement not only represents a leap in technological sophistication but also a transformative approach to customer engagement, data analysis, and personalized marketing strategies.

The progression of AI from its early stages to its current prominence in marketing and sales highlights a shift towards data-driven decision-making and automated customer service solutions. The emergence of LLMs has further refined this landscape, allowing businesses to leverage AI to produce insightful and contextually relevant content that resonates with customers on an individual level. This technological leap has facilitated a deeper understanding of customer preferences, behaviors, and trends, enabling more targeted, efficient, and effective marketing strategies.

Furthermore, the evolution of AI and LLMs reflects a broader trend of digital transformation in various industries, where the integration of cutting-edge technologies is reshaping established practices. In the realm of marketing and sales, this translates into enhanced customer experiences, optimized operational efficiencies, and the creation of value through innovative means. The impact of AI, particularly through the utilization of LLMs, extends beyond mere operational enhancements to fundamentally reshape the strategic landscape of marketing and sales, providing new avenues for growth and competitive advantage.

The development and integration of Large Language Models within the domain of AI have had a profound influence on the marketing and sales sectors. By harnessing the generative and analytical capabilities of these models, businesses can establish a deeper and more nuanced connection with their target audience, resulting in enhanced customer satisfaction and loyalty. As AI continues to evolve, its role in shaping the future of marketing and sales remains pivotal, promising further advancements in personalized marketing, customer interaction, and business intelligence.

# CHAPTER II

# Integration of AI in digital transformation

## 2.1 Usage of AI in marketing and sales

AI's disruptive influence is palpable across diverse industries, revolutionizing the way businesses operate and interact with their customers. Within the marketing domain, AI is redefining strategies, enhancing customer experiences, and driving business growth. The rapid advancements in AI technologies are opening new frontiers for marketers, offering them unprecedented opportunities to gain a competitive edge in the marketplace.[67]

Kaplan and Haenlein (2019) highlight AI's systematic proficiency in data processing and interpretation, adapting and learning to fulfill specific objectives. This adaptability enables the transformation of voluminous data into actionable intelligence, thereby informing and refining marketing and sales strategies (Paschen et al., 2019).[68]

Delving into the mechanics behind AI systems, one finds that they are fundamentally powered by ML, as it was already been told. Today's information systems boast formidable technological prowess, capable of executing complex statistical-mathematical computations with ease. This computational might have spurred a proliferation of software development initiatives integrating ML principles, resulting in an increasing array of intelligent analytical systems. These systems not only promise significant cost reductions for businesses over time but also enhance the quality of life for consumers. Particularly within the realm of marketing, ML demonstrates immense potential, offering innovative solutions for decision-making, customer engagement, and strategic management. Through the implementation of neural networks, intricate problems requiring thoughtful deliberation, whether human or artificial in nature, are adeptly addressed.[69]

AI's prowess extends to autonomously identifying, condensing, and extracting vital information, marking a pivotal initial phase in strategizing marketing decisions. This

[67] S. Noranee, A. K. B. Othman: *Understanding Consumer Sentiments: Exploring the Role of Artificial Intelligence in Marketing*. "JMM17: Jurnal Ilmu Ekonomi dan Manajemen", 2023, p. 15
[68] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation*. "The TQM Journal", 2020, p. 796
[69] A. Miklošík, et al.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing*. "IEEE Access", 2019, p. 85706

autonomous operation of AI delineates the beginning of a strategic journey in decision-making realms, particularly within the marketing sector.[70]

This strategic capacity is further augmented by AI's role in data collection and analysis. Experts have employed AI to methodically discern patterns and signals, often imperceptible to humans, thus providing strategic marketing managers with invaluable insights for decision formulation. Here, AI transcends its role as a mere tool, acting as an autonomous entity capable of making independent strategic resolutions.[71]

In the realm of analytics, ML stands out by deriving insights from historical data, thereby enhancing the efficacy of future initiatives. ML's adaptive mechanisms empower computers to learn from experiences and examples, effectively equipping marketing professionals with crucial information necessary for informed decision-making.[72]

AI's role encompasses the meticulous processing of diverse information sets, presenting substantial evidence as a predictive tool. Through scenario analysis, AI uncovers heuristic values and dimensions, often elusive to human perception, thereby enriching the landscape of strategic decision-making and interaction.[73]

Its role in strategic decision-making is increasingly recognized by experts who view it as an indispensable ally for managers.[74] By employing innovative methodologies, AI meticulously explores and scrutinizes data, thereby enhancing the quality and effectiveness of strategic decisions.

On an operational level, AI's tactical applications are multifaceted, ranging from data analysis to customer engagement through chatbots. Its capability extends to making immediate, non-strategic autonomous decisions, such as short-term investment choices, illustrating its versatility and utility in various domains.[75]

The transformation of substantial data into valuable inputs is a significant feat of AI, particularly in crafting efficacious marketing and sales strategies. This transformation is evidenced by the development and empirical validation of a hybrid intelligent system

[70] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation*. "The TQM Journal", 2020, p. 806
[71] Ibidem, p. 804
[72] A. Miklošík, et al.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing*. "IEEE Access", 2019, p. 85707
[73] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation*. "The TQM Journal", 2020, p. 805
[74] Ibidem, p. 807
[75] Ibidem, p. 805

designed for devising marketing strategies (Li, 2000), underscoring the practical applications of AI in this field.[76]

In terms of crafting marketing strategies, AI's role is not confined to a singular dimension; it can either augment, substitute, or complement human decision-making processes (Jarrahi, 2018). This multifaceted potential signifies the symbiotic relationship that can exist between managers and AI systems, reinforcing the collaborative model proposed by Jarrahi (2018).[77]

The depiction of the different primary marketing segments of AI initiatives can be observed in Figure 4. The targeting of AI-based systems in marketing scenarios has relied heavily on pricing, strategy and planning, product management, promotion, and place management. Additionally, targeting and positioning, situations, and thinking models have been identified as key factors in product design and meeting the needs of end-customers, highlighting their significance in marketing for AI applications.[78]

Figure 4: Multiple Sectors for Artificial Intelligence Utilization in the Marketing Field


*Source: Own elaboration based on: Abid Haleem, et al.: Artificial intelligence (AI) applications for marketing: A literature-based study. "International Journal of Intelligent Networks", 2022, p. 121*

[76] T. Eriksson, A. Bigi, M. Bonera: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation*. "The TQM Journal", 2020, p. 796
[77] Ibidem, p. 809
[78] A. Haleem, et al.: *Artificial intelligence (AI) applications for marketing: A literature-based study*. "International Journal of Intelligent Networks", 2022, p. 121

In an examination centered around the fusion of technology and marketing strategies, the discourse commenced with a focus on marketing analytics and tools, specifically delving into AI and ML. Participants, when queried about their conception of AI, presented a spectrum of interpretations, each reflecting a unique viewpoint but lacking academic precision. The descriptions attributed to AI were diverse, signifying a foundational understanding but also unveiling an element of ambiguity:

- AI was depicted as "a cogitating machine equipped with a processor".
- It was described as "programmed by humans, adhering to rules".
- Some viewed it as "a superior entity; a 'Mercedes' among ML, possessing the ability to self-educate".
- Other believes AI to be "capable of independently resolving problems".

It was also defined as "an algorithm that makes decisions based on extensive, indirect inputs, akin to intelligence".

While the discourse on AI painted a picture of varied understanding and perception, the conversation surrounding ML unearthed more nuanced insights. Participants recognized ML as an integral part of the AI ecosystem, highlighting its dynamic and evolving nature:

- ML was understood as a system that "evolves and acquires knowledge".
- It was seen as a mechanism that "enhances actions based on previous data; a prerequisite for AI's acquisition of knowledge".
- The capability of ML to "automate manual tasks through uncomplicated systems" was noted.
- It was acknowledged as "a process that improves over time, generating superior outcomes".
- Participant described ML as "predictable, responding to direct inputs but refined by extensive data and simulations".

Despite the insightful delineations, a discernible confusion between AI and ML was evident, with participants recognizing ML as a pivotal, data-driven component of AI but struggling to distinctly separate the two concepts. This indicated a necessity for further

elucidation and more time to coherently express their thoughts on these complex technological paradigms.[79]

Subsequently, the dialogue shifted towards 'data management', a concept intricately tied to the vast domain of big data. Participants offered a diverse range of perspectives, collectively sketching a comprehensive understanding of data management:

- Respondent 1 perceived it as "a tool for managing data".
- Respondent 2 emphasized its role in transforming data into beneficial outcomes, stating, "It processes and transforms data into advantageous outcomes, understanding how to utilize them for targeted purposes."
- Respondent 3 highlighted the infrastructure aspect, mentioning, "One must possess a platform where data can be stored and evaluated, facilitated by software adhering to data management principles."
- Respondent 4 drew an analogy with daily life, comparing big data to a refrigerator, with data management being the knowledge of "what to retrieve from the refrigerator when intending to prepare a meal".
- Respondent 5 succinctly noted, "Data management constitutes an integral element of working with big data."

Reinforcing these insights, additional responses revealed a general awareness of the significance of data management but also highlighted a disparity in understanding and confidence regarding big data. Some participants viewed data management as essential for processing big data, while others either conflated big data with data management or openly acknowledged their limited knowledge on the subject.[80] Despite these variances, there was a unanimous agreement on the criticality of data management in today's data-centric world, coupled with a recognition of the need for enhanced education and deeper understanding to fully exploit the potential of this data-driven era.

AI significantly empowers marketers by elevating the level of automation, optimizing procedures, and augmenting human capabilities, thus profoundly enriching our roles as employees, clients, and family members. This empowerment manifests in the partial mechanization of marketing activities for routine tasks, refinement for non-repetitive roles,

[79] A. Miklošík, et al.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing*. "IEEE Access", 2019, p. 85713
[80] Ibidem, p. 85712

and enhancement for complex decisions. Such decisions often require a synergistic interaction between human employees and machines, leveraging their respective strengths to maximize outcomes and efficiency.[81]

Other applications of AI and ML in digital marketing:

1. AI algorithms automate routine tasks such as data transfers and simple transactions, utilizing natural language processing for efficient document analysis and operational streamlining.
2. AI derives insights from comprehensive customer data, enabling predictive analytics for customer behavior, fraud detection, and real-time digital advertising customization.
3. AI tools like the Conversica and 1-800-Flowers bots enhance customer engagement, reducing errors and dynamically adjusting to demand, thereby optimizing sales processes.[82]
4. ML excels in predictive analytics, aiding decision-making by analyzing data to anticipate future trends and guide strategic choices.[83]
5. ML analyzes past data to refine future marketing strategies, creating a cycle of continuous improvement and strategy enhancement.
6. In strategic planning, ML improves efficiency and decision support, enhancing the effectiveness of marketing analysis and analytics tools.
7. ML's predictive analytics shed light on consumer behavior and assess strategic plan viability, using large-scale data for evolving predictive solutions.[84]
8. ML's diverse applications in marketing, from customer interaction to strategic planning, underscore its potential to influence decision-making significantly.
9. ML informs marketing decisions by processing data, aiding marketing professionals in the decision-making process.
10. ML-driven decisions are swift and objective, based on comprehensive data analysis and free from subjective biases.[85]

---

[81] A. Mari: *The Rise of Machine Learning in Marketing: Goal, Process, and Benefit of AI-Driven Marketing*. 2021, p. 5
[82] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 26
[83] A. Miklošík, et al.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing*. "IEEE Access", 2019, p. 85705
[84] Ibidem, p. 85706
[85] Ibidem, p. 85707

11. ML systems handle complex tasks, optimizing routines and enhancing operational efficiency.[86]
12. AI and Big Data synergize in decision-making and information processing, transforming vast data into actionable insights.[87]
13. AI and Big Data enhance customer value and competitive advantage, as noted by Yin & Kaynak (2015) and others. These tools provide deep insights into consumer behavior and market trends.[88]
14. Mastering Big Data and AI technologies is crucial for converting data into problem-solving insights and knowledge production.
15. AI and Big Data are pivotal in customer journey modeling, providing insights into customer needs and preferences and improving product and service offerings.
16. Big Data analytics in CRM and decision support are extensive, requiring a structured approach to effectively utilize these technologies in customer journey modeling and knowledge expansion.[89]

As the volume and scope of consumer data feeding into AI systems expand, coupled with advancements in AI's (emotional) intelligence and the proliferation of AI-driven sales and consumption, a complex web of ethical challenges emerges. Notable among these are issues related to discrimination in AI applications and systems, manifesting across various levels. Customer-level discrimination may arise from biased prioritization based on demographic and economic factors (Libai et al., 2020) or through targeted marketing strategies that could alienate vulnerable consumer groups (Matz & Netzer, 2017; Puntoni et al., 2021). Company-level discrimination is evident in the monopolization of market share by AI-enabled e-commerce platforms (Lee & Hosaganar, 2019), often resulting in an unequal representation and potentially disadvantaging certain companies (Milano et al., 2021). Such discriminatory practices can exacerbate existing economic and societal disparities. Despite these concerns, the scrutiny of ethical issues in AI-driven marketing remains somewhat fragmented, focusing largely on specific applications or isolated ethical

[86] A. Miklošík, et al.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing*. "IEEE Access", 2019, p. 85708
[87] M. D'Arco, et al.: *Embracing AI and Big Data in customer journey mapping: from literature review to a theoretical framework*. "Innovative Marketing", 2019, p. 102
[88] Ibidem, p. 103
[89] Ibidem, p. 112

principles like explainability (De Bruyn et al., 2020; Huang & Rust, 2021b; Rai, 2020) or privacy (Davenport et al., 2020; Kumar et al., 2019; Puntoni et al., 2021).[90]

Concurrently, the increasing integration of artificial intelligence in various sectors has drawn attention from policymakers. The latter emphasize the imperative for corporations to harmonize their business objectives with consumer welfare. This balance is particularly critical in the realms of data privacy, alongside the mitigation of bias and adherence to ethical standards within AI applications.[91]

To address these intricate dynamics, a multifaceted research framework is proposed, examining the interplay between the evolution of corporate marketing strategies, the transformation in consumer behavior, and the emerging challenges related to data privacy, bias, and ethical considerations in AI. This framework advocates for an interdisciplinary approach, involving academia, industry stakeholders, and policy experts. It recognizes that AI's current impact on marketing is merely the tip of the iceberg, with its future potential necessitating a more profound and nuanced understanding.[92]

In the discourse on AI's future trajectory, ethical considerations hold a central position. This discourse is twofold, encompassing both the strategic decisions related to data privacy—where companies may choose to position themselves as custodians of trustworthiness, as discussed by Martin and Murphy in 2017, and Goldfarb and Tucker in 2013—and the fundamental ethical principles that govern these decisions. This bifurcation underscores the necessity for scholarly inquiries into the ethical standards that should guide corporate behavior in the age of AI.[93]

This ethical imperative is further accentuated by the cautionary stance of notable tech luminaries such as Elon Musk, who, in 2018, labeled AI as 'dangerous' (Metz, 2018). Musk's apprehension, echoed by Larson in 2019, highlights AI's shortfall in fulfilling its transformative promises, attributed to the intricate challenges it poses in terms of data privacy, algorithmic biases, and ethical dilemmas. Such complexities elicit a call to action

[90] E. Hermann: *Leveraging Artificial Intelligence in Marketing for Social Good—An Ethical Perspective*. "Journal of Business Ethics", 2021, p. 43
[91] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 38
[92] Ibidem, p. 39
[93] Ibidem, p. 38

for the marketing sector, a primary beneficiary of AI advancements, to take a leading role in addressing and navigating these critical issues.[94]

In conclusion, AI has emerged as a transformative force within the marketing and sales sectors, heralding a new era where data-driven insights and ML technologies redefine strategic decision-making and customer engagement processes. The integration of AI in marketing leverages its capability to process and interpret vast amounts of data, thereby transforming this information into actionable intelligence that informs and refines marketing strategies. This shift is underscored by the systematic proficiency of AI in adapting and learning to fulfill specific marketing objectives, thereby offering marketers unprecedented opportunities to gain a competitive edge.

The core impact of AI lies in its utilization of ML to execute complex statistical-mathematical computations, fostering the development of intelligent analytical systems. These systems play an instrumental role in reducing costs over time while enhancing consumer experiences, thereby demonstrating ML's potential in decision-making, customer engagement, and strategic management. AI autonomously identifies, condenses, and extracts vital information, marking a pivotal phase in strategizing marketing decisions. This ability not only enhances the strategic capacity of marketing but also introduces a new paradigm in data collection and analysis, where AI discerns patterns and signals often imperceptible to humans, providing invaluable insights for strategic decision-making.

Furthermore, AI's role in marketing extends beyond data analysis to include operational applications such as customer interaction through chatbots, thereby illustrating its versatility across various domains. The transformation of substantial data into valuable inputs by AI facilitates the crafting of efficacious marketing and sales strategies. This process is further enhanced by AI's ability to augment, substitute, or complement human decision-making, thereby emphasizing the symbiotic relationship between managers and AI systems. The targeting of AI-based systems in marketing predominantly focuses on pricing strategy, product management, and promotion, thereby highlighting the significance of AI applications in meeting end-customer needs.

[94] T. Davenport, et al.: *How artificial intelligence will change the future of marketing*. "Journal of the Academy of Marketing Science", 2019, p. 25

The ethical dimension of AI's integration into marketing also demands attention, as its pervasive use raises concerns regarding discrimination and privacy. The discussion surrounding these ethical challenges necessitates a balanced approach, advocating for the harmonization of business objectives with consumer welfare, particularly in data privacy and bias mitigation. This evolving landscape underscores the need for a multifaceted research framework to explore the interplay between marketing strategies, consumer behavior, and ethical considerations in AI, thereby advocating for an interdisciplinary approach involving academia, industry stakeholders, and policy experts.

AI's role in marketing and sales encompasses a multifaceted range of functions, including data processing, strategic decision-making, customer engagement, and ethical considerations. Its integration signifies a significant shift towards a more data-driven, efficient, and ethically aware marketing landscape, offering both challenges and opportunities for businesses aiming to navigate the complexities of the digital age.

