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THE PANORAMA OF ARTIFICIAL INTELLIGENCE – DEVELOPMENT OR ADVANCEMENT?

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ABSTRACT:

The objective of this study is to identify and describe the main milestones in the development of artificial intelligence in the form of a chronological overview of its historical development. This study also seeks to present an argument that challenges the stereotypically and uncritically accepted thesis that draws no distinction between the concepts of development and advancement as they apply to artificial intelligence. Development is a mechanism following a process of leaps forward, without a goal, without criteria based on values or morals. Progress is an ambivalent phenomenon, the practical outcome and result of a specific developmental phase of interacting social, technological, economic, and cultural factors. A historical understanding of the context that gave rise to the development of key concepts of artificial intelligence technologies is the foundation for further possible scientific analysis and qualified predictions of the transformation of society. The phenomenon of artificial intelligence is distinctive for its ambivalent nature. On one hand, it contributes to the prosperity of society, increases efficiency, accelerates performance, and makes a range of human activities easier and more precise. On the other hand, artificial intelligence generates unseen social risks, transforms the function of cultural patterns, and breaks social norms, raising philosophical, ethical, moral, and legislative questions. This review study can serve as a starting point for further study and research analyses to identify the main trends in the technological development of artificial intelligence in the context of questions of advancement in social, cultural, political, economic, ethical, or legislative transformations of society.

KEY WORDS:

advancement, ambivalence, artificial intelligence, chronological overview, development, risks

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1 Introduction

"Artificial intelligence (AI) is more than just a technology. It is becoming a fixed part of cultural change, a determinant of social reality, and a part of everyday life." (Betancourt, 2020, p. 14). The applications of AI can be seen in various spheres of human life. In medical sciences (Kalra et al., 2024) techniques based on AI can be used for various diagnostic procedures such as disease prediction, medication decisions, and disease prognosis. In the field of education, AI enables personalisation of instruction, the implementation of adaptive educational systems, or the application of virtual and augmented reality to the learning process (Fitria, 2023). In transportation and logistics, it helps optimise traffic using intelligent systems, manage public transport, and dynamically adapt schedules and routes to the current traffic situation (Wang et al., 2024). In industrial manufacturing, AI fundamentally contributes to improving efficiency, productivity, and the spread of innovation (Grech et al., 2023). It assists in various areas of manufacturing, logistics, maintenance, and process control. AI also plays an important role in the media and marketing spheres (Henry, 2019). It is significantly shaping the digital information landscape, contributing to the transformation of public space and redefining the relationship between public and private (Radošinská & Višňovský, 2016). AI improves personalisation and allows data to be analysed and customers to be reached more effectively (Mariani et al., 2022). AI is changing the way content is created, how marketing campaigns are designed, and how consumers are engaged (Malikireddy, 2024).

On the one hand, we see that AI has the potential to contribute to the prosperity of society, accelerating and streamlining many human activities, freeing employees from routine, tedious, unskilled, and time-consuming workflows that could easily by subject to algorithms. It enables the development of human capital in other, more creative types of professions that require inventiveness, new forms of thinking, and a critical approach. On the other hand, there are serious philosophical, ethical, moral, legislative, and social questions about the relationship between artificial intelligence, people, and society. The technological enthusiasm and belief in the further prosperity of one aspect have been replaced with fears of unseen risks created by artificial intelligence, the erosion of the principles of humanity, and the questioning of human identity.

The role of AI in society is full of doubt and uncertainty, generating countless potential questions. Will humanity undergo a fundamental transformation in which the reality of physical objects is gradually identified with the virtual and augmented reality of digitised human existence? In such a world, will there still be room for human emotions, empathy, and spontaneity, or will we be left with nothing more than robotic sex? Will artificial intelligence algorithms come to dominate the conventional environment of partner relationships and replace them with digitised projections of emotions and simulations of human feelings? Will we then still crave the human touch? Will a "Proteus effect" (Reinhard et al., 2019) take hold in full force in the form of a permanent adaptation of real human life to a digital representation of it? Will such a world even be real? Will this reality eventually become merely virtual or will the virtual become real? Will there still be a difference between online and offline communication or are there other possible alternative scenarios of future evolution? Logically, questions such as these and others are multiplying, and a search is underway for various philosophical explanations and legislative measures, as options for regulating and overseeing artificial intelligence have become the subject of debate. In order to understand these questions and find adequate answers to them, it is important to reflect on how the idea of artificial intelligence has evolved over time and what major milestones have determined or are continuing to determine its direction.