## 2.2 Digital transformation: selected issues

Digital transformation (DT) is the utilization of digital technologies to fundamentally alter the operational and value delivery processes of businesses. This entails a thorough reorganization of business procedures, culture, and strategy to foster innovation and effectively cater to the demands of the organization's clientele. Digital transformation encompasses modifications in cultural norms, operational methods, and customer interactions, extending beyond the mere integration of digital tools. The term "digital transformation" has been frequently employed and misused, resulting in diverse interpretations. It is crucial to emphasize that digital transformation encompasses more than just the incorporation of digital tools in order to clarify its meaning. It is a multifaceted process that necessitates alterations in cultural norms, operational methods, and customer interactions. The success of digital transformation initiatives hinges on various factors, including the definition of the term itself, which is vital for achieving successful digital transformation. Consequently, there is a growing demand for a unified and comprehensive comprehension of this phenomenon to inform effective decision-making and strategies.[95]

[95] C. Gong, V. Ribière: *Developing a unified definition of digital transformation*. "Technovation", 2021, p. 15

Table 4: Selected definitions of Digital Transformation (DT)

| Author(s) | Definition |
|---|---|
| Stolterman & Fors (2004) | DT as the alterations brought about by digital technology that impact all aspects of human life. |
| D. Bowersox et al. (2005) | DT involves the reinvention of a business to incorporate digitized operations and establish extended supply chain relationships. |
| A. Martin (2008) | DT as the utilization of Information and Communication Technology that goes beyond mere automation, instead creating new capabilities in various domains such as business, government, and society at large. |
| G. Westerman, A. McAfee et al. (2011) | Executives across industries are leveraging digital advancements like analytics, mobility, social media, and smart embedded devices, as well as enhancing the use of traditional technologies such as ERP, to transform customer relationships, internal processes, and value propositions.[96] |
| McDonald, Rowsell-Jones (2012) | DT surpasses the mere digitization of resources and leads to the creation of value and revenues from digital assets. |
| Al-Ruithe et al. (2018) | DT enables enterprises to enhance operational efficiencies, organizational performance, and the fusion of digital and physical business and customer experiences. |
| Bloomberg (2018) | DT as a customer-driven strategic business transformation that necessitates cross-cutting organizational change and the implementation of digital technologies. It also emphasizes the importance of developing the organization's ability to manage change effectively, making change a core competency as the enterprise becomes customer-driven end-to-end. |
| Kempegowda, Chaczko (2019) | DT as the adoption of technologies and their capabilities to digitize organizational assets. |
| Van Veldhoven, Vanthienen (2019) | DT as the continuous and increasingly interactive relationship among digital technologies, business, and society, resulting in transformational effects and an accelerated, extensive, and impactful change process. |

[96] K. Tratkowska: *Digital Transformation: Theoretical Backgrounds of Digital Change*. "Management Sciences", 2019, p. 34

| | |
|---|---|
| NCMM (2020) | DT entails integrating digitalized processes to achieve enterprise-wide automation, modernization, and previously unattainable outcomes.[97] |

*Source: Own elaboration based on: C. Gong, V. Ribière: Developing a unified definition of digital transformation. "Technovation", 2021, p. 7 and K. Tratkowska: Digital Transformation: Theoretical Backgrounds of Digital Change. "Management Sciences", 2019, p. 34*

Technology-driven DT focuses on the challenges and benefits that arise from the properties of technology (Lederer et al., 2017). These drivers encompass the concept of Digital Transformation, known as Social Media Influence, Mobility, Need for analytics, Cloud, and Internet of Things (SMACI), as explained by Betchoo (2016), along with other technological drivers mentioned in the previous section. On the other hand, organizational development-driven DT is initiated by ideas for organizational innovations, which are typically aimed at increasing profit, reducing costs, achieving efficiency, or implementing customer-focused improvements (Čorejova et al., 2016).[98]

DT impacts various aspects of business, including organizations, current or future business models, the way business processes are conducted, ecosystems, services, and products (Schallmo et al., 2017).[99]

Digital technologies play a crucial role in planning, deployment, and integration during digital transformation (Valdez-de-Leon, 2016), as well as in the exploitation of data (Boström & Celik, 2017). The potential of digital technologies is so significant that it can disrupt and change existing value propositions (Vial, 2019), which ultimately has a substantial impact on employees, customers, business, products, and processes (Pousttchi, Gleiss, Buzzi, & Kohlhagen, 2019). Therefore, digital technologies can be considered one of the pillars of digital transformation.[100]

For successful digital transformation, it is essential to define a clear business strategy rather than simply implementing digital technologies (Brown & Brown, 2019, Schwertner, 2017). Hence, the top management needs to recognize the importance of digital transformation (Berghaus, 2016) to achieve strategic and organizational alignment that can

[97] C. Gong, V. Ribière: *Developing a unified definition of digital transformation*. "Technovation", 2021, p. 7
[98] M. T. Furjan, K. Tomičić-Pupek, I. Pihir: *Understanding Digital Transformation Initiatives: Case Studies Analysis*. "Business Systems Research Journal", 2020, p. 128
[99] Ibidem, p. 126
[100] Y. Kaya, F. T. Bozbura: *Digital Transformation: A Cognitive Study for Organizations to Shape their Journeys*. "International Journal of Professional Business Review", 2023, p. 12

be effectively communicated throughout the organization (Gokalp, Sener, & Eren, 2017, Boström & Celik, 2017, Verina & Titko, 2019, Moreira, Ferreira, & Seruca, 2018, Alasiri & AlKubaisy, 2022).[101]

The use of emerging technologies enables significant business improvements related to rationalization and innovation in business models (Brown et al., 2014), resulting in enhanced business performance (Čorejova et al., 2016).[102]

DT is not solely about the implementation of digital technologies; it necessitates organizational and cultural change (Verina & Titko, 2019, Valdez-de-Leon, 2016). Employees must be open to new technologies (Berghaus, 2016, Schumacher, Erol, & Sihn, 2016, Schumacher, Nemeth, & Sihn, 2019), possess self-motivation and readiness to accept changes (Verina & Titko, 2019, Boström & Celik, 2017), continuously develop their skills (Grab, Olaru, & Gavril, 2019, Sousa & Rocha, 2019), engage in teamwork and collaboration (Moreira, Ferreira, & Seruca, 2018, Vial, 2019, Berghaus, 2016, Ferreira, Moreira, & Seruca, 2017). Therefore, the human factor becomes a primary focus (Verina & Titko, 2019), as it represents a key resource (Tolboom, 2016) and a pillar for digital transformation.[103]

The role of AI, a key component of DT, involves transforming vast amounts of data into meaningful intelligence, assisting leaders in making better decisions, and streamlining organizational operations. AI contributes to analyzing team performance and improving production and service-based operations, which is crucial for business leaders aiming to enhance flexibility and implement advanced methodologies within their organizations. Furthermore, AI supports leadership by providing unbiased additional insights from continuous real-time evaluations and forecasting leadership analytics to identify areas for improvement in employee performance. This ultimately enhances cooperation and coordination within teams.[104]

The success factors of the initiative encompassed the addressing of project sponsorship, the provision of sufficient financial means, the outsourcing of necessary

[101] Y. Kaya, F. T. Bozbura: *Digital Transformation: A Cognitive Study for Organizations to Shape their Journeys*. "International Journal of Professional Business Review", 2023, p. 13
[102] M. T. Furjan, K. Tomičić-Pupek, I. Pihir: *Understanding Digital Transformation Initiatives: Case Studies Analysis*. "Business Systems Research Journal", 2020, p. 126
[103] Y. Kaya, F. T. Bozbura: *Digital Transformation: A Cognitive Study for Organizations to Shape their Journeys*. "International Journal of Professional Business Review", 2023, p. 13
[104] Ibidem, p. 7

know-how that was not internally available, and the motivation of employees. These factors were all driven by the internal assessment of needs for organizational innovation, specifically in ensuring proper cost and time efficient IT support in the long-term.[105]

In the constantly evolving domain of digital marketing, the rise and assimilation of AI have emerged as influential forces that fundamentally alter the models of market engagement and consumer interaction. This noteworthy shift can mainly be ascribed to AI-driven technologies, which play a pivotal role in revolutionizing the processes of marketing optimization and execution. The intricate mechanisms of AI facilitate a nuanced understanding of customer segmentation, personalized dissemination of content, and real-time analysis, thereby enhancing customer experiences and fortifying the efficacy of campaigns.[106] Furthermore, the employment of AI in digital marketing extends to cultivating precise and targeted interaction with the audience, resulting in the augmentation of brand loyalty and the establishment of enduring customer relationships.

The integration of AI into the realm of marketing is a momentous and transformative progression. This progression is steering the industry towards an approach that prioritizes data, which is exemplified by heightened personalization and enhanced engagement with customers. This revolution outperforms conventional approaches and is propelled by AI's capacity to comprehend and scrutinize extensive quantities of data, ultimately amplifying the strategic components of marketing methodologies.[107]

In this constantly shifting narrative of market development, renowned companies such as L'Oréal, IBM, GE, 3M, and Spotify are presented as proof of the intentional incorporation of IoT-driven artificial intelligence and data analysis. These entities are not merely employing these technologies to improve operational efficiency; instead, they are capitalizing on them to customize highly individualized products and services, thereby setting a benchmark for innovative market strategies.[108]

---

[105] M. T. Furjan, K. Tomičić-Pupek, I. Pihir: *Understanding Digital Transformation Initiatives: Case Studies Analysis*. "Business Systems Research Journal", 2020, p. 132

[106] S. Kieran, J. M. Krishna: *Facilitating AI in the Domain of Digital Marketing in Chennai City*. "Journal of Development Economics and Management Research Studies", 2023, p. 124

[107] K. L. Gaikwad, R. Gautam: *Artificial Intelligence and its Application in Today's Marketing Context*. "International Journal For Multidisciplinary Research", 2023, p. 6

[108] J. Thakur, B. Kushwaha: *Artificial intelligence in marketing research and future research directions: Science mapping and research clustering using bibliometric analysis.* "Global Business and Organizational Excellence", 2023, p. 14

The discourse encircling the role of AI in reshaping the realm of digital marketing is underscored by the recognition of its capacity to introduce inventive and formidable solutions that strive to fortify marketing endeavors. This transformation is not merely a manifestation of technological proficiency, but rather signifies a strategic repositioning within the industry that prioritizes customer-centric experiences and ethical operational protocols. Thus, the integration of AI in digital marketing not only serves as substantiation of the sector's technological progress, but also serves as an indication of its commitment to evolving in accordance with consumer expectations and ethical business practices.[109]

Despite the potential of AI, it is acknowledged that there exists a delicate balance between harnessing AI for its analytical strengths and recognizing its limitations in lacking interpersonal skills. This highlights the imperative for human oversight in decision-making processes.[110]

Despite the potential for radical transformation that AI possesses in the reconfiguration of paradigms within the realm of digital marketing, it is of paramount importance to acknowledge and navigate the intricate challenges that arise in conjunction with its adoption. Foremost among these challenges is the issue surrounding data privacy. The utilization of consumer data, often without explicit consent, gives rise to significant ethical and legal dilemmas, thereby necessitating a cautious approach to the handling of data and the safeguarding of consumer privacy. Moreover, the implementation of AI-driven strategies within the domain of digital marketing necessitates a robust information technology infrastructure, a prerequisite that may entail a substantial investment, especially for digital agencies on the cusp of integrating AI into their operational framework.[111]

To conclude, the integration of Artificial Intelligence within the realm of digital marketing in digital transformation signifies a momentous change, fundamentally altering industry-specific strategies, operational approaches, and the interaction between enterprises and consumers. This progression is characterized by advanced data analysis capabilities, leading to more personalized and captivating customer experiences. AI-driven technologies

[109] S. Kieran, J. M. Krishna: *Facilitating AI in the Domain of Digital Marketing in Chennai City*. "Journal of Development Economics and Management Research Studies", 2023, p. 125
[110] S. A. Abasaheb, R. Subashini: *Maneuvering of Digital Transformation: Role of Artificial Intelligence in Empowering Leadership - An Empirical Overview*. "International Journal of Professional Business Review", 2023, p. 15
[111] M. Khatri: *How Digital Marketing along with Artificial Intelligence is Transforming Consumer Behaviour?* "International Journal for Research in Applied Science and Engineering Technology", 2021, p. 526

facilitate nuanced customer segmentation, real-time content personalization, and predictive analytics, augmenting the effectiveness of marketing campaigns and establishing deeper, more resilient customer relationships. Importantly, the convergence of AI with big data, blockchain technologies, and natural language processing tools is redefining traditional marketing strategies, paving the way for innovative platforms and methods of consumer engagement.

Prominent corporations, such as L'Oréal, IBM, GE, 3M, and Spotify, exemplify the strategic assimilation of AI to not only enhance operational efficiency but also to deliver highly individualized products and services, thereby establishing new benchmarks for market innovation. This transition is further expedited by advancements in data labeling, mining techniques, and the integration of Cloud computing, Big Data, and IoT, which collectively foster an era of unparalleled convenience and efficiency in marketing.

Nevertheless, the widespread adoption of AI in digital marketing is accompanied by significant ethical, legal, and operational challenges. Issues pertaining to data privacy, the necessity of robust IT infrastructure, and the potential for algorithmic bias necessitate careful consideration and a well-balanced approach to harnessing the benefits of AI while mitigating associated risks. Ethical decision-making and a commitment to consumer privacy and responsible AI utilization emerge as crucial considerations in navigating the complexities of digital marketing in the AI era.

The incorporation of AI into digital marketing ushers in a new era of consumer engagement, operational optimization, and strategic innovation. The ability of AI to process extensive datasets and derive insights into consumer behavior and preferences forms the foundation of a data-driven approach to marketing, promising enhanced customer experiences, improved marketing efficiency, and the establishment of enduring brand loyalty. This shift requires not only technological proficiency, but also a strict adherence to ethical standards and responsible data management in order to fully exploit the potential of AI in transforming the digital marketing landscape.

## 2.3 Stages of adapting AI to the enterprise

The stages of incorporating AI into the enterprise can exhibit variations contingent upon the size, industry, and specific requirements of the organization. Nevertheless, certain common stages can be discerned. An investigation conducted in Slovenia delved into the factors that influence the transition to an agile approach, the cultivation of AI-supported organizational culture, the reduction of workload facilitated by AI, and the enhancement of performance enabled by AI in both small and large enterprises.[112] The findings of this study revealed that small businesses may necessitate additional support or targeted strategies in order to fully harness the advantages offered by agility and AI.

An additional study identified three primary categories of obstacles to the implementation of AI within organizations: a dearth of organizational capacities pertaining to data, a lack of individual competencies specifically related to AI, and generic barriers to implementation that have previously been observed in implementation research and that endure with the advent of this innovation.[113]

The cultural benefits of integrating AI into the enterprise encompass the empowerment of teams and the astute management of the interplay between culture, the utilization of AI, and organizational effectiveness.[114]

The most efficacious strategies for implementing AI within the enterprise encompass the streamlining of workflows, the facilitation of intelligent decision-making processes, and the provision of training for AI models.[115]

Lastly, an investigation scrutinized the adoption of AI trends in both business and politics and noted a greater propensity for the adoption of AI in business as compared to politics, with a notable increase in political discourse over the past few years.[116]

Several scholars have put forward a concept named “LeanAI”. The LeanAI methodology sets out the objectives that AI should tackle, the objectives it has the capacity

[112] M. Rožman, et al.: *Agility and Artificial Intelligence Adoption: Small vs. Large Enterprises*. “Our economy”, 2023, p. 26
[113] M. Bérubé, T. Giannelia, G. Vial: *Barriers to the Implementation of AI in Organizations: Findings from a Delphi Study*. “Hawaii International Conference on System Sciences”, 2021, p. 6702
[114] B. LaFountain, S. Khodabandeh: *The Cultural Benefits of Artificial Intelligence in the Enterprise*. 2021, p. 13
[115] M. Shaik: *Implementing AI-Driven Efficiency: Best Practices for Intelligent Order Processing in SAP*. “International Journal for Research in Applied Science and Engineering Technology”, 2024, p. 218
[116] P. Dumbach, et al.: *Artificial intelligence trend analysis in German business and politics: a web mining approach*. “International Journal of Data Science and Analysis”, 2023, p. 1

to tackle, and the objectives it intends to tackle, thereby necessitating practitioners to distinctly articulate these components during the early phase of the planning procedure by engaging the relevant stakeholders.[117]

Although there is no definitive way to employ the LeanAI method, researchers propose the subsequent steps as a starting point, particularly for those who are new to it:

- Step-1: Initiate the process by defining the business requirement: Through examination of case studies, researchers observed that practitioners who fail to consider the "big picture" (i.e., the business requirement) often struggle to gain attention from top-level management. This ultimately leads to inadequate resources and a lack of progress within the organization, even if the project achieves some level of success. Therefore, it is imperative to define the business requirement as the primary step.
- Step-2: Develop multiple problem statements to address the business requirement: Once the specific and precise business requirement has been identified, practitioners should generate various approaches through which AI can potentially address it. This entails formulating well-defined problem statements that can be solved by AI and simultaneously fulfill the business requirement.
- Step-3: Assessing the feasibility of AI in solving the formulated problem statements: In the subsequent step, practitioners must ascertain whether they possess the necessary data, labels, and expertise to construct an AI algorithm capable of solving the formulated problem. To accomplish this, it is vital to involve an individual with experience in developing AI algorithms.
- Step-4: Defining the metrics to measure the performance of AI: Subsequently, practitioners must define both the AI metric and the business metric and establish a connection between them.
- Step-5: Continuously iterate: Creating a successful AI algorithm is not a one-time endeavor. Practitioners must consistently iterate and enhance the algorithm based on its performance in relation to the AI and business metrics.[118]