The objective of this study is to identify and describe the main milestones in the development of AI, while presenting a brief chronological development of the idea of AI as a technology of the future. Another objective is to critically challenge the often incorrect, inaccurate, and unqualified conflation or identification of the terms development and advancement as they apply to AI. In the media, public debates, policy discussions, and academia, there is a need for a much stronger and more precise distinction between development and advancement as meaningfully distinct concepts. We define development as a mechanism following a linear process of change, without goals, oversight, or respect for values or moral criteria. Progress is then defined as the specific results of development in the form of practical outcomes and applications. We propose conceptualising advancement as an ambivalent phenomenon that requires constant critical evaluation, oversight, and effort to predict the intended and unintended

social effects of technological innovations. A more comprehensive overview, including the characteristics of the various stages of the development of artificial intelligence, is not adequately captured in the current literature and is not described in detail in the form of a clear and comprehensible concept of the main phases of its technological development. These are often only brief excursions into the history of the development of AI and shorter overviews (Koukolík, 2024). The objective of this study is at the same time to provide a historical understanding of the context of the development of key technological concepts of artificial intelligence and to provide a basis for further possible scientific analyses, critically distinguishing between the development and advancement of AI. Identifying key historical milestones in the development of artificial intelligence will also allow researchers to track the trends and character of technological development and predict the potential and risks of AI. An overview of the development of AI will aid analyses of its ethical and societal implications by providing access to historical perceptions of AI in society in the context of changes in legislative and cultural norms. Last but not least, the chronology of the development of artificial intelligence provides an overview of paradigm shifts in the specific area of technology and identifies influences on its current form.

This study is based on a method of literature review of scholarly sources (primarily through the use of the ProQuest and Google Scholar databases) and other relevant sources (including works of literature) and a critical evaluation of the main events in the development of artificial intelligence, from the first ideas about the emergence of parallel "non-human" intelligence to the present. This study presents original ideas and reflections, thematically differentiating between the development and advancement of AI in the context of current issues of the ambiguous and internally contradictory role of AI in human society.

2 The Origins of the Evolution of Artificial Intelligence

From the beginning of human thought and intellect, humans have been fascinated with the idea of creating machines that could simulate or even surpass human intelligence. This desire dates back to ancient Greece, where philosophers and thinkers explored ways to mechanise thought and enable machines to perform activities previously reserved only for human reason. One of the earliest recorded examples of an artificial being is Talos, a mythical iron giant. The legend of Talos first appears in Greek mythology in Homer's Odyssey from the 8th century BC, and represents the ancient interest in creating an intelligent and powerful artifact of reason. Another example is found in ancient Roman literature, in Ovid's Metamorphoses in the 1st century AD. The story of Pygmalion, a sculptor from Crete, tells how Pygmalion falls in love with a statue he has created. Through his prayers, the statue comes to life. The story illustrates the human desire to create an artificial being that fulfils the ideal of perfection (Domouzi & Bär, 2024).

The Prague Golem, a legendary figure of medieval Jewish folklore, provides an interesting perspective on the concept of artificial intelligence. According to legend, the Golem was created by Rabbi Judah Loew of Prague in the 16th century to protect the Jewish community from persecution and danger. The creature was created from clay and brought to life through magical rituals. Though the Golem did not exhibit self-awareness or the ability to learn like modern AI, its purpose and mode of operation are analogous (Frunza, 2023).

During the Renaissance, one of the most famous examples was Frankenstein. Mary Shelley's 1818 novel tells the story of a scientist who created human beings from dead bodies. "This story depicts the dangers and ethical dilemma associated with creating AI. Frankenstein attempts to play the role of God, reviving the creature regardless of the consequences, which ultimately leads to tragic ends." (Shelley, 2018, p. 256). Another example is the second part of Johann Wolfgang von Goethe's 1832 tragedy, where Faust uses alchemy to create a homunculus. The homunculus, a small artificial man, symbolises the human desire to create and control life, which is often linked to questions about ethics, power, and the limits of scientific knowledge (Goethe, 2015).