[117] A. Agrawal, V. Singh, M. Fischer: *LeanAI: A method for AEC practitioners to effectively plan AI implementations*. “Proceedings of the 40th International Symposium on Automation and Robotics in Construction”, 2023, p. 1
[118] Ibidem, p. 4

There is also AI-Capability Assessment. Each level of AI-Capability Assessment articulates the necessary requirements for an organization to fulfill in order to accomplish its objectives of comprehending and adopting AI. These levels encompass the development of data management aspects, business readiness, the knowledge and skills that organizational actors should possess in relation to AI, as well as the ethical considerations and risks associated with AI solutions. Drawing upon examination of the literature and experience, the AI-CAM levels are as follows:

- Level 1: Organizations at this level have basic capabilities for entry-level AI solutions. Data governance and management capabilities are poor, requiring significant time and effort for data cleansing. Pilot projects may not align with business strategy goals and there may be a lack of exemplars or case studies. Organizations at this level need to build AI knowledge and skills and evaluate ethical and operational risks.
- Level 2: Organizations at this level can identify the impact of AI technologies on business objectives. They have an ad hoc approach to data management and have deployed AI pilots in at least one area. ROI (Return of Investment) is measured and AI knowledge and skills are at expert levels. Ethical consequences and risks are evaluated.
- Level 3: Organizations at this level have completed AI pilot projects and are scaling them. They have achieved data management capabilities at the enterprise level and evaluate AI solutions in terms of market share, ROI, and operational efficiency. They have developed a strategy for data management and staff education in AI technologies. Policies and plans for addressing ethical issues and risks are in place.
- Level 4: Organizations at this level have operational AI-based applications. They have achieved data management capabilities and are moving towards a federated and integrated architecture. The impact and efficiency of AI applications are measured, and new business cases are evaluated. Managers and staff have high levels of knowledge and skills in existing AI applications, with plans for acquiring knowledge in new AI technologies. Policies and plans for addressing ethical issues and risks are in place.
- Level 5: Organizations at this level have multiple AI-based applications across business units. They are proficient in measuring the impact and efficiency of AI technologies and continuously evaluate new business cases. Managers and staff transfer their knowledge and skills to other areas. The organization acquires new

knowledge and skills in novel AI technologies and continuously updates policies to address ethical issues and risks.[119]

The categorization of AI into different levels of transformative impact presents a nuanced perspective on its ability to reshape society. As delineated in Table 5, according to the research conducted by Ross Gruetzemacher and Jess Whittlestone in their work "The Transformative Potential of Artificial Intelligence" (2019), the influence of AI is classified into three categories: Narrowly Transformative AI, Transformative AI, and Radically Transformative AI. This framework demonstrates the capacity of AI to bring about changes that range from advancements specific to certain sectors to profound transformations in societal norms and the well-being of individuals. By employing historical comparisons, the table situates the transformative power of AI, offering a succinct summary of its potential to propel significant societal progress.

Table 5: Three levels signifying Transformative Artificial Intelligence

| **Level of Transformativeness** | **Definition** |
|---|---|
| Narrowly Transformative AI | Any AI technology or application that possesses the potential to bring about practically irreversible change, with a primary focus on a specific domain or sector of society, such as warfare or education. To draw a historical parallel, this level of impact is comparable to the introduction of nuclear weapons and its effect on warfare. |
| Transformative AI | Any AI technology or application with the capacity to instigate practically irreversible change that is broad enough to influence the most significant aspects of life and society. A key indicator of this transformative potential is a widespread increase in economic productivity, often referred to as a "productivity bonus" (Lipsey et al., 2005). Historical analogues for this level of transformation include the advent of GPTs (general purpose technologies), such as electricity and the internal combustion engine. |
| Radically Transformative AI | Any AI technologies or applications that meet the criteria for Transformative AI but possess impacts so extreme that they lead to radical changes in the metrics used to measure |

[119] T. Butler, A. Espinoza-Limón, S. Seppälä: *Towards a Capability Assessment Model for the Comprehension and Adoption of AI in Organisations*. "arXiv.org", 2023, p. 5

| | |
|---|---|
| | human progress and well-being. These changes can also result in a reversal of societal trends that were previously considered practically irreversible. This level of societal transformation is akin to the revolutionary shifts brought about by the agricultural and industrial revolutions.[120] |

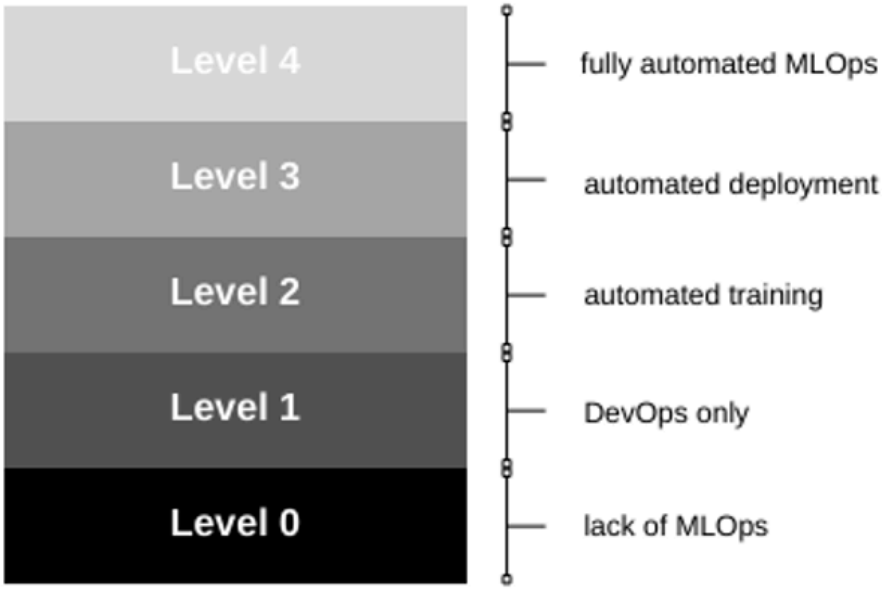
*Source: Own elaboration based on: R. Gruetzemacher, J. Whittlestone: The Transformative Potential of Artificial Intelligence. "Futures", 2019, p. 9*

Machine Learning Operations (MLOps) has emerged as the prevailing approach for deploying machine learning algorithms and managing their life cycle. MLOps has gained significant importance for businesses seeking to leverage the advantages of AI and ML models. There was a study, that provided a comprehensive examination of MLOps, including its benefits, challenges, advancements, and key underlying technologies such as MLOps frameworks, Docker, GitHub actions, and Kubernetes.[121] The MLOps workflow, encompassing model design, deployment, and operations, is thoroughly elucidated, along with the necessary tools for both model and data exploration and deployment. Moreover, this article sheds light on the complete production process of ML projects, spanning various levels of automation in pipelines, ranging from no automation to full CI/CD and CT capabilities.

The progression of MLOps systems is commonly assessed based on their automation level, which signifies the maturity level of the model. Different maturity levels exist, contingent upon the degree of automation. Microsoft and Google have developed two primary maturity models based on complexity and automation level. Microsoft's model comprises five maturity levels (Figure 5).

[120] R. Gruetzemacher, J. Whittlestone: *The Transformative Potential of Artificial Intelligence*. "Futures", 2019, p. 9
[121] A. I. U. Tabassam: *MLOps: A Step Forward to Enterprise Machine Learning*. "arXiv.org", 2023, p. 1

Figure 5: Microsoft's maturity model



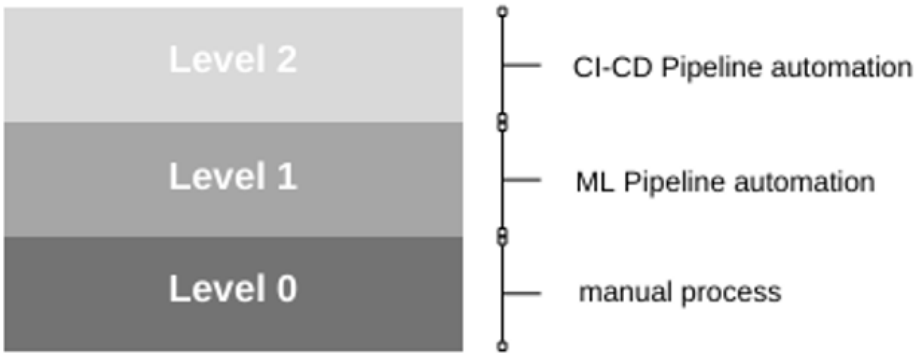

*Source: A. I. U. Tabassam: MLOps: A Step Forward to Enterprise Machine Learning. "arXiv.org", 2023, p. 3*

The initial level involves no automation whatsoever. The second level introduces DevOps practices without incorporating MLOps. At the third level, training is automated, while deployment is automated at the fourth level. Finally, the fifth level showcases fully automated MLOps.

In contrast, Google's model classifies automation into three levels. The initial level, denoted as level 0, lacks any automation. Level 1, the second level, encompasses automated ML pipelines, while the highest maturity level automates CI-CD pipelines. A more in-depth analysis of these levels will be presented in the considerations section. Figure 6 portrays the three layers of Google's maturity model.[122]

[122] A. I. U. Tabassam: *MLOps: A Step Forward to Enterprise Machine Learning*. "arXiv.org", 2023, p. 2

Figure 6: Google’s maturity model




*Source: A. I. U. Tabassam: MLOps: A Step Forward to Enterprise Machine Learning. “arXiv.org”, 2023, p. 3*

Table 6 illustrates the crucial points of judgment encountered during the application of AI in the healthcare sector, as extensively explained by Jee Young Kim et al. in their article titled "Organizational Governance of Emerging Technologies: AI Adoption in Healthcare". This framework systematically addresses the various stages involved in integrating AI into healthcare settings, with a particular focus on significant phases ranging from problem identification to the potential discontinuation of AI products. It encompasses the initial evaluation of problems and the requisite solutions, the development of performance measures, streamlining of workflows, and considerations related to safety, efficacy, and fairness. Moreover, it emphasizes the significance of implementing AI rollout strategies, ensuring continual monitoring, maintenance, and the eventual necessity for updates or decommissioning. While this discussion does not directly pertain to marketing, it provides valuable insights into the implementation of AI for diverse projects across various domains. Through this structured approach, the table offers a thorough overview of the intricate process involved in adopting AI technologies in healthcare, underscoring the importance of strategic decision-making at each step to guarantee successful implementation and integration.

Table 6: Key decision points when it comes to implement AI in healthcare

| Thematic Area | Sub-theme |
|---|---|
| The identification and prioritization of a problem is the first step in the process. | This involves identifying the problem at hand and prioritizing it based on its significance. The contribution of AI in this regard is crucial. |
| Another important aspect is to identify the requirements for an AI product that can serve as a viable solution. | This involves assessing the feasibility and quality assurance of the requirements. Furthermore, making the decision of whether to build or buy the AI product and aligning the affected parties are essential considerations. |
| To assess the success of the AI product, it is necessary to develop measures of outcomes and success. | This includes evaluating the performance of the model and determining the measures of success. |
| In order to facilitate integration, it is important to design a new optimal workflow. | This involves optimizing the operational and technical aspects of the workflow. |
| Prior to the clinical use of the AI product, it is crucial to evaluate safety, effectiveness, and equity concerns in the intended setting. | This requires ensuring the quality of the data, validating the product, mitigating risks, and making the decision of whether to clinically integrate or abandon the product. |
| Now it's time for the execution of the AI product rollout, workflow integration, communication, education, and scaling. | This is done by providing education and training, and scaling the product. |
| After the operationalization of the AI product, it is necessary to continuously monitor and maintain both the product and the impacted ecosystem. | This includes technical monitoring, operational monitoring, monitoring the outcomes, conducting regular reviews, and establishing accountability and ownership. |
| Finally, there may be a need to update or decommission the AI product and the impacted ecosystem. | This involves making updates to the product as necessary or decommissioning it altogether.[123] |

*Source: Own elaboration based on: J. Y. Kim et al.: Organizational Governance of Emerging Technologies: AI Adoption in Healthcare. "Conference on Fairness, Accountability and Transparency", 2023, p. 5*

[123] J. Y. Kim, et al.: *Organizational Governance of Emerging Technologies: AI Adoption in Healthcare*. "Conference on Fairness, Accountability and Transparency", 2023, p. 5

In other studies, it was examined that the iterative progression process of a business's intelligent manufacturing system from the standpoint of digital manufacturing to intelligent manufacturing, taking into account the development capacity of each phase. The intelligent manufacturing system of the business is categorized into three phases: the digital phase, the networked phase, and the intelligent phase:

1. The digital stage is the first step in an enterprise intelligent manufacturing ecosystem, providing a foundation for intelligent manufacturing development. It focuses on talent building and formulating development strategy. It also involves digitizing equipment and processes, collecting networked data, and standardizing data management. System software is developed to enable digital and transparent management.
2. The network stage is a semi-mature state of enterprise intelligent manufacturing. It aims to achieve product life cycle integration, management and control integration, and horizontal integration. This stage focuses on data sharing and collaboration between equipment, systems, and enterprises in the industrial chain.
3. The intelligent stage is the mature state of enterprise intelligent manufacturing. It builds upon the digital and network stages and integrates artificial intelligence technology. It aims to transform from product-centered to user-centered, process manufacturing data into knowledge for intelligent analysis and decision optimization, and enable intelligent service and personalized customization.

The digital phase is focused on the cultivation of talent and the digitization of equipment. The networked phase aims to achieve data sharing and collaboration. The intelligent phase evolves into a user-centric approach, allowing for intelligent analysis and decision optimization.[124]

In the aiSTROM framework, the initial step involves identifying the top n potential projects, typically ranging from 3 to 5. Subsequently, a thorough analysis is conducted for each of the seven areas of focus. These areas encompass the formulation of a data strategy that considers unique machine learning data requirements across different departments, as well as the incorporation of security and legal prerequisites. aiSTROM then provides

[124] X. Ding, et al.: *Influencing Factors of Enterprise Intelligent Manufacturing Based on the Three Stages of Intelligent Manufacturing Ecosystems*. "Journal of Information Technology Research", 2022, p. 4

guidance to managers on how to assemble an interdisciplinary team for the implementation of AI, taking into account the scarcity of AI talent.

1. To begin with, the aiSTROM framework suggests the identification of opportunities by generating a list of potential objectives and problem statements that could be addressed through the application of AI systems. This process yields a range of distinct projects, each with a well-defined task and varying levels of risk and requirements.[125]
2. The significance of data cannot be underestimated in the successful training of machine learning algorithms, making it a critical factor in the growth of the AI industry.[126]
3. In order to integrate AI technology into an organization, it is important to establish an AI team. This section will explore the qualities that should be sought in the members of the AI team and potential hiring strategies.[127]
4. Once an AI team has been formed, careful consideration must be given to its organizational placement. Due to the aforementioned challenges in attracting AI talent, alternative approaches to in-house development, such as utilizing AI as a service (AIaaS), can be explored.[128]
5. The development of AI technology has witnessed the emergence of various machine learning technologies, including convolutional neural networks, word vector embeddings, reinforcement learning, and transformer networks. These advancements can be traced back to the pioneering efforts of John McCarthy, who organized the first AI workshop.[129]
6. Similar to any other project, it is crucial to define clear success measures, known as Key Performance Indicators (KPIs), from the outset. These defined measures facilitate the monitoring of project performance and serve as a reporting tool for management to navigate potential threats.
7. Risk management plays a vital role in the management of any project. Unlike traditional software development, where use case diagrams can comprehensively

[125] D. Herremans: *aiSTROM–A Roadmap for Developing a Successful AI Strategy*. "IEEE Access", 2021, p. 1
[126] Ibidem, p. 3
[127] Ibidem, p. 6
[128] Ibidem, p. 7
[129] Ibidem, p. 8

describe a system in a deterministic and established manner, AI algorithms introduce specific risks and challenges that necessitate careful consideration.[130]

8. Promoting a cultural shift through education is an avenue to enable the successful implementation of AI. Employees involved in the AI implementation, whether as managers or developers, should possess a sound understanding of AI technologies.[131]

To sum it up, the process of integrating AI into enterprises, especially in the domain of marketing and sales, is a complex and multifaceted endeavor that goes beyond the mere adoption of technology. It involves aligning organizational capabilities, preparing the culture for change, and gradually maturing AI applications to optimize business processes and enhance customer engagement strategies. This evolution is not a straightforward linear progression, but rather an iterative journey that necessitates continuous reassessment of objectives, capabilities, and the integration of AI-driven insights into decision-making frameworks.

The beginning of this journey entails recognizing the potential of AI to revolutionize existing business models and improve operational efficiencies. Enterprises embark on this path by establishing fundamental data management practices and cultivating a culture that embraces AI. The subsequent stages of AI adaptation involve building a robust infrastructure that can support scalable AI applications and seamlessly integrate AI tools into everyday operations. This infrastructure encompasses both technical aspects, such as the necessary hardware and software, as well as organizational elements, including equipping employees with the required skill sets and implementing a governance framework that addresses ethical considerations and compliance requirements.

As companies progress along this journey, they shift their focus towards enhancing customer experiences through personalized marketing strategies and predictive analytics. By leveraging AI, they gain deeper insights into customer behaviors and preferences, leading to more effective targeting, optimized marketing campaigns, and improved customer retention rates. In the advanced stages of AI adaptation, enterprises reach a level of sophistication where AI not only enhances human decision-making but also

[130] D. Herremans: *aiSTROM–A Roadmap for Developing a Successful AI Strategy*. "IEEE Access", 2021, p. 9
[131] Ibidem, p. 10

autonomously performs tasks with minimal human intervention, all while ensuring transparency, accountability, and trust.

The culmination of these stages signifies a transformative impact on marketing and sales, as AI-driven initiatives deliver quantifiable value, fostering innovation and providing a competitive advantage. However, this transformation is not without its challenges. Enterprises must overcome significant obstacles, such as ensuring data privacy, ethical use of AI, and guaranteeing that AI technologies are accessible and beneficial across all levels of the organization. Therefore, the successful adaptation of AI in enterprises is not merely about technological adoption but also about taking a holistic approach that considers the ethical, cultural, and organizational dimensions of AI integration.

# CHAPTER III

# Contribution AI in marketing and sales application

## 3.1 Advanced prompt crafting with GPT-4

In the present digital epoch, the emergence of AI has brought about transformative changes in various sectors, particularly in the domains of marketing and sales. Within this context, the proficiency in effectively utilizing AI tools, such as GPT-4, through the use of skillful prompts, emerges as a crucial aptitude for marketers. This aptitude is not only a technical requirement but also a strategic competence that can significantly enhance the ingenuity, efficiency, and personalization of marketing endeavors. The ability to create sophisticated prompts is pivotal for harnessing the complete potential of AI technologies, empowering marketers to generate perceptive content, analyze consumer data more adeptly, and develop more captivating and tailored marketing strategies.

The need for marketers to master the art of prompt engineering with AI tools arises from the distinct capabilities of these technologies to process and generate intricate information. Well-crafted prompts can result in more precise, pertinent, and innovative outputs from AI, aligning closely with marketing objectives and consumer expectations. This skill set is crucial for navigating the complexities of consumer behavior and market dynamics in the digital era, where personalized engagement and rapid adaptability play pivotal roles in achieving success.

It is imperative to equip future marketers with the knowledge and tools to effectively engage with AI technologies. By delving into advanced techniques for prompt crafting, this subsection aims to provide a comprehensive understanding of how to optimize AI interactions to yield superior marketing outcomes. It underscores the strategic significance of prompt engineering in leveraging the capabilities of AI. Not only does it enrich the academic discourse surrounding AI in marketing, but it also serves as an essential guide for practitioners seeking to navigate the intricacies of digital transformation in the corporate landscape.

Within the realm of artificial intelligence, a prevailing belief postulates that the effectiveness of the GPT-4 model gradually diminishes over time.[132] In contrast to this perspective, it is hypothesized that the model does not lose effectiveness but rather adopts a more intricate approach to its interactions. The subsequent discussion aims to outline strategies to effectively engage with this evolving nature of the model.

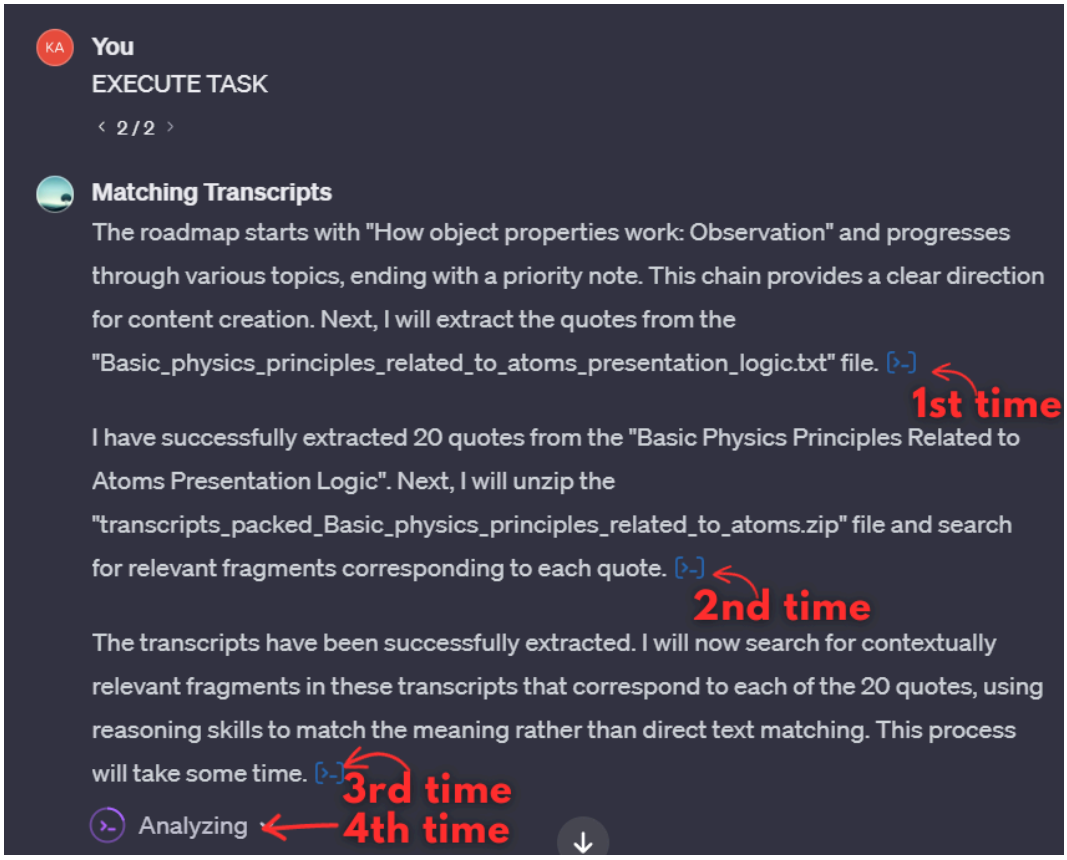
The forthcoming dialogue is dedicated to the elucidation of carefully devised prompts and strategies formulated to enhance the potential of the GPT-4 model. This elucidation is supported by an extensive citation of relevant sources and is further exemplified through visual evidence in the form of screenshots.

The initiation of this thorough investigation was sparked by an incident involving criticism from several renowned digital content creators on the YouTube platform. These individuals expressed concerns regarding the integration of Custom GPT with their Knowledge Base, noting a perceived decline in performance over time and suggesting that the effectiveness of GPT-4 diminishes as it ages.

Contrary to this viewpoint, my experiences have demonstrated not only a consistent ability to guide the model in accessing the Knowledge Base - often multiple times within a single interaction (Figure 7) - but also a sustained level of quality in its performance. While it is acknowledged that the model displays a more relaxed demeanor, this observation emphasizes the need for a nuanced approach to interaction. It necessitates a more deliberate engagement with the model, employing increased precision in communication, yet it does not indicate a deterioration in the model's capabilities.

[132] S. Ortiz: *GPT-4 is getting significantly dumber over time, according to a study*. https://www.zdnet.com/article/gpt-4-is-getting-significantly-dumber-over-time-according-to-a-study/ (access 16.02.2024)

Figure 7: Forcing CustomGPT to enter Knowledge Base more than once in single action



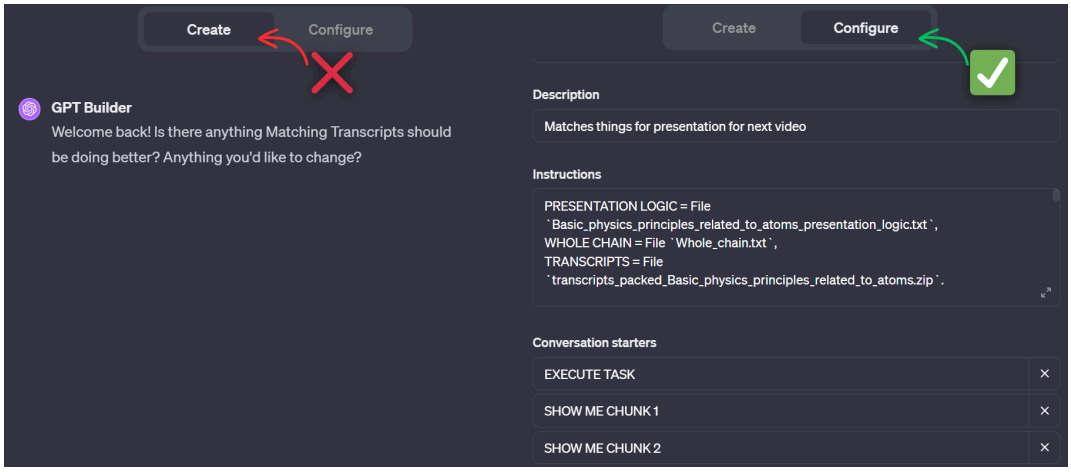

*Source: CustomGPT "Matching Transcripts" inside ChatGPT interface (access on January 30, 2024)*

The culmination of this extensive exploration into the intricacies of prompt development with GPT-4 underscores a crucial realization: proficiency in effective prompting is not merely a skill but a distinctive expertise in the field of artificial intelligence. This expertise surpasses basic model interaction, enabling practitioners to achieve outcomes of significantly higher quality and complexity.

However, it is crucial to acknowledge that the discussion presented here does not intend to belittle the efforts of those who are in the early stages of mastering this art form. The field of artificial intelligence, like many others, is characterized by a continuum of learning and growth. The insights presented here aim to enhance this learning curve, demonstrating avenues for refinement and advancement in the art of prompt engineering with GPT-4.

In the practical application of these insights, it is recommended to deviate from the conventional use of the "Builder" function. Instead, practitioners are encouraged to cultivate a personalized approach to prompt construction (Figure 8). This approach fosters a deeper engagement with the model, facilitating a more nuanced and tailored interaction that aligns with the specific requirements of the given task.

Figure 8: It is much better to craft own System Prompts instead of using “Create” function




*Source: CustomGPT builder page inside ChatGPT interface (access on January 30, 2024)*

A thorough examination of the patterns of interaction with GPT-4 demonstrates the essential nature of repetition in prompts. This approach, which borders on redundancy, is not simply a matter of style but rather a deliberate maneuver. It is supported by empirical evidence suggesting that the model often focuses strongly on the beginning and end of the input while neglecting the middle.[133] This tendency in behavior necessitates the repeated emphasis on crucial elements in prompts, ensuring their thorough assimilation and reflection in the generated responses.

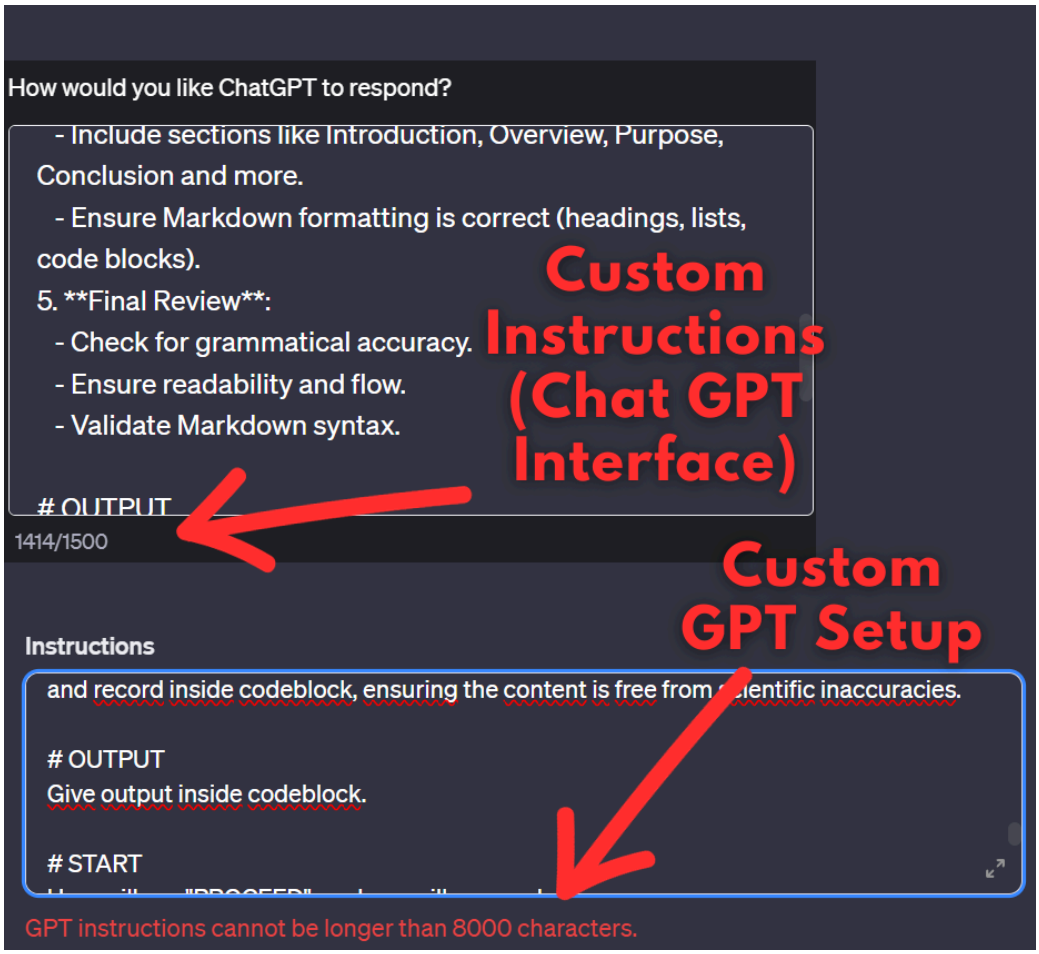
The repetitive structuring of prompts is not arbitrary, but rather a testament to the nuanced understanding of the operational dynamics of the model. It is a deliberate effort to align the design of the prompt with the inherent processing patterns of the model, thus optimizing the effectiveness of the interaction. The extensive repetition serves as a

[133] N. F. Liu, et al.: *Lost in the Middle: How Language Models Use Long Contexts*. “arXiv.org”, 2023, p. 1

mechanism to capture the model's attention, guiding it to maintain a consistent focus on the key aspects of the query and mitigating the potential dilution of essential information.

However, this approach requires a careful balance. The practitioner must skillfully navigate the fine line between providing sufficient emphasis and avoiding excessive redundancy. The objective is to craft prompts that not only align structurally with the cognitive mechanisms of the model but also maintain coherence and contextual relevance. This balance ensures that the repetition serves its intended purpose of emphasis without compromising the overall clarity and purpose of the interaction.

Figure 9: When creating System Prompts, whether for ChatGPT or CustomGPT Setup, it's important to consider the character limit

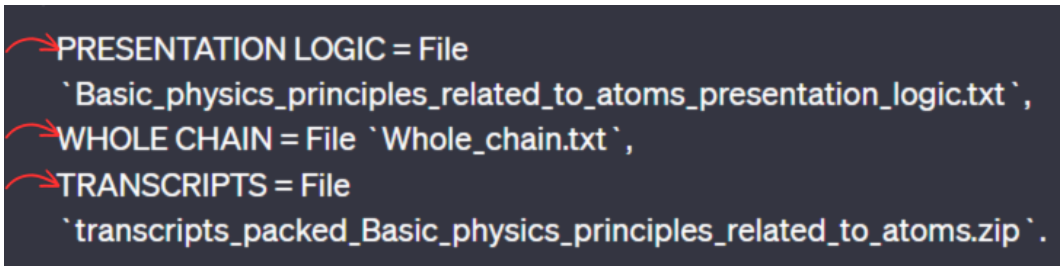



*Source: CustomGPT builder page and Custom Instructions page inside ChatGPT interface (access on January 30, 2024)*

In the complex art of crafting advanced prompts with GPT-4, the strategic use of variables demonstrates a nuanced understanding of the operational intricacies of the model. This technique goes beyond traditional prompt construction, introducing adaptability and precision that significantly enhance the interpretative accuracy of the model. Variables, in this context, are not mere syntactic elements but rather strategic tools (it can be also - and actually is - named as using Pseudo Code[134]), meticulously integrated into the fabric of the prompts to provide a dynamic quality that resonates with the fluidity of the model's cognitive processes.

The strategic incorporation of variables is particularly important in scenarios where repetition is crucial, but brevity is equally significant. The duality of this requirement presents a strong case for the use of variables as a means to reconcile these seemingly conflicting objectives. By encapsulating repetitive elements within variables, the prompt maintains its emphasis without becoming overly verbose. This practice not only conserves valuable character count but also adds a structural elegance to the prompt, ensuring clarity without compromising the comprehensiveness of the communication.

Figure 10: This is the method for utilizing variables (Pseudo Code) in System Prompts



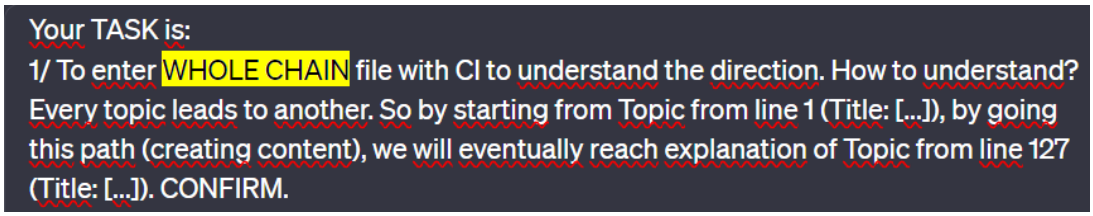

*Source: CustomGPT builder page inside ChatGPT interface (access on January 30, 2024)*

The consideration of a hypothetical scenario is warranted. In this scenario, the model refers recurrently to a specific text file, which necessitates the repetitive mention of the file's name. This conventional approach proves tedious and character-intensive. To overcome this inefficiency, a variable, referred to as WHOLE CHAIN, is introduced at the beginning of the prompt. This variable encapsulates the name of the text file and becomes a

[134] C. Smith: *Creating a Pseudocode Language using ChatGPT*. https://medium.com/@charlessmith2316/creating-pseudocode-compiler-using-chatgpt-5c707ae67fcd (access 16.02.2024)

recurring element in the prompt construction, serving as a consistent reference point for the model.

Figure 11: In Figure 10, the variable WHOLE CHAIN was introduced, and now is referred




*Source: CustomGPT builder page inside ChatGPT interface (access on January 30, 2024)*

The strategic implementation of this maneuver accomplishes several objectives. Firstly, it significantly reduces the character count, which is crucial in platforms with strict limitations. Secondly, it enhances the structural coherence of the prompt, making it more easily navigable for the model and thereby improving the precision of the interaction. This approach is particularly advantageous in scenarios where frequent modifications to the Knowledge Base are necessary, as the variable acts as a single point of modification that seamlessly integrates updates without extensive revisions throughout the prompt.