R.U.R. by Karel Čapek is a notable tale from Czech literature that deals with the issue of AI, and autonomous machines that gradually become self-aware and subsequently threaten the very existence of humanity. R.U.R. is one of the first literary works to focus on topics such as autonomous technological machines and ethical issues related to the creation of artificial beings. The play not only popularised the use of the term "robot" in the global consciousness, but also provided an original reflection on the potential impact of technological advancement on human existence and society (Čapek, 2004).

3 The Genesis of AI (1950 – 1956)

It was during this period that interest in AI truly took hold in computer science, opening the door to many innovations and discoveries that shaped the world of technology.

1950 – Alan Turing publishes a paper entitled "Computer Machinery and Intelligence" in which he proposes a test of a machine intelligence called The Imitation Game, designed to measure computer intelligence. After the design of the Turing test, there have been many attempts to create software that could pass the test; thus far none have been unsuccessful. (Smith et al., 2006).

1952 – "Computer scientist Arthur Samuel develops a checkers game program that is the first that can play checkers against a human opponent. This was the first AI program to be written and run in the US." (Giacaglia, 2022, p. 25).

1955 – Computer science and interactive computing pioneer John McCarthy introduces a definition of "artificial intelligence" at a workshop in Dartmouth attended by many of the world's leading thinkers in the field of computing technology. This was how AI became a popular concept (Computer History Museum, 2024).

4 The Dawn of AI (1957 – 1979)

The subsequent period in history was characterised predominantly by the creation of basic concepts and tools for its further development. Major milestones were the development of programming languages, the emergence of expert systems, machine learning, the development of early robots, and philosophical debates about the nature of intelligence. Most of these breakthroughs laid the groundwork for the further development of AI in the 1980s and 1990s.

1958 – Frank Rosenblatt introduces the concept of a layered network of perceptrons in his book Perceptron. The perceptron was the first neural network model that had the ability to learn. Although this network was not deep (it did not have many layers), it introduced the concept of machine learning. This was important for the development of AI because it allowed for the creation of machine learning algorithms and neural networks, which constitute tools fundamental to modern AI research (Rosenblatt, 1958). At the same time, in 1958, John McCarthy created LISP (short for List Processing), the first programming language for AI research (Ida, 2024).

1959 – "Arthur Samuel introduces the term "machine learning" in the context of trying to teach a computer to play chess better than the humans who programmed it." (Chamundeswari et al., 2024, p. 10). Chess has long been considered a game of the intellect, and many computing pioneers believed that a machine for playing chess would be the hallmark of true AI.

1961 – James L. Adams, an engineer and researcher, creates The Stanford Cart. This project was one of the first attempts to create an autonomous vehicle capable of navigating unfamiliar terrain and avoiding obstacles.

1965 – "Edward Feigenbaum and Joshua Lederberg creates the first "expert system", a form of AI programmed to replicate the thinking and decision-making abilities of human experts." (Chamundeswari et al., 2024, p. 11).

1966 – "Joseph Weizenbaum creates the first "chatterbot" (later shortened to chatbot) named ELIZA, a mock psychotherapist that uses natural language processing (NLP) to converse with humans." (Kourkoulou et al., 2024, p. 7).

1968 – Mathematician Alexey Ivakhnenko (1968) publishes a study entitled "The group method of data handling – a rival of the method of stochastic approximation", in which he proposes a new approach to AI (GMDH) that would later become what we now know as "deep learning".

1973 – "Mathematician James Lighthill submits a report to the British Science Council where he argues that the discoveries made thus far had not been as impressive as scientists promised. The main part of the document was entitled "Past Disappointments". This eventually led the British government to withdraw support for AI research at the majority of British universities." (Smith et al., 2006, p. 18).

1979 – The American Association for Artificial Intelligence is founded, which now operates under the name Association for the Advancement of Artificial Intelligence (AAAI). The goal of this organisation is to promote scientific research and development in the field of AI, to foster collaboration among researchers, and to raise awareness of the importance of AI in various areas of life.

5 AI Boom (1980 – 1987)

This period was characterised by the rapid development of commercial applications of AI, mainly due to the success of expert systems that simulated the decision-making processes of human experts. Companies and governments began to invest heavily in AI technologies, while machine learning techniques and the use of expert systems became more popular, which allowed computers to learn from their mistakes and make independent decisions. Optimism about the possibilities of AI led to a surge in interest and investment but also set the stage for the subsequent "twilight" of AI, when it was shown that the technology had fallen short of ambitious expectations.