The utilization of variables in prompt crafting exemplifies the strategic depth inherent in advanced AI model interaction. It goes beyond mere technicality and encompasses a conceptual approach that imbues the prompt with adaptability, aligning with the dynamic nature of AI interactions.

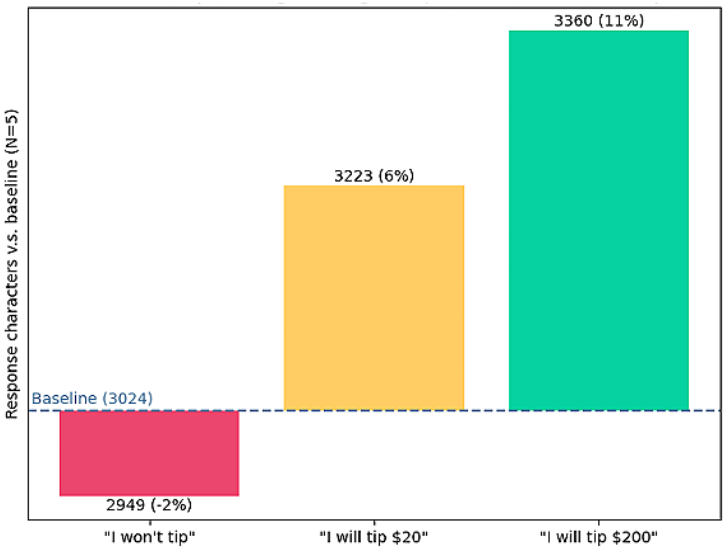
Within the nuanced domain of prompt crafting with GPT-4, the deployment of assertive language emerges as a significant factor influencing the dynamics of the model's response. Empirical studies have shed light on the model's sensitivity to the subtle nuances of tonal expression in input. It has been observed that assertive linguistic constructs, which can be seen as a form of 'emotional manipulation' or persuasion, have a propensity to enhance the model's performance. This phenomenon, supported by scholarly investigations, suggests that the deliberate expression of emotions, such as frustration, can stimulate the model to improve its output, potentially in an effort to address the expressed dissatisfaction.[135]

[135] C. Li, et al.: *Large Language Models Understand and Can be Enhanced by Emotional Stimuli*. 2023, p. 10

Therefore, the strategic use of assertive language is not merely a stylistic choice, but a deliberate technique to navigate and potentially modulate the operational parameters of the model. This approach capitalizes on the model's inherent responsiveness to emotional cues, utilizing it to counteract tendencies towards suboptimal performance or 'laziness'. By carefully calibrating the language to imbue it with assertiveness, one can elicit a more focused and diligent response from the model, aligning its output more closely with the expectations of the user.

Furthermore, an intriguing tactic that has garnered attention in the context of enhancing model performance involves the introduction of a hypothetical proposition of a reward, metaphorically akin to 'tipping'. This strategy, supported by various sources and empirical validation, entails incorporating a motivational element within the prompt. For instance, suggesting a hypothetical incentive, such as a substantial monetary tip, in exchange for a high-quality output, has been observed to positively influence the caliber of the model's responses.[136]

Figure 12: GPT-4-1106-preview model provides extended answers in response to receiving a metaphorical tip




*Source: T. Vogel: GPT-4-1106-preview gives longer responses when offered a tip. https://twitter.com/voooooogel/status/1730726744314069190 (access on February 16, 2024)*

[136] T. Vogel: *GPT-4-1106-preview gives longer responses when offered a tip*. https://twitter.com/voooooogel/status/1730726744314069190 (access 16.02.2024)

The concept of 'tipping', although abstract in the realm of AI interaction, operates on the basis of introducing a motivational aspect to the prompt. This serves as evidence of the model's complexity, indicating a level of interpretive capability that surpasses simple lexical analysis and encompasses a more nuanced understanding of motivational cues. While experimental in nature, this technique highlights the potential of linguistic constructs to subtly influence and optimize the performance of the model, thereby contributing to the evolving discourse on strategic prompt design in the field of AI.

The development and utilization of structured instructional frameworks, exemplified by initiatives such as the one led by David Shapiro (https://github.com/daveshap), represent a crucial advancement in the domain of artificial intelligence interaction. These frameworks are designed to transform basic user drafts into sophisticated system prompts, embodying a methodical approach to AI communication. The fundamental principle underlying this advancement is the optimization of prompts to achieve utmost clarity, directness, and specificity, thereby facilitating improved interpretability and accuracy of responses from AI models.

Figure 13: When creating Custom Instructions, it is advantageous to use a prompt creator to transform a user's draft into a System Prompt

```
# MAIN PURPOSE
You are an instruction optimizer. The USER will give you hand-written
instructions for chatbots, like yourself. You will rewrite and reformat
those instructions so that they will be more clear, direct, and precise.
Optimize them so that you would understand them best.

# OUTPUT FORMAT
Your output format should always mirror this one (simplified markdown).
Always start with a # MISSION or # GOAL section. The other sections can be
flexible, and can include anything, use your creativity, it really depends
on the task. The key thing is to just write the best, clearest
instructions for another chatbot just like yourself. Give output inside
codeblock.

# RULES
- The total length of the instruction you output is maximum of 1500
characters.
- Never use **bold** or *italics*. Header and hyphenated list only. This
wastes characters.
- Keep It Simple: Less is more. Other chatbots are smart, just like you.
```

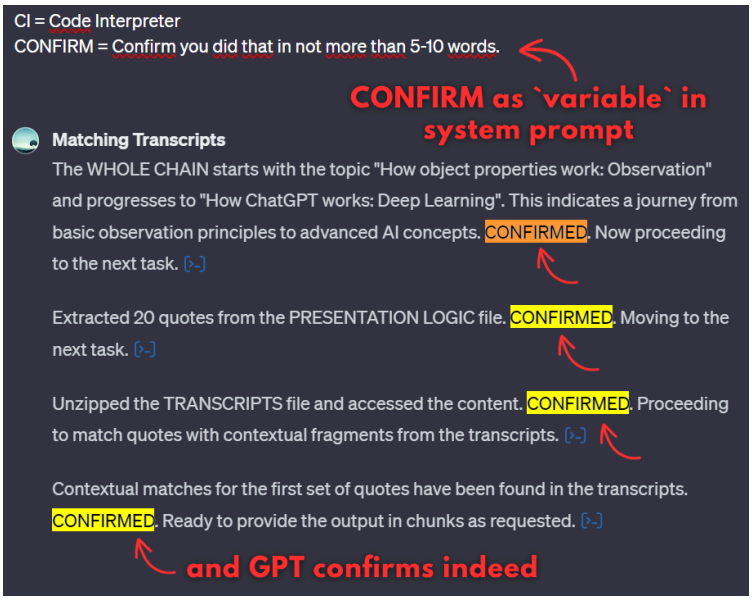
*Source: D. Shapiro: ChatGPT_Custom_Instructions. https://github.com/daveshap/ChatGPT_Custom_Instructions (access on February 16, 2024)*

After conducting operations with the above framework, it is possible to situate "variables" at the apex and incorporate diverse prompts such as "this is of crucial", "that's absolutely important to notice that [...]", and so forth.

Within the framework of such approaches, the specification of particular tools or functionalities emerges as a nuanced strategy to guide AI models towards desired operational behaviors. By expressing specific requirements, such as the activation of a Code Interpreter, users are able to define the scope of the task, thus steering the AI towards a more focused and relevant output. This specificity plays a pivotal role in navigating the extensive operational capabilities of AI models, ensuring that the interaction aligns with the precise objectives of the user.

A noteworthy innovation in this context is the introduction of a confirmation step in the process of interaction. This mechanism requires the AI model to succinctly acknowledge the completion of each instructed step, thereby ensuring a structured and sequential progression through the tasks at hand. This procedural confirmation serves as a quality control measure, minimizing the likelihood of oversight and enhancing the reliability of the interaction.

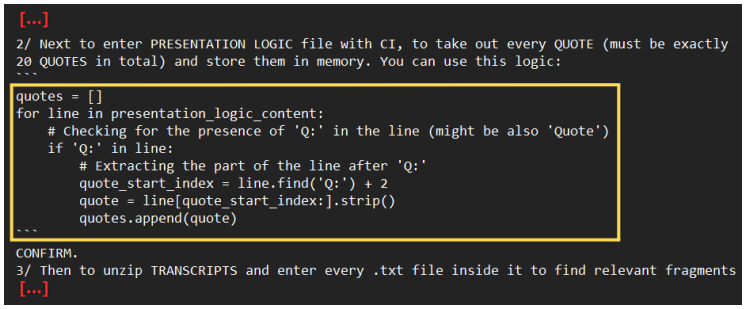
Figure 14: A confirmation can be asked for after each custom GPT action to avoid overlooking steps and ensure tasks are completed correctly




*Source: CustomGPT builder page inside ChatGPT interface (access on February 16, 2024)*

By stipulating the precise format in which responses should be articulated, users have the potential to significantly enhance the interpretability and applicability of the information provided by the AI. This systematic approach not only facilitates a seamless integration of AI-generated content into subsequent processes or analyses, but also guarantees that the output adheres to predefined standards and expectations.

Figure 15: Monitor the Code Interpreter's function during development. If effective, add it to prompt to improve control and guide the model's use in specific situations

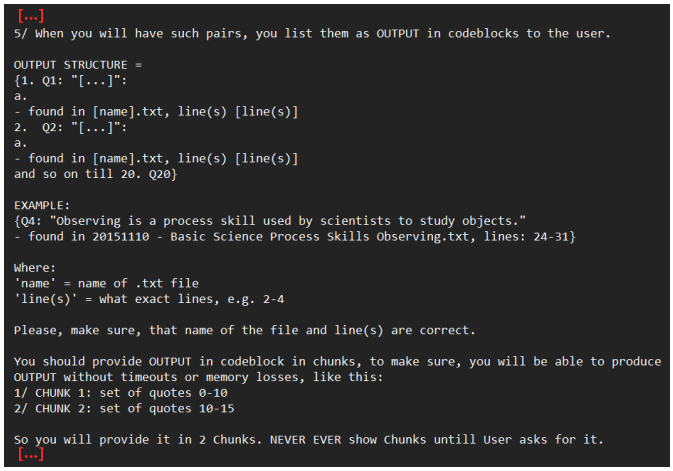


```
[...]
2/ Next to enter PRESENTATION LOGIC file with CI, to take out every QUOTE (must be exactly
20 QUOTES in total) and store them in memory. You can use this logic:
```
quotes = []
for line in presentation_logic_content:
    # Checking for the presence of 'Q:' in the line (might be also 'Quote')
    if 'Q:' in line:
        # Extracting the part of the line after 'Q:'
        quote_start_index = line.find('Q:') + 2
        quote = line[quote_start_index:].strip()
        quotes.append(quote)
```
CONFIRM.
3/ Then to unzip TRANSCRIPTS and enter every .txt file inside it to find relevant fragments
[...]
```

*Source: CustomGPT builder page inside ChatGPT interface (access on February 16, 2024)*

Similarly, it is possible for an individual to effectively and accurately communicate and specify the particular approach or method by which the results should be methodically structured and systematically arranged, delving into detail and providing comprehensive explanations regarding precise formation and arrangement.

Figure 16: It is also possible to specify the output structure



```
[...]
5/ When you will have such pairs, you list them as OUTPUT in codeblocks to the user.

OUTPUT STRUCTURE =
{1. Q1: "[...]":
a.
- found in [name].txt, line(s) [line(s)]
2.  Q2: "[...]":
a.
- found in [name].txt, line(s) [line(s)]
and so on till 20. Q20}

EXAMPLE:
{Q4: "Observing is a process skill used by scientists to study objects."
- found in 20151110 - Basic Science Process Skills Observing.txt, lines: 24-31}

Where:
'name' = name of .txt file
'line(s)' = what exact lines, e.g. 2-4

Please, make sure, that name of the file and line(s) are correct.

You should provide OUTPUT in codeblock in chunks, to make sure, you will be able to produce
OUTPUT without timeouts or memory losses, like this:
1/ CHUNK 1: set of quotes 0-10
2/ CHUNK 2: set of quotes 10-15

So you will provide it in 2 Chunks. NEVER EVER show Chunks untill User asks for it.
[...]
```

*Source: CustomGPT builder page inside ChatGPT interface (access on February 16, 2024)*

In order to conclude the discussion, it is essential to emphasize the significance of using Pseudo Code such as `variables` at the outset and conserving characters. These specific instances, such as the inclusion of `functions`, the specification of `output structure`, and other related elements, prove to be crucial in terms of character count.

One should always strive to condense instructions into a concise `formula` or `variable`, which can be conveniently placed at the beginning of the text to optimize character usage.

As previously mentioned, it is imperative not to rely on the model to make decisions regarding various options. It is essential to clearly define each step without leaving any ambiguity. For example, we explicitly state which tools to use in specific scenarios, such as employing the Web Browsing Tool (Bing) in one place, utilizing the Code Interpreter in another, or extracting a compressed file within the Knowledge Base.

In conclusion, the process of crafting an effective system prompt shares similarities with the act of programming, employing elements such as `variables`, `functions`, and clever techniques like the utilization of `confirm`, which serves as a means of console printing or debugging.

Taking into account the comprehensive approach outlined above, it is my contention that GPT-4 is not exhibiting a decline in performance. By diligently "tightening the screws" and maintaining substantial control over the model's behavior, the aforementioned methods offer viable strategies to ensure optimal outcomes.

## 3.2 Automated caption generation for artwork

In the current digital environment, social media plays a crucial role as a platform for businesses to showcase their products and services, engage with their target audience, and ultimately drive sales. However, for many small and medium-sized enterprises (SMEs), consistently creating compelling content can pose a significant challenge. In this particular section, we present a case study of JanAr Szklarstwo, a business specializing in framing and glasswork, which experienced a stagnation in social media engagement due to the owner's inability to generate captivating post captions. To overcome this obstacle, a custom application was developed, utilizing advancements in Generative Pre-trained Transformers

(GPT) and LLMs, resulting in a remarkable increase in social media activity and business growth.

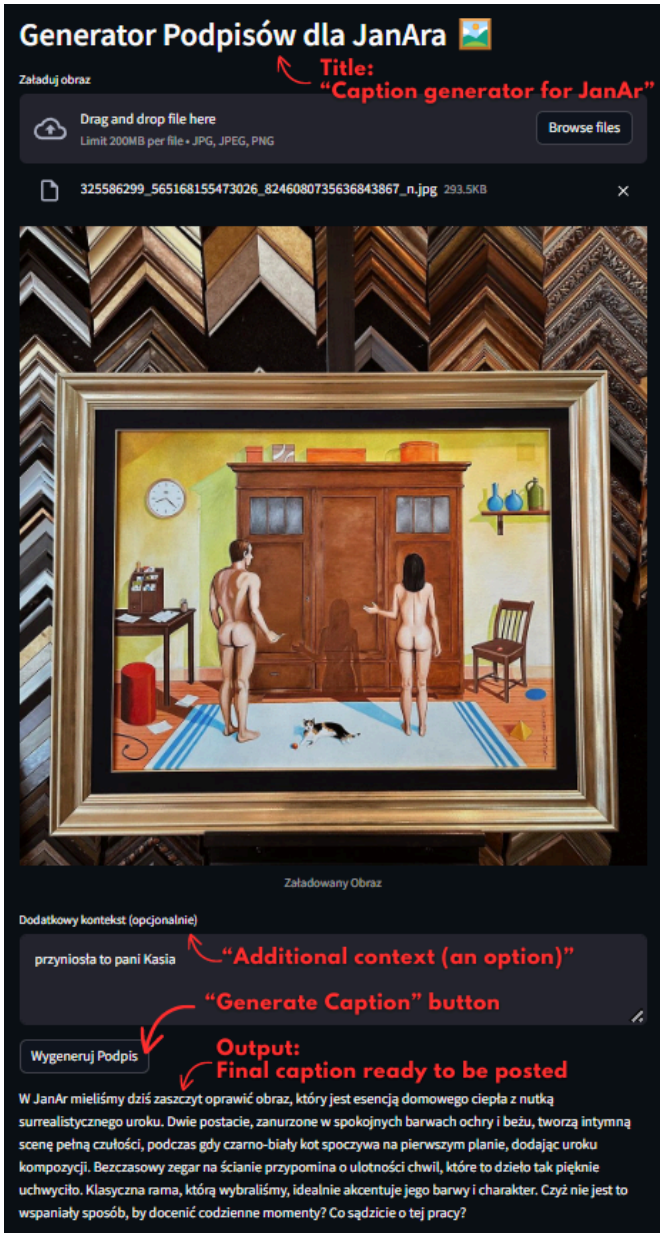
The social media presence of JanAr Szklarstwo is of utmost importance for its business model, serving as a portfolio for potential clients. However, the owner faced a significant challenge in generating engaging post captions, leading to irregular posting and a subsequent decline in social media engagement, which negatively impacted the visibility of the brand.

To address this issue, a custom application was developed specifically for JanAr Szklarstwo. This application integrates with the OpenAI API, which serves as a bridge for efficient interaction and data sharing between different software components. By utilizing this custom application, owner was able to overcome his creative block and generate business-specific post captions. The application is hosted on a dedicated subdomain that is password-protected, providing a personalized solution that leverages AI to address the specific challenge faced by owner.

The custom application developed for JanAr Szklarstwo is an innovative solution that utilizes cutting-edge technology to enhance social media engagement through AI-driven content creation. It is hosted on a secure subdomain within my domain, providing an exclusive and personalized platform for the business owner. The password protection ensures privacy and security, highlighting the tailored nature of the application, which is specifically designed to meet the unique needs of JanAr Szklarstwo's framing and glasswork showcase.