1980 – "The first AAAI conference takes place at Stanford University. In the same year, the first expert system arrived on the commercial market, known as XCON (Expert Configuration System). It was designed to help with the ordering of computer systems by automatically selecting components based on customer needs." (Chamundeswari et al., 2024, p. 12).

1981 – Japan launches the ambitious Fifth Generation Computer Systems (FGCS) project with the goal of creating computers capable of using AI to solve complex problems and communicate in natural language. This project inspired other countries and companies to invest more in AI. Later on, the original plan was considered unrealistic and in 1982was revised with more achievable goals. Although there were criticisms of the project over the course of the decade, it achieved significant results, especially in educating a new generation of Japanese computer science professionals (Feigenbaum & Shrobe, 1993).

1984 – AAAI warns of the impending "twilight" of AI due to the growing risks of reduced interest and declining research funding (Chamundeswari et al., 2024).

1986 – Ernst Dickmann and his team at the Bundeswehr University in Munich create and demonstrate the first driverless car (robot car). It could travel at speeds of up to 55 mph on roads that had no other obstacles or human drivers (Chamundeswari et al., 2024).

6 The Twilight of AI (1987 – 1993)

Private investors and governments lose interest in AI significantly, often suspending their funding due to the high cost versus the seemingly low return. "Several factors led to this situation, including a lack of available datasets, inflated expectations, and a lack of technological resources to support ambitious projects. During the twilight of AI, research programs often had to use other names such as "machine learning", "informatics", or "knowledge-based systems" to secure funding. The commercial AI industry also suffered because AI programs required expensive computing power that commercial machines could not process efficiently." (Smith et al., 2006, p. 18-19).

1987 – "The market for specialised LISP-based hardware collapses due to cheaper and more accessible competitors. This caused many companies specialised in LISP to go out of business because the technology was relatively cheap and widely available." (Chamundeswari et al., 2024, p. 13-14).

1988 – Scientist and futurologist Hans Moravec formulates what is called the Moravec paradox. In 1998 Moravec wrote: "It is comparatively easy to make computers exhibit adult level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility." (Ord, 2020, p. 121).

1992 – End of the Fifth Generation Computer Systems (FGCS) project after it fails to achieve its goals, symbolising a global disappointment for the potential of AI (Pollack, 1992).

7 Agents of AI (1992 – 2011)

After the twilight period of AI, research began to focus more on developing practical applications of AI. This era also introduced AI into everyday life through technological innovation. This surge of interest was followed by a sharp increase in research funding, which allowed for an acceleration in overall technological development.

1997 – In May 1997, Deep Blue developed by IBM becomes the first computer to defeat world chess champion Garry Kasparov in a six-game match, marking a pivotal moment for computing and the future of artificial intelligence (IBM, n.d.). Windows released Naturally Speaking, an easy-to-use speech recognition software developed by Dragon Systems (Henriques, 1999).

2000 – Professor Cynthia Breazeal develops Kismet, the first robot that can simulate human emotions using facial expressions including the eyes, eyebrows, ears, and mouth (Chamundeswari et al., 2024).

2004 – NASA lands two rovers on Mars, Spirit and Opportunity, which navigate the planet's surface without human intervention. As part of the Mars Exploration Rover Program, the rovers were programmed for a ninety-day mission to search for geological evidence of Mars' early environment and potential habitability. Spirit remained operational for 20 times its anticipated service life, ending its mission on March 22, 2010. Opportunity operated for nearly 15 years, during which time it broke the record for distance travelled on another planet and ended its mission on February 13, 2019 (NASA, n.d.).

2006 – "Companies such as Twitter, Facebook, and Netflix began using AI as part of their advertising and user experience algorithms." (Chamundeswari et al., 2024, p. 15).

2010 – Microsoft launched the Xbox 360 Kinect, the first gaming hardware designed to track body movements and translate them into gaming directions (Chamundeswari et al., 2024).

2011 – The NLP computer Watson designed by IBM and programmed to answer questions, wins the popular TV game show Jeopardy against two former champions.

2011 – Apple issues Siri, the first virtual assistant with speech recognition and speech synthesis.