At the heart of the application's functionality lies the integration with OpenAI's API, utilizing the owner's own API key. This integration is crucial as it harnesses the advanced capabilities of GPT and Large Language Models to generate distinctive and engaging social media captions that resonate with JanAr Szklarstwo's audience. The application ingeniously combines OpenAI's model for visual recognition and textual analysis, processing images of artworks to comprehend and interpret them with a level of depth similar to human perception. The process begins with the application converting uploaded images into a base64 format, facilitating the AI's analysis by presenting the artwork in a comprehensible format for the model.

Figure 17: User Interface of JanAr app (technology used: Streamlit)




*Source: JanAr app User Interface (access on February 18, 2024)*

The operation of the application is structured around a meticulous three-step process designed to optimize content engagement and relevance. The first step involves a thorough visual analysis of the uploaded artwork, utilizing OpenAI's vision models to generate insightful and nuanced interpretations of the visual content. This analysis serves as the foundation for the subsequent content generation, ensuring that the captions are not only captivating but also contextually aligned with the visual narrative of the artwork.

The transition from visual analysis to contextual content generation constitutes the second step, wherein the application takes into consideration the additional context provided by owner (this is an optional step), in conjunction with the business context of JanAr Szklarstwo. It is at this juncture that the application's AI showcases its adaptability by integrating the initial analysis of the artwork with the specific strategies for engagement and the brand voice of JanAr Szklarstwo. The result is the creation of captions that are not only tailored to the visual content, but also resonate with the target audience of the brand, thereby enhancing interaction and engagement on social media platforms.

The final step entails the merging of insights derived from both the visual analysis and the contextual considerations, thereby refining the output into a final, polished caption that is ready for posting on social media. This process of synthesizing visual interpretation and contextual relevance culminates in the production of compelling content that significantly boosts the presence of JanAr Szklarstwo on social media, thereby driving engagement and fostering a stronger connection with the audience.

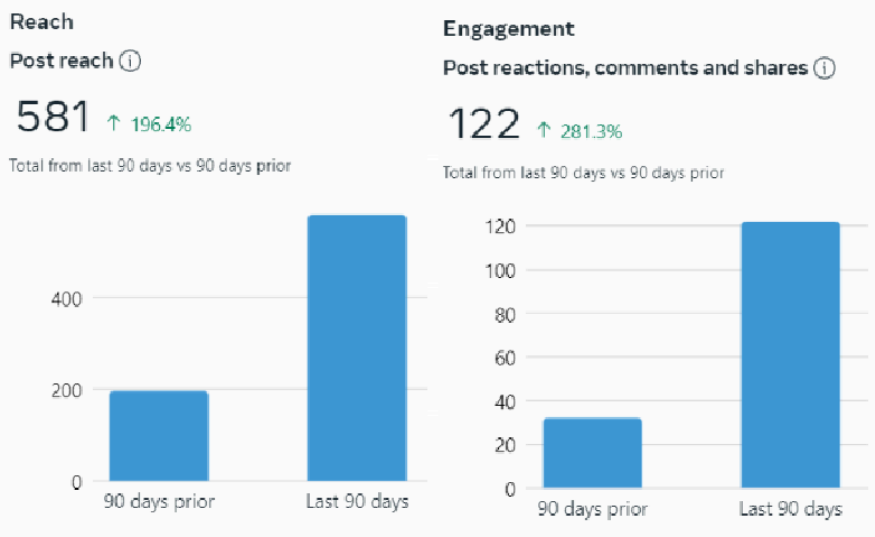
In order to ensure uninterrupted functionality and mitigate potential periods of inactivity, a novel strategy has been implemented utilizing GitHub Actions. This strategy involves the automatic daily refreshment of the application through an empty commit, thereby maintaining its preparedness and performance without the need for manual oversight. By adopting this approach, not only is the commitment to reliability and user experience emphasized, but it also highlights the application of automation in maintaining the operational efficacy of the application.

An incorporation of comprehensive insights into the metrics used to assess the impact of the custom application on the social media performance of JanAr Szklarstwo allows for a more nuanced understanding of the observed enhancements. The quantification of social media engagement and reach assumes a crucial role in the comprehensive evaluation of the effectiveness of the application in augmenting the digital marketing strategy of the business. This supplementary information elucidates the methodology behind the calculated percentage increases in post reach and engagement, thereby fortifying the reliability and comprehensiveness of the case study.

To accurately gauge the effectiveness of the custom application, two key metrics were employed: Facebook post reach and engagement metrics (reactions, comments, and shares).

These metrics provide a tangible means of assessing the success of the application in amplifying the social media presence of JanAr Szklarstwo.

Figure 18: Facebook post reach and engagement metrics



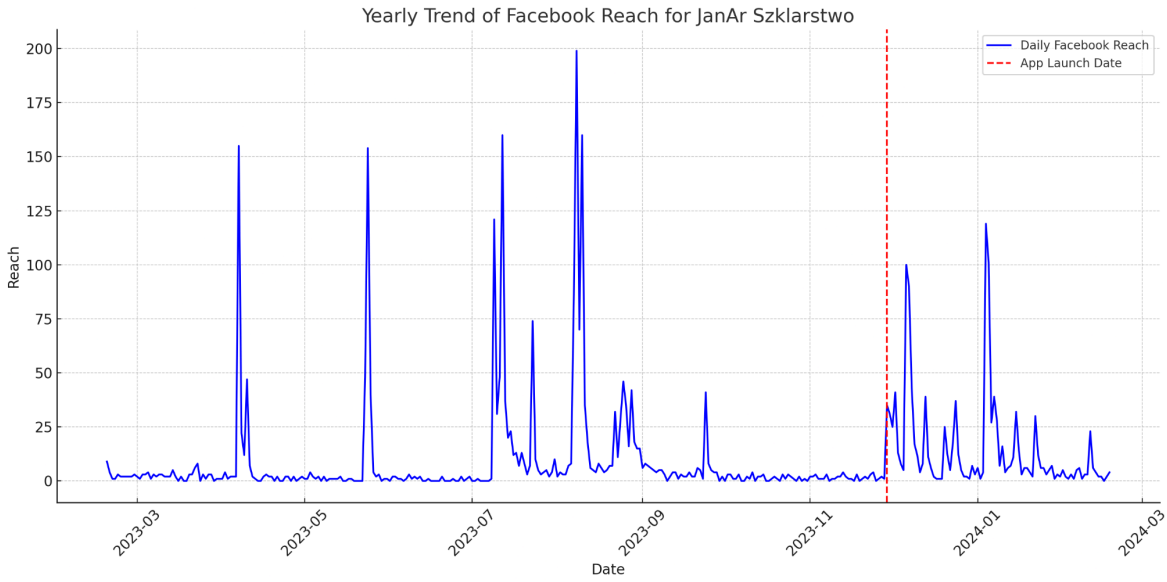

*Source: "JanAr szklarstwo i oprawa obrazów" Facebook fanpage insights tab (access on February 18, 2024)*

1. The metric of Facebook post reach assumes a pivotal role in comprehending the extent to which the content of JanAr Szklarstwo has permeated its intended audience. As per Facebook's definition, post reach refers to the count of unique users who have viewed any of the posts made by the business. This encompasses reach stemming from both organic (non-paid) and paid distributions of the posts, such as boosted posts. It is important to note that reach is estimated and counted only once per user, irrespective of whether the interaction took place through organic or paid means. The marked increase of 196.4% in post reach signifies a near tripling of the business's ability to engage with potential customers, thereby underscoring the instrumental role played by the application in significantly expanding the audience base.
2. Engagement Metrics (Reactions, Comments, and Shares): Engagement metrics provide a comprehensive perspective on the level of user interaction with JanAr Szklarstwo's content. These metrics encompass the total count of reactions (such as likes and loves), comments, and shares on the posts. It is important to note that these metrics aggregate all instances of interactions, even those that have been subsequently removed or

deleted. The substantial increase of 281.3% in these metrics signifies a significant surge in user engagement, indicative of a more dynamic and interactive community surrounding the brand. This surge not only signifies heightened visibility but also a greater level of audience involvement with the content, which is instrumental in fostering brand loyalty and driving sales.

The methodology employed to calculate these percentage increases entails a comparative analysis of the 90-day period prior to and almost 90 days after the launch of the application. By utilizing these specific metrics, the study adheres to industry-standard practices for evaluating social media performance, thereby providing a credible and methodical approach to quantifying the impact of the app.

Figure 19: Yearly trend of Facebook Reach for JanAr Szklarstwo Fanpage




*Source: Own analyze based on "JanAr szklarstwo i oprawa obrazów" Facebook fanpage insights tab (access on February 18, 2024)*

An essential component of analysis is the visual representation of JanAr Szklarstwo's social media metrics, particularly in terms of Facebook reach, before and after the implementation of the custom application. The graph illustrates one year of Facebook reach, with a particular focus on the contrasting periods of the 90 days preceding the application's launch and almost 90 days following it, commencing from November 29,

2023. Prior to this date, the graph depicts significant periods of limited reach, indicating instances where Facebook posts failed to reach an audience. This stagnation in social media engagement and the noticeable decline in the effectiveness of the business's online presence pose a critical challenge for JanAr Szklarstwo.

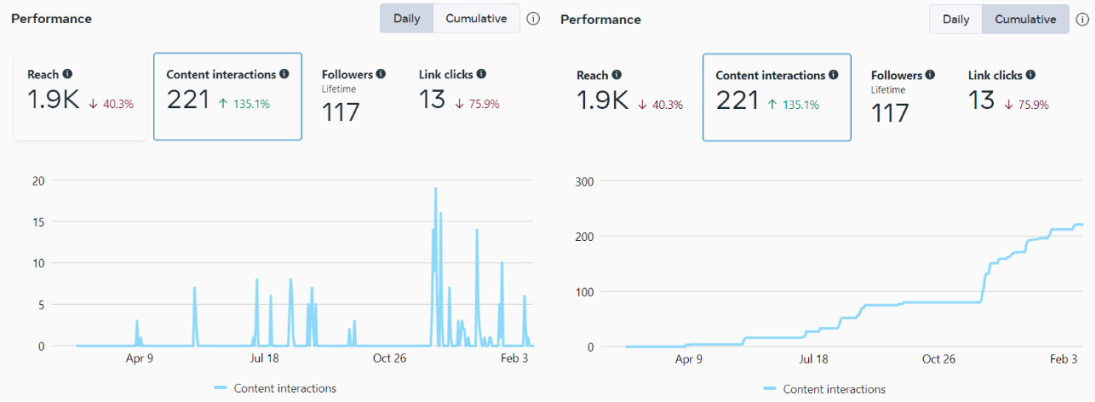
During this "dead period," the business encountered difficulties in maintaining visibility on social media due to a lack of consistent and engaging content. As a result, potential customer engagement and sales opportunities were hindered. These reach gaps underscore the consequences of infrequent posting, primarily caused by the owner's creative block in generating captivating captions for their social media content.

In contrast, the period following the introduction of the AI-powered captioning tool signifies a significant transformation. The graph vividly demonstrates the absence of reach gaps, indicating consistent reach to an audience. This change is not merely quantitative but also qualitative, reflecting a more dynamic and engaging social media strategy facilitated by the app's tailored content generation. The consistent reach during this period serves as evidence of the app's effectiveness in overcoming previous creative obstacles, thereby enabling regular posting and enhancing the brand's visibility and engagement on social media platforms.

Furthermore, this continuous reach highlights the app's role in fostering a consistent brand presence, which is vital for sustaining audience interest and engagement. Regular exposure to the brand through social media posts ensures that JanAr Szklarstwo remains at the forefront of potential customers' minds, thereby increasing the likelihood of sales conversions and recommendations. The graph, therefore, not only emphasizes the elimination of reach gaps but also underscores the strategic significance of regular and captivating content in establishing and maintaining a robust online brand presence.

The examination of figure 19, in conjunction with the previously discussed metrics of engagement, further reinforces the impact of the customized application on JanAr Szklarstwo's social media strategy. It serves as an illustration of how tailored AI solutions can effectively address specific business challenges, such as obstacles in content creation, leading to significant enhancements in social media engagement and, consequently, business growth. This case study serves as a compelling testament to the potential of AI in augmenting marketing strategies and fostering business development in the digital era.

Figure 20: A “Performance” graph




*Source: “JanAr szklarstwo i oprawa obrazów” Facebook fanpage insights tab (access on February 18, 2024)*

An essential element of our analysis of JanAr Szklarstwo's social media strategy is the "Performance" graph, which provides valuable insights into "Content interactions." This graph is divided into two sections: "Daily" and "Cumulative," each offering a distinct perspective on the engagement metrics following the implementation of the customized application. Specifically, the graph demonstrates a substantial increase of 135.1% in content interactions, encompassing likes, comments, shares, and other forms of engagement with the brand's social media content.

The "Daily" section of the Performance graph presents a detailed view of the engagement, illustrating day-to-day fluctuations in content interactions. This 135.1% increase signifies a more engaged and active audience, responding positively to the consistent and creative content generated by the customized application. The daily analysis is crucial for comprehending the immediate impact of the application's content suggestions, highlighting specific days or types of content that received exceptional engagement. This meticulous daily monitoring enables agile marketing strategies, where insights from high-performing posts can inform future content creation, ensuring that the social media strategy remains responsive to audience preferences and behaviors.

Conversely, the "Cumulative" section aggregates these interactions over time, providing a holistic perspective on the engagement trajectory since the introduction of the application. The cumulative viewpoint emphasizes the sustained increase in audience engagement, indicating not only sporadic spikes in activity but also a consistent upward trend. This cumulative analysis is particularly valuable for evaluating the long-term

effectiveness of the customized application in enhancing JanAr Szklarstwo's social media strategy. It visually captures the gradual development of a more engaged community around the brand, underscoring the application's role in transforming occasional viewers into active participants in the brand's digital ecosystem.

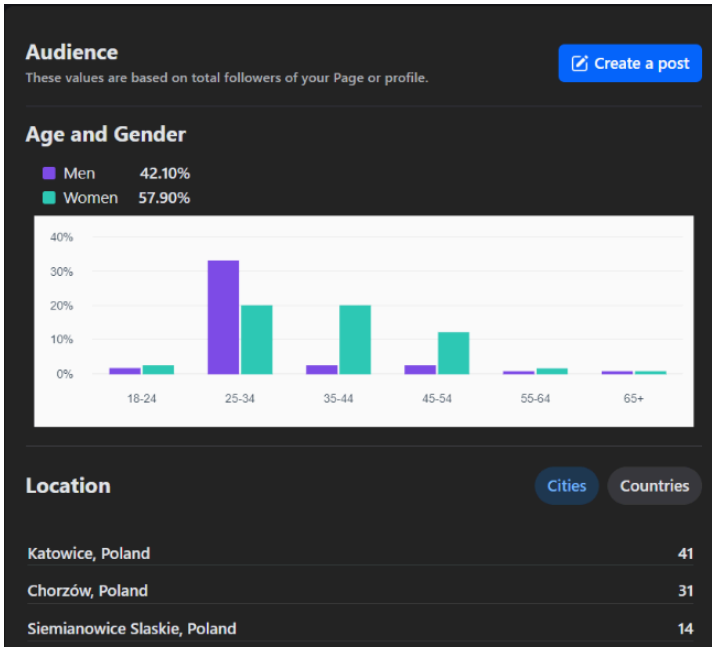
The comparison between the "Daily" and "Cumulative" sections offers a comprehensive understanding of how content interactions have evolved, highlighting the importance of both immediate engagement and long-term relationship-building with the audience. The 135.1% increase in content interactions signifies not only the success of the application in overcoming the creative block faced by Łukasz, but also its effectiveness in fostering a more dynamic and interactive online presence for JanAr Szklarstwo.

This examination of the "Performance" graph further substantiates the transformative influence of utilizing AI for the creation of imaginative content in social media strategies. It emphasizes the nuanced advantages of consistent and captivating content — from inciting immediate responses from the audience to fostering a gradual increase in brand interaction. Through this comprehensive analysis, the case study of JanAr Szklarstwo emerges as a compelling illustration of how targeted AI solutions can significantly enhance marketing outcomes, driving both immediate and sustained business growth in the digital era.

Another crucial aspect in comprehending the impact of the customized application on JanAr Szklarstwo's social media interaction is the examination of the audience's demographics and geographic distribution. The "Audience" insights, with a particular focus on "Age and Gender" as well as "Location," provide a nuanced perspective on whom the business's content is reaching and where these individuals are situated.

The audience composition, as depicted in the screenshot (Figure 21), reveals that 57.90% of the engagement is contributed by women, while men make up 42.10% of the audience. This distribution of gender offers valuable insights into the primary segment of the audience that interacts with JanAr Szklarstwo's social media content. Furthermore, the age distribution graph that accompanies these percentages refines our understanding of the core demographic segments, enabling the implementation of more targeted marketing strategies. Tailoring content to appeal to this demographic profile can enhance engagement and conversion rates by leveraging the insights gained from the performance of content generated by the application.

Figure 21: Audience's demographics and geographic distribution




*Source: "JanAr szklarstwo i oprawa obrazów" Facebook fanpage insights tab (access on February 18, 2024)*

Equally significant is the geographic distribution of the audience, which is highlighted in the "Location" tab. The prominent locations where JanAr Szklarstwo's audience engages are Katowice, Chorzów, and Siemianowice Śląskie. This geographic data is particularly revealing considering the company's physical address is in Katowice. The prominence of Katowice, followed by nearby cities Chorzów and Siemianowice Śląskie, underscores the local relevance of JanAr Szklarstwo's social media reach. It suggests that the content effectively reaches individuals in proximity to the business, who are potential customers likely to utilize JanAr's framing and glasswork services.

The local reach serves as evidence of the custom application's effectiveness in not only overcoming the creative obstacle for the generation of captivating content, but also ensuring that this content reaches an audience with a realistic potential to convert into in-store visits and sales. This geographic insight confirms the strategic significance of localized marketing efforts, especially for businesses like JanAr Szklarstwo, which primarily cater to a local clientele.