8 Artificial General Intelligence (2012 – present)

Among recent developments, we can see a sharp increase in commonly used AI tools such as virtual assistants, search engines, etc. This period has also popularised deep learning and big data. Several key factors have led to the advancement of AI. The availability of big data, more powerful computers, and the development of deep learning algorithms have enabled AI to achieve widespread adoption in applications such as autonomous driving, facial recognition, machine translation, and personalised recommendations.

2012 – A convolutional neural network (CNN) called AlexNet, with 8 layers and 60 million parameters, won the prestigious ILSVRC – ImageNet Large Scale Visual Recognition Challenge (Krizhevsky et al., 2017). By training on two graphics processing units (GPUs), training time was dramatically reduced, allowing experimentation with

more complex models and leading to unprecedented successes in image recognition (Huang, 2016; PINECONE, n.d.).

2014 – Amazon introduced the Echo smart speaker and its voice assistant Alexa, which rely on speech recognition and synthesis. This was a significant moment for the development of voice-controlled technologies in the home. Alexa was revolutionary in that it allowed users to control a smart home and other devices using voice commands (Kelly, 2014).

2016 – Hanson Robotics creates a humanoid robot named Sophia, which became known as the first "robot citizen" and was the first robot created with a realistic human appearance and the ability to communicate, see, and replicate emotions (Greshko, 2018).

In the same year, the Google Assistant was introduced, a virtual assistant that used artificial intelligence to make users' lives easier (Levy, 2016).

2017 – Google researchers develop the concept of transformers in the article "Attention Is All You Need", which inspired subsequent research into tools that could automatically parse unlabelled text into large-scale LLM language models (Vaswani et al., 2017).

2018 – A language processing AI from Chinese technology group Alibaba triumphs over human intellect in the Stanford Reading Comprehension Test. The model, called DuReader, achieved an accuracy score of 93.1, showing that it is capable of understanding text at a level comparable to human intellect (Fenner, 2018).

In December 2018, the European Commission presented its Coordinated AI Plan, whose purpose was to maximise investment and support science, research, and testing of AI applications, talent and digital skills, and ethical and regulatory issues, as well as to also focus on the use of AI in the public sector (Directorate-General for Communication, 2024).

In addition, the first robot incorporating artificial intelligence, Cimon, developed by IBM, Airbus, and the German Aerospace Centre (DLR), was sent into space to provide support to astronauts in various tasks and experiments. Using artificial intelligence and voice interaction, it was designed to improve the efficiency of the crew on the International Space Station and to explore the options for using robots in space missions (IBM, 2018).

2019 – At the order of the European Commission under the Coordinated Plan, the Czech government in May 2019 develops and approves the National Strategy for Artificial Intelligence (NAIS), a strategic document for AI in the Czech Republic (Vláda ČR, 2021).

Google's AlphaStar has reached the Grandmaster level in the video game StarCraft 2, outperforming all but the top 0.2% of human players (Chamundeswari et al., 2024).

2020 – Microsoft launches the Turing Natural Language Generation model with 17 billion parameters to generate natural-sounding text with high levels of accuracy and variation. The model was trained on a massive dataset of text and code and was able to generate realistic, logically ordered, and meaningful text in a variety of styles (Rosset, 2020).

In addition, Open AI began beta testing GPT-3, a model that uses Deep Learning to generate code, poetry, and other similar language and writing tasks. While not the first of its kind, it is the first to create content almost indistinguishable from human-created content.

Another product from Open AI was Jukebox, a deep learning model for generating music. Jukebox was revolutionary in that it could generate realistic and original music in a variety of styles (Open AI, n.d.a).

The same year saw a breakthrough moment in biomedical research – DeepMind's AlphaFold winning the CASP (Critical Assessment of Structure Prediction) competition. This competition is a major test of the accuracy of protein structure prediction, a key step in understanding biological function and drug development. Prior to AlphaFold 2, no team had achieved accuracy comparable to experimental methods (The Alpha Fold team, 2020).

2021 – OpenAI introduces DALL·E, an AI model that can generate realistic images based on text descriptions, enabling the creation of new and creative visual content. DALL-E is a version with 12 billion parameters. It has a diverse set of capabilities, including creating anthropomorphised versions of animals and objects, combining unrelated concepts in a believable way, rendering text, and applying transformations to existing images (Ramesh et al., 2021).