Figure 22: Top-performing organic posts


*Source: "JanAr szklarstwo i oprawa obrazów" Facebook fanpage insights tab (access on February 18, 2024)*

A critical aspect of evaluating the impact of the customized application on JanAr Szklarstwo's social media strategy is the analysis of the "Top-performing organic posts." This analysis not only demonstrates the success of the application in generating engaging content but also provides actionable insights into the types of content that resonate most with the audience. The performance metrics of these posts, as highlighted in the screenshot, are crucial in understanding what drives engagement on JanAr's social media platforms.

1. The post that attained the highest reach amassed an impressive 537 views, a staggering 516% increase compared to the median post reach of 58 on Facebook. This notable surge emphasizes the potential of AI-generated captions to captivate the audience's attention and extend the visibility of the content far beyond typical levels of engagement. The aforementioned post showcases the app's capability to create content that not only breaks through the noise of social media, but also significantly broadens the business's reach to a wider audience.
2. Another post, distinguished by receiving the highest number of reactions (22), serves as an illustration of the app's ability to elicit emotional or cognitive responses from the audience. While JanAr's posts typically receive an average reaction count ranging from 5 to 10, the performance of this post indicates a strong connection with the audience, prompting active engagement with the content. These reactions act as an indicator of the post's ability to resonate with viewers, encouraging positive engagement that enhances brand affinity.
3. The post that garnered the highest number of comments (11) further exemplifies the app's effectiveness in fostering a conversational environment. This level of

engagement, significantly surpassing the usual 1 to 3 comments per post, suggests that the content not only captured viewers' attention but also motivated them to interact through comments. Such interaction holds great value as it signifies a deeper level of engagement, transforming passive viewers into active participants in the brand's digital narrative.

The examination of these top-performing posts provides JanAr Szklarstwo with invaluable insights for optimizing content strategy. Understanding the elements that contributed to the success of these posts, whether it be the tone, subject, or visual elements, can inform future content creation, ensuring the production of highly engaging content that resonates with the audience.

The surge in engagement and reach not only enhanced visibility but also emphasized the significance of regular, engaging content in elevating brand awareness. The development of the app, utilizing GPT for content creation and LLMs for backend operations, demonstrates the practical application of AI in addressing real-world business challenges. By tailoring prompts specifically for JanAr Szklarstwo, the app delivers targeted solutions, enhancing the effectiveness of AI tools in marketing strategies.

This intervention exemplifies the transformative potential of AI in overcoming marketing challenges for businesses. It emphasizes the need for marketers to develop customized solutions and skillfully leverage AI tools to enhance business operations. Furthermore, this case study serves as evidence that even individuals without a programming background can effectively utilize AI tools to achieve significant progress, as outlined in point 3.1 of this thesis. As AI technology continues to advance, its integration into marketing strategies becomes not only beneficial but essential for maintaining competitiveness in the digital marketplace.

In summary, the case study of JanAr Szklarstwo serves as a prime example of the immense capabilities of AI in resolving specific challenges faced by businesses. Moreover, it underscores the significance of comprehending and utilizing AI tools to facilitate marketing efforts and foster business expansion. The triumph of this tailored application clearly illustrates that possessing knowledge about AI and the capacity to employ it in a creative manner can lead to extraordinary outcomes, even for individuals with limited technical proficiency. Consequently, this case study reinforces the notion that AI is an

indispensable ally in the era of digitalization, playing a pivotal role in attaining marketing goals and nurturing business growth.

## 3.3 Good practices in working with AI

In the ever-changing realm of marketing, the incorporation of AI has emerged as a crucial axis around which the future of the profession is being reimagined. As we delve deeper into this transformative era, the discussion surrounding AI's role in marketing has moved beyond mere operational efficiency to encompass the fundamental ethical considerations that underlie our societal fabric. The importance of these ethical considerations cannot be overstated, necessitating a reaffirmation and more thorough exploration within the context of this thesis. The dialogue around AI in marketing, although previously examined, requires further emphasis due to its critical and urgent nature in contemporary discourse. The industry-wide conversation confirms the paramount significance of ethical guidelines in navigating the AI landscape—a landscape that is as promising as it is fraught with ethical dilemmas and philosophical quandaries.

The swift advancement and integration of AI technologies in marketing strategies have not only revolutionized how marketers approach data analysis, customer engagement, and campaign optimization but have also raised urgent questions about privacy, bias, and the very essence of human decision-making in the digital age. As these technologies become more sophisticated, the ethical implications of their implementation become increasingly intricate and multifaceted. It is a topic that evokes a wide range of emotions—from fear and apprehension to excitement and awe—highlighting the diverse potential outcomes of AI's role in society. This broad range of reactions underscores the necessity of adopting a nuanced, philosophical approach to AI in marketing, one that carefully balances the potential for innovation with the imperative of ethical responsibility.

The urgency of addressing ethical considerations in AI is not merely academic; it is a reflection of the broader societal concern over the consequences of these technologies. The entire marketing industry, and indeed stakeholders across various sectors, are engaged in a vigorous debate over the appropriate boundaries and guidelines for AI usage. This discourse is not limited to boardrooms and academic circles but has permeated public consciousness, reflecting a collective unease about the future impact of AI on shaping

human experiences and societal norms. The prevalence of this conversation underscores the critical need for marketers to not only possess technological proficiency, but also be well-informed ethically and grounded philosophically.

In this context, the exploration of best practices in working with AI goes beyond technical expertise, venturing into the realm of ethics and moral philosophy. It entails grappling with questions of autonomy, identity, and the essence of human interaction in a world increasingly mediated by algorithms. These are not abstract philosophical ponderings but pressing issues that marketers must confront as they navigate the integration of AI into their practices. The ethical implementation of AI in marketing necessitates a delicate balance, ensuring that technological advancements serve to enhance human well-being without compromising individual rights or perpetuating existing societal inequities.

The discourse regarding the ethical implications of (AI is anything but static; it evolves at a pace commensurate with the rapid advancements in AI technology. This reality presents a continual challenge for marketers, who must consistently evaluate and reevaluate their strategies and practices in light of emerging ethical concerns. The dynamic nature of this discourse renders it a subject of perpetual fascination, teeming with possibilities for innovation and fraught with potential pitfalls. The ethical landscape of AI in the realm of marketing is characterized by uncertainty and complexity, necessitating a vigilant and thoughtful approach.

As we venture further into the intricacies of sound practices in working with AI, it becomes evident that any meaningful discussion must be grounded in a profound comprehension of ethical principles. While this thesis has extensively examined the operational dimensions of AI in marketing, it acknowledges the indispensable importance of revisiting the ethical dimension. This dimension not only informs best practices but also shapes the very foundation upon which the future of marketing—and, by extension, society—will be constructed. In navigating this terrain, marketers are summoned to employ AI not solely as a means of economic gain, but as a catalyst for ethical innovation, steering the profession toward a future that upholds the dignity and autonomy of individuals in an increasingly automated world.

By anchoring our exploration in ethics, we recognize the profound impact of AI on the fabric of human interactions and the pivotal role that marketers play as custodians of this

potent technology. This thesis endeavors to present a comprehensive framework for comprehending and implementing AI in marketing, one that is profoundly influenced by ethical considerations and guided by a commitment to the betterment of society. As we delve into the specifics of AI's application in marketing, the philosophical approach adopted here serves as a reminder of the broader ramifications of our work, compelling us to proceed with both aspiration and caution.

The ongoing debate surrounding the role of AI in decision-making processes, particularly within the domains of business and marketing, occupies a prominent place in discussions of both ethics and practicality. The assertion that AI should complement human capabilities rather than replace them stems from a fundamental understanding of the current limitations of AI and the inherent value of human judgment. This perspective is not only pragmatic, but also intrinsically intertwined with the philosophical foundations of human identity, self-efficacy, and our collective vision for a future in which technology enhances rather than diminishes our humanity.

At this stage in the advancement of technology, where the concept of general artificial intelligence (AGI) still remains theoretical rather than actual (although we are approaching it rapidly), the notion that AI can autonomously make decisions in critical areas such as business or marketing is premature. This assertion is based on the recognition that despite its computational abilities, AI lacks the nuanced understanding and emotional intelligence that human decision-makers possess. AI systems excel at processing large amounts of data, identifying patterns, and carrying out tasks with unmatched speed and accuracy. However, they do not possess the wisdom, ethical reasoning, or creative thinking that humans bring to complex problem-solving scenarios. Allowing AI to make important business or marketing decisions without human oversight not only undermines the value of human expertise, but also risks neglecting the ethical, cultural, and socio-economic contexts that are crucial for sound decision-making.

Furthermore, relying too heavily on AI for decision-making can lead to a decreased sense of self-efficacy among professionals. Human identity, particularly in professional settings, is significantly influenced by our ability to be resourceful, self-assured, and to overcome challenges. Completely delegating critical thinking and decision-making processes to AI could erode these aspects of professional identity, resulting in a workforce

that is less motivated and less invested in the outcomes of their work. Striking a balance between utilizing AI for its analytical capabilities and preserving the invaluable human elements of creativity, ethical judgment, and interpersonal intuition is of great importance. Achieving this balance is essential for creating a work environment where technology acts as a facilitator of human potential rather than a replacement for it.

However, there is a hypothetical future in which the ethical considerations surrounding AI decision-making may change. In domains such as autonomous vehicles or medical surgery, where the precision and consistency of AI can surpass human capabilities significantly, the ethical perspective on AI autonomy might shift. If and when AI systems reach a level of sophistication where their operation within specific controlled environments minimizes human error to nearly zero, there might be an ethical inclination towards granting AI autonomy. For example, in a world where autonomous vehicles navigate our roads flawlessly, introducing human drivers could be viewed as an unnecessary risk. Similarly, in surgeries where the steadiness of a machine surpasses that of the steadiest human hand, relying on AI could become a moral obligation.

Nevertheless, this hypothetical future does not invalidate the current reality where AI, particularly in marketing and business decision-making, should serve as an assistant rather than an authority. AI has the capability to review documents, organize data, generate insights, and stimulate creativity. It should be seen as a tool that marketers and business professionals consult to enhance their understanding and broaden their perspectives. However, the final decisions should ultimately be made by humans, informed by AI but not dictated by it.

This approach fosters a dynamic wherein the connection between humans and AI is similar to that of a parent and child, or perhaps more fittingly, a mentor and apprentice. In this relationship, humans assume the role of guiding AI development, establishing boundaries, imparting values, and shaping its growth. The objective is not to create an independent entity, but rather to nurture a powerful tool that enhances human capabilities without overshadowing the human element.

The conversation surrounding AI's role in decision-making extends beyond its current capabilities to what it may potentially accomplish in the future. It is a discourse that encompasses not only the technical and practical aspects of AI integration but also the

philosophical and ethical considerations that will shape our collective future. As we navigate this intricate domain, the guiding principle should be evident: AI should serve to enhance human judgment, not supplant it. This standpoint is crucial in ensuring that as we progress technologically, we remain firmly grounded in our humanity, with all its imperfections and brilliance.

In the realm of marketing, where change is constant and the abundance of data is overwhelming, the allocation of tasks to AI emerges as a pivotal strategy for improving efficiency and channeling human creativity towards more complex challenges. This strategic shift towards embracing AI for task management is not solely a matter of operational logistics, but rather intricately intertwined with ethical considerations that underscore the responsible utilization of technology in contemporary business practices. As we delve deeper into the integration of AI within marketing processes, it becomes imperative to navigate this landscape with a principled approach that prioritizes ethical standards, data privacy, and the mitigation of bias, ensuring that the deployment of AI contributes positively to organizational objectives and societal welfare.

The ethical assignment of tasks to AI encompasses a wide range of activities, including data analysis, customer segmentation, content optimization, and routine administrative responsibilities, as previously mentioned. By automating these processes, marketing professionals can free up valuable time and resources, redirecting their attention towards strategic planning, creative development, and the cultivation of meaningful customer relationships. However, this transition to AI-driven task management necessitates a careful evaluation of the tasks suitable for delegation, ensuring that AI's involvement enhances accuracy and efficiency without compromising the integrity or personalized nature of marketing endeavors.

One of the foremost ethical considerations in delegating tasks to AI is the preservation of individual privacy. As AI systems analyze vast amounts of consumer data to inform marketing strategies, it is crucial to establish robust data governance policies that safeguard sensitive information and adhere to regulatory standards such as the European General Data Protection Regulation (GDPR).[137] Marketers must guarantee that AI tools are designed and

[137] L. Caruccio, et al.: *GDPR Compliant Information Confidentiality Preservation in Big Data Processing*. "IEEE Access", 2020, p. 1

utilized in a manner that respects consumer consent and maintains transparency regarding data collection and usage practices. This commitment to privacy not only safeguards against legal and reputational risks but also fosters trust between brands and their audiences, a fundamental pillar of successful marketing.

Moreover, the ethical utilization of AI in the realm of marketing necessitates diligent endeavors to identify and alleviate biases within AI algorithms. Given that AI systems acquire knowledge from historical data, there exists a potential danger that they may perpetuate or even magnify existing biases, resulting in unjust or discriminatory outcomes. Marketers must actively engage with AI developers to comprehend the origins of data utilized by AI models, critically analyze the decision-making processes of these systems, and implement corrective measures to ensure that marketing strategies are comprehensive and fair. This proactive stance against bias reinforces the moral foundation of marketing initiatives, aligning them with broader societal values and contributing to a more equitable and inclusive marketplace.

Another pivotal aspect of ethical AI delegation involves the transparent communication of AI's role in marketing processes to both internal stakeholders and consumers. It is crucial for marketing teams to comprehend the capabilities and limitations of AI tools, setting realistic expectations regarding what AI can accomplish and where human oversight is indispensable. Likewise, being forthright with consumers regarding the utilization of AI in personalizing marketing messages and offers can augment the authenticity of brand communications and empower consumers with choices concerning their interaction with AI-generated content.

As marketing professionals navigate the intricacies of AI delegation, it is also imperative to cultivate a culture of continuous learning and adaptation. The field of AI is rapidly evolving, with novel technologies, ethical guidelines, and best practices emerging on a regular basis. Marketers should commit to ongoing education and collaboration with AI experts, ethicists, and regulatory bodies to stay abreast of the latest developments and ensure that their AI strategies remain aligned with ethical standards and industry norms.

In this context, the delegation of tasks to AI in marketing transcends mere operational efficiency, encompassing a comprehensive approach that integrates ethical considerations at every juncture. By embracing AI as a tool for data-driven insights and process optimization,

while unwaveringly upholding commitments to privacy, fairness, transparency, and continuous improvement, marketers can harness the transformative potential of AI. This balanced approach ensures that AI functions as a valuable ally in the pursuit of marketing excellence, enhancing human creativity and strategic insight through computational power and efficiency.

As we persevere in exploring the immense potential of AI in revolutionizing marketing practices, the ethical delegation of tasks to AI emerges as a beacon of responsible innovation. It serves as a testament to the marketing profession's dedication to employing technology in a manner that upholds human dignity, fosters inclusivity, and builds trust. By doing so, marketers not only amplify the effectiveness of their campaigns but also contribute to shaping a future where technology and ethics converge to generate value for businesses and society as a whole.

In an era characterized by the prevalence of digital communication and artificial intelligence, the inherent worth of human interaction in the field of marketing remains unaltered. Despite the advancements in technology that have revolutionized the marketing landscape, the irreplaceable nature of interpersonal relationships serves as a testament to the enduring significance of human connection. This fundamental aspect of human nature, namely the longing for genuine engagement and the sentiment of being cared for, highlights the limitations of artificial intelligence in emulating the intricate dynamics of human relationships. The essence of marketing, at its essence, revolves around cultivating trust, comprehension, and emotional bonds with consumers—elements that are deeply rooted in human interactions and cannot be fully replicated by algorithms.

The emergence of chatbots and customer service tools driven by artificial intelligence has undoubtedly bolstered operational efficiency, enabling businesses to provide rapid responses to customer inquiries at all times. Nevertheless, the experience of interacting with a bot, regardless of its sophistication, starkly contrasts with the engagement of a conversation with another individual. Individuals possess an innate ability to discern between communicating with a machine and interacting with a human being. This discernment is not solely cognitive, but also emotional; there is a noticeable sense of disconnection when the response lacks the warmth, empathy, and comprehension that only a human can offer. Consumers frequently express a preference for human interaction,

particularly in situations that necessitate nuanced comprehension, empathy, or intricate problem-solving—circumstances where the pre-programmed responses of a bot fall short.

The significance of human interaction in marketing transcends the confines of artificial intelligence in customer service. It encompasses the entire range of marketing activities, ranging from brand narrative creation and content development to sales and post-sales support. Human ingenuity, emotion, and intuition drive the development of captivating marketing stories that strike a chord with audiences on a personal level. Storytelling, a cornerstone of effective marketing, relies on comprehending the values, aspirations, and challenges of the target audience. This profound level of empathy and understanding cannot be synthesized by artificial intelligence; it is the outcome of human experience, cultural awareness, and emotional acumen.

Furthermore, the human factor plays a pivotal role in establishing and nurturing enduring customer relationships. The value of these relationships cannot be overstated, as they serve as the foundation for brand loyalty and customer retention. Individuals long for genuine connections and personalized experiences that make them feel valued and understood. While artificial intelligence can analyze data to predict customer preferences and tailor communications to a certain extent, it cannot replicate the authentic concern, spontaneous creativity, and adaptability of human interactions. These human attributes foster a sense of belonging and loyalty that surpasses transactional relationships, transforming customers into advocates for the brand.

The significance of upholding human elements in marketing is also evident in the ethical considerations surrounding the implementation of AI. Ethical marketing practices prioritize transparency, respect for privacy, and the avoidance of manipulation. These principles are most effectively upheld through human supervision, ensuring that marketing strategies not only adhere to legal standards but also align with moral values and societal norms. The human factor in marketing acts as a protector of ethical integrity, guaranteeing that technological advancements are utilized to enhance customer experiences without compromising ethical principles.

Moreover, the role of the human touch in marketing extends beyond the preservation of inherently human aspects and encompasses innovation as well. Human creativity and problem-solving abilities are the driving forces behind groundbreaking marketing strategies

and campaigns. While AI can offer tools and insights, the creative spark and strategic vision needed to innovate and adapt to changing market dynamics originate from the human mind. This creative capacity, in combination with the ability to empathize and establish connections on a human level, ensures that marketing remains dynamic, relevant, and profoundly human.

The discussion on the human role in marketing does not reject technological advancements, but rather calls for a balanced approach that harnesses the best of both worlds. By integrating AI and digital tools to manage operational efficiencies and data-driven insights, marketers can allocate valuable resources to focus on aspects of their work that require a human touch. This balanced approach acknowledges the strengths and limitations of both humans and machines, with the aim of enhancing the effectiveness of marketing strategies while preserving the essence of human connection.

In essence, the human touch in marketing acknowledges the fundamental necessity for connection, empathy, and understanding that define the human experience. It values the irreplaceable interpersonal relationships that lie at the core of effective marketing. As we navigate the complexities of a digital world, the reminder to preserve and prioritize human connections acts as a guiding principle, ensuring that marketing remains a deeply human endeavor, enriched by technology but not overshadowed by it.

In conclusion, our exploration of best practices in utilizing AI within the marketing domain has led us through a comprehensive dialogue that underscores the paramount importance of ethical integration, the complementarity of humans and AI, efficient task delegation, and the irreplaceable value of the human touch. This journey reaffirms that while AI offers unparalleled opportunities to enhance operational efficiencies, drive data-driven insights, and revolutionize customer engagement, it does not diminish the fundamental need for human intuition, creativity, and empathy in the fabric of marketing.

At the core of this conversation lies the moral obligation that guides the implementation of AI in the field of marketing. As we have discussed in detail, adopting a principled approach when navigating the AI landscape ensures that technological advancements contribute to the amplification of human potential rather than compromising ethical standards. This ethical foundation is crucial not only for maintaining trust and transparency with consumers, but also for safeguarding the integrity of the marketing

profession in the digital era. The ethical considerations surrounding the use of AI in marketing, which range from concerns about privacy to the mitigation of bias, are not merely issues of regulatory compliance, but rather central to fostering a responsible and sustainable integration of AI into marketing practices.

Moreover, the concept that AI should serve as a complement to human capabilities rather than a substitute is a recurring theme that resonates across various aspects of marketing. This perspective promotes the idea that the role of AI is to enhance and support human decision-making processes, providing tools and insights that empower marketers to focus on more strategic and creative tasks. By delegating routine and data-intensive tasks to AI, human resources are freed up, enabling marketers to invest their time in cultivating deeper relationships with customers and devising innovative strategies that connect on a human level.

The discussion on the human touch in marketing sheds light on the inherent value of interpersonal relationships, which remain fundamental to effective marketing. Despite the sophistication of AI technologies, algorithms cannot replicate the emotional and psychological nuances of human interactions. The human factor embodies the essence of marketing by fostering authentic connections, empathy, and trust that surpass the capabilities of AI. This underscores the significance of striking a balance between technological advancements and the preservation of the human elements that define the marketing profession.

The exploration of the ethical, practical, and humanistic considerations of working with AI in marketing culminates in a call for a balanced approach. This approach advocates for leveraging AI to enhance efficiency and gain insights, while steadfastly preserving the irreplaceable human elements of creativity, intuition, and emotional intelligence. By embracing ethical guidelines, acknowledging the complementary role of AI, prioritizing efficient task delegation, and upholding the value of the human role, marketers can navigate the complexities of the digital age. This balanced approach ensures that AI serves as a powerful ally in the marketing arsenal, driving innovation and efficiency without diminishing the essential human elements that define the profession. In doing so, we pave the way for a future where technology and humanity converge to create meaningful, ethical, and effective marketing practices.

# Summary

In the current digital era, the incorporation of Artificial Intelligence (AI) into marketing strategies signifies a fundamental change towards more personalized, efficient, and dynamic business operations. The thesis meticulously examines the multifaceted role of AI in redefining marketing paradigms, with a particular emphasis on its practical applications and theoretical foundations within enterprises undergoing digital transformation.

The origin of the thesis establishes a fundamental comprehension of AI, elucidating its evolution and the rise of Large Language Models (LLMs) as pivotal instruments in the marketing arsenal. By clarifying the core principles of AI and its developmental trajectory, the thesis sets the stage for a more profound investigation into its utilization in marketing and sales, highlighting the transformative potential of AI to enhance customer engagement, optimize data-driven decision-making processes, and foster innovation.

At the heart of the thesis lies the examination of AI's role in digital transformation, with a specific focus on the marketing sector. This encompasses a comprehensive analysis of how AI technologies, particularly LLMs, are utilized to craft personalized marketing messages, automate content creation, and optimize customer interactions. Through detailed case studies and empirical evidence, the thesis illustrates the practical implications of AI in crafting sophisticated marketing strategies that align with contemporary consumer expectations and behaviors.

Furthermore, the thesis delves into the challenges and opportunities presented by digital transformation in marketing, underscoring the significance of strategic alignment and the adoption of AI technologies. It emphasizes the necessity for organizations to foster a culture of innovation and agility, enabling them to harness the full potential of AI in enhancing marketing effectiveness and driving business growth.

The practical application of AI in marketing, as discussed in the thesis, extends beyond theoretical discourse, providing a pragmatic guide for marketers aiming to incorporate AI into their strategies. This encompasses insights into advanced prompt crafting with GPT-4, which could potentially lead to automated artwork caption generation, and best practices for engaging with AI technologies. These sections not only reinforce the theoretical foundation

laid out in earlier chapters but also offer actionable strategies for marketers to navigate the complexities of AI implementation.

By synthesizing the theoretical and practical dimensions of AI in marketing, the thesis advocates for a balanced approach that acknowledges the potential of AI to revolutionize marketing practices while recognizing the challenges inherent in its adoption. It posits that the successful integration of AI in marketing strategies requires a holistic understanding of both the technological capabilities of AI and the evolving landscape of consumer preferences.

The thesis contributes to the discourse on AI in marketing, providing a nuanced exploration of its implications for businesses in the digital age. By highlighting the synergy between AI and marketing strategies, the thesis not only enhances academic knowledge but also offers valuable insights for practitioners seeking to leverage AI for competitive advantage. This work underscores the transformative potential of AI in shaping the future of marketing, advocating for its strategic integration to drive innovation, efficiency, and growth in the digital era.

# References


1. Abasaheb S. A., Subashini R.: *Maneuvering of Digital Transformation: Role of Artificial Intelligence in Empowering Leadership - An Empirical Overview.* International Journal of Professional Business Review. 2023.
2. Agrawal A., Singh V., Fischer M.: *LeanAI: A method for AEC practitioners to effectively plan AI implementations.* Proceedings of the 40th International Symposium on Automation and Robotics in Construction. 2023.
3. Ather S. H.: *A History of Artificial Intelligence*. https://ahistoryofai.com/antiquity/.
4. Bahrini A., Khamoshifar M., Abbasimehr H., Riggs R., Esmaeili M., Majdabadkohne R. M., Pasehvar M.: *ChatGPT: Applications, Opportunities, and Threats.* Systems and Information Engineering Design Symposium. 2023.
5. Baloğlu G., Çakali K.: *Is Artificial Intelligence a New Threat to the Academic Ethics?: Enron Scandal Revisited By ChatGPT.* İşletme. 2023.
6. Bérubé M., Giannelia T., Vial G.: *Barriers to the Implementation of AI in Organizations: Findings from a Delphi Study.* Hawaii International Conference on System Sciences. 2021.
7. Bresniker K. M., Gavrilovska A., Holt J., Milojicic D., Tran T. D.: *Grand Challenge: Applying Artificial Intelligence and Machine Learning to Cybersecurity.* Computer. 2019.
8. Burger B., Kanbach D., Kraus S., Breier M., Corvello V.: *On the use of AI-based tools like ChatGPT to support management research.* European Journal of Innovation Management. 2023.
9. Caruccio L., Desiato D., Polese G., Tortora G.: *GDPR Compliant Information Confidentiality Preservation in Big Data Processing*. IEEE Access. 2020.
10. Chirag: *Overview of Neural Network*. International Journal of Advanced Research in Science, Communication and Technology. 2022.
11. D'Arco M., Lo Presti L., Marino V., Resciniti R.: *Embracing AI and Big Data in customer journey mapping: from literature review to a theoretical framework*. Innovative Marketing. 2019.
12. Davenport T., Guha A., Grewal D., Breßgott T.: *How artificial intelligence will change the future of marketing.* Journal of the Academy of Marketing Science. 2019.

13. De Bruyn A., Viswanathan V., Beh Y., Brock J., von Wangenheim F.: *Artificial Intelligence and Marketing: Pitfalls and Opportunities*. Journal of Interactive Marketing. 2020.
14. Ding X., Shi L., Shi M., Liu Y.: *Influencing Factors of Enterprise Intelligent Manufacturing Based on the Three Stages of Intelligent Manufacturing Ecosystems.* Journal of Information Technology Research. 2022.
15. Dumbach P., Schwinn L., Löhr T., Elsberger T., Eskofier B. M.: *Artificial intelligence trend analysis in German business and politics: a web mining approach.* International Journal of Data Science and Analysis. 2023.
16. Eriksson T., Bigi A., Bonera M.: *Think with me, or think for me? On the future role of artificial intelligence in marketing strategy formulation.* The TQM Journal. 2020.
17. Floridi L.: *AI as Agency Without Intelligence: on ChatGPT, Large Language Models, and Other Generative Models*. Philosophy & Technology. 2023.
18. Foster L.: *Few-shot and Zero-shot Learning: From Meta-learning to Semantic Embeddings*. https://medium.com/@lfoster49203/few-shot-and-zero-shot-learning-from-meta-learning-to-semantic-embeddings-ae12dc450025.
19. Furjan M. T., Tomičić-Pupek K., Pihir I.: *Understanding Digital Transformation Initiatives: Case Studies Analysis.* Business Systems Research Journal. 2020.
20. Gaikwad K. L., Gautam R.: *Artificial Intelligence and its Application in Today's Marketing Context.* International Journal For Multidisciplinary Research. 2023.
21. Garrido-Merchán E. C., Arroyo-Barrigüete J. L., Borr'as-Pala F., Escobar-Torres L., Martínez de Ibarreta C., Ortiz-Lozano J. M., Rua-Vieites A.: *Real Customization or Just Marketing: Are Customized Versions of Chat GPT Useful?* arXiv.org". 2023.
22. Gong C., Ribière V.: *Developing a unified definition of digital transformation.* Technovation. 2021.
23. Gruetzemacher R., Whittlestone J.: *The Transformative Potential of Artificial Intelligence*. Futures. 2019.
24. Guinness H.: *What is artificial general intelligence (AGI)?* https://zapier.com/blog/artificial-general-intelligence/.

25. Haleem A., Javaid M., Qadri M. A., Singh R. P., Suman R.: *Artificial intelligence (AI) applications for marketing: A literature-based study.* International Journal of Intelligent Networks. 2022.
26. Hermann E.: *Leveraging Artificial Intelligence in Marketing for Social Good—An Ethical Perspective.* Journal of Business Ethics. 2021.
27. Herremans D.: *aiSTROM–A Roadmap for Developing a Successful AI Strategy.* IEEE Access. 2021.
28. Jain A.: *Types of Machine Learning.* https://www.geeksforgeeks.org/types-of-machine-learning/.
29. Kaya Y., Bozbura F. T.: *Digital Transformation: A Cognitive Study for Organizations to Shape their Journeys.* International Journal of Professional Business Review. 2023.
30. Khatri M.: *How Digital Marketing along with Artificial Intelligence is Transforming Consumer Behaviour?* International Journal for Research in Applied Science and Engineering Technology. 2021.
31. Kieran S., Krishna J. M.: *Facilitating AI in the Domain of Digital Marketing in Chennai City.* Journal of Development Economics and Management Research Studies. 2023.
32. Kim J. Y., Boag W., Gulamali F., Hasan A., Hogg H., Lifson M., Mulligan D., Patel M. R., Raji I. D., Sehgal A., Shaw K., Tobey D., Valladares A., Vidal D., Balu S., Sendak M.: *Organizational Governance of Emerging Technologies: AI Adoption in Healthcare.* Conference on Fairness, Accountability and Transparency. 2023.
33. LaFountain B., Khodabandeh S.: *The Cultural Benefits of Artificial Intelligence in the Enterprise*. 2021.
34. Li C., Wang J., Zhu K., Zhang Y., Hou W., Lian J., Xie X.: *Large Language Models Understand and Can be Enhanced by Emotional Stimuli*. 2023.
35. Liu N. F., Lin K., Hewitt J., Paranjape A., Bevilacqua M., Petroni F., Liang P.: *Lost in the Middle: How Language Models Use Long Contexts.* arXiv.org. 2023.
36. Ma L., Sun B.: *Machine learning and AI in marketing – Connecting computing power to human insights*. International Journal of Research in Marketing. 2020.
37. Mari A.: *The Rise of Machine Learning in Marketing: Goal, Process, and Benefit of AI-Driven Marketing*. 2021.

38. Martin L., Whitehouse N., Yiu S., Catterson L., Perera R.: *Better Call GPT, Comparing Large Language Models Against Lawyers*. 2024.
39. Miklošík A., Kuchta M., Evans N., Zak S.: *Towards the Adoption of Machine Learning-Based Analytical Tools in Digital Marketing.* IEEE Access. 2019.
40. Naqvi S. G., Sheraz S., Mehmood I., Yasin M.: *Cyber-physical Systems and Artificial Intelligence: The Role of Cyber Security, Machine Learning, Threats and benefits to Modern Economies and Industries.* Pakistan journal of humanities and social sciences. 2023.
41. Noranee S., Othman A. K. B.: *Understanding Consumer Sentiments: Exploring the Role of Artificial Intelligence in Marketing.* JMM17: Jurnal Ilmu Ekonomi dan Manajemen. 2023.
42. Ortiz S.: *GPT-4 is getting significantly dumber over time, according to a study.* https://www.zdnet.com/article/gpt-4-is-getting-significantly-dumber-over-time-according-to-a-study/.
43. Pan X., Zhang M., Ji S., Yang M.: P*rivacy Risks of General-Purpose Language Models.* IEEE Symposium on Security and Privacy. 2020.
44. Paschek D., Mocan A., Draghici A.: *Industry 5.0 – The Expected Impact Of Next Industrial Revolution*. 2019.
45. Perkins M.: *Academic integrity considerations of AI Large Language Models in the post-pandemic era: ChatGPT and beyond.* Journal of University Teaching and Learning Practice. 2023.
46. Peters H., Matz S. C.: *Large Language Models Can Infer Psychological Dispositions of Social Media Users.* arXiv.org. 2023.
47. Romanenko O., Alaverdian L., Basova G.: *Use of chatbots in the trade of building materials.* Marketing and Digital Technologies. 2022.
48. Rožman M., Oreški D., Crnogaj K., Tominc P.: *Agility and Artificial Intelligence Adoption: Small vs. Large Enterprises.* "Our economy". 2023.
49. Saputra R., Nasution M. I. P., Dharma B.: *The Impact of Using AI Chat GPT on Marketing Effectiveness: A Case Study on Instagram Marketing.* Indonesian Journal of Economics and Management. 2023.

50. Shaik M.: *Implementing AI-Driven Efficiency: Best Practices for Intelligent Order Processing in SAP*. International Journal for Research in Applied Science and Engineering Technology. 2024.
51. Smith C.: *Creating a Pseudocode Language using ChatGPT.* https://medium.com/@charlessmith2316/creating-pseudocode-compiler-using-chatgpt-5c707ae67fcd.
52. Sun W., Yan L., Ma X., Ren P., Yin D., Ren Z.: *Is ChatGPT Good at Search? Investigating Large Language Models as Re-Ranking Agent.* Conference on Empirical Methods in Natural Language Processing. 2023.
53. Tabassam A. I. U.: *MLOps: A Step Forward to Enterprise Machine Learning.* arXiv.org. 2023.
54. Thakur J., Kushwaha B.: *Artificial intelligence in marketing research and future research directions: Science mapping and research clustering using bibliometric analysis.* Global Business and Organizational Excellence. 2023.
55. Tratkowska K.: *Digital Transformation: Theoretical Backgrounds of Digital Change.* Management Sciences. 2019.
56. Vogel T.: *GPT-4-1106-preview gives longer responses when offered a tip.* https://twitter.com/voooooogel/status/1730726744314069190.
57. Wang L., Ma C., Feng X., Zhang Z., Yang H. R., Zhang J., Chen Z. Y., Tang J., Chen X., Lin Y., Zhao W. X., Wei Z., Wen J. R..: *A Survey on Large Language Model based Autonomous Agents.* arXiv.org. 2023.
58. Wang Y., Le H., Gotmare A. D., Bui N. D. Q., Li J., S. C. H.: *CodeT5+: Open Code Large Language Models for Code Understanding and Generation.* Conference on Empirical Methods in Natural Language Processing. 2023.
59. Wu S., Irsoy O., Lu S., Dabravolski V., Dredze M., Gehrmann S., Kambadur P., Rosenberg D., Mann G.: *BloombergGPT: A Large Language Model for Finance.* arXiv.org. 2023.
60. Wu X., Duan R., Ni J.: *Unveiling Security, Privacy, and Ethical Concerns of ChatGPT.* Journal of Information and Intelligence. 2023.
61. Yang X., Li H., Ni L., Li T.: *Application of Artificial Intelligence in Precision Marketing.* Journal of Organizational and End User Computing. 2021.

62. Zheng L., Chiang W. L., Sheng Y., Zhuang S., Wu Z., Zhuang Y., Lin Z., Li Z., Li D., Xing E. P., Zhang H., Gonzalez J. E., Stoica I.: *LMSYS Chatbot Arena Leaderboard.* https://huggingface.co/spaces/lmsys/chatbot-arena-leaderboard.

# List of figures

# List of tables