2022 – DeepMind introduces a multimodal model, Gato, that can engage in dialogue, play video games, control a robotic arm to stack blocks, and perform other tasks. Gato uses a form of the Transformer neural network, learning multiple tasks simultaneously and switching between them without losing skills. Gato is considered a "generalist agent" that can perform a wide range of complex tasks (Reed et al., 2022).

Intel is developing a revolutionary deepfake video detector called FakeCatcher. It works by analysing the "blood flow" in an image and can detect fake footage with 96% accuracy within milliseconds. FakeCatcher thus represents a significant step in the fight against misinformation and deepfake videos in the online world (Intel, 2022).

OpenAI has introduced Whisper, an automatic speech recognition (ASR) system trained on 680,000 hours of multilingual and multitask monitored data. It has immunity to accents, background noise, and technical language. Whisper is revolutionary in that it enables real-time transcription of audio with high accuracy and in multiple languages (Open AI, 2022).

MyoSuite is a platform from Meta AI for research and development in AI focused on working with muscles and movement. It solves biomechanical problems, offers muscle and bone simulations, provides biomechanical models, and enables the creation of realistic virtual avatars. MyoSuite represents a significant advance in AI and biomechanics that has the potential to transform research and development into prosthetics, virtual reality, and rehabilitation, leading to improved quality of life for patients while pushing the boundaries of human capabilities (Meta, 2022).

2023 – The first commercial humanoid robot appears on the market: Figure01 from Figure AI. It is human-shaped, opens doors, uses tools, and walks up stairs. It carries 8 kg of cargo, lasts 2 hours on battery, and walks at a speed of 1.8 km/h. It helps in production, logistics, warehouses, and shops (Figure AI, n.d.).

GPT-4 has a massive 175 billion parameter model, making it one of the most powerful LLMs in the world. It can be used in creative and technical writing tasks such as songwriting, script writing, or learning a user's writing style. GPT-4 attempts to eliminate problems of LLM such as generating toxic content (Open AI, n.d.b).

In December, Google launched its AI chatbot Bard as a direct competitor to ChatGPT. The basis for Bard's development was the LaMDA model, but it gradually used more advanced LLM models, namely PaLM 2 and then Gemini to achieve better results (Pichai, 2023). Gemini is currently Google's best performing LLM and serves as the basis for the current version of Bard (Pichai, 2024).

Another new development from Google was the AI Anyone platform, which allows users to converse with historical figures, celebrities, and even people who have already died. Users can immerse themselves in the thoughts, memories, and experiences of individuals from the past and experience authentic conversations that transcend time. By personalising and responding to the user's input, AI technology creates unique interactions that open up new possibilities for understanding history and connecting with the future (Chrome Web Store, n.d.).

Another major event in 2023 was Meta's series of 28 advanced conversational AI assistants based on media celebrity profiles. These are currently available in beta versions in the US for WhatsApp, Messenger, and Instagram. Interacting with the AI assistants mimics real conversations with famous people. Each of them has a new name, characteristics, and Instagram and Facebook profiles (Meta, 2023).

2024 – This year sees further interesting and innovative steps in the development of AI program capabilities. For example, the Sora program was announced by OpenAI, and was designed to create high-quality videos up to one minute in length based on text input. Sora can create complex scenes with multiple characters and specific movements. The model is currently available to a limited test group, including teams focused on mitigating risk and damage. OpenAI is also collecting feedback from selected visual artists, designers, and filmmakers (Open AI, n.d.c).

Introduced in March, the Devin autonomous software engineer from Cognition Labs uses machine learning and AI to automate coding tasks. It can deploy an entire software development process, from concept to code, freeing up human programmers to take on more creative and strategic tasks. Devin increases productivity, improves code quality, and reduces development time (Wu, 2024).

On August 1, 2024, the European Artificial Intelligence Act (AI Act) came into force, providing developers and implementers with clear requirements and obligations regarding the specific use of AI, while reducing the administrative and financial burden on businesses. In addition, the EU is placing an emphasis on creating a regulatory framework for safe AI and plans to introduce a code of conduct for providers of universal AI models, to be finalised by April 2025 (Directorate-General for Communication, 2024).

In September, OpenAI introduced o1, a new line of reasoning models for solving hard problems, designed to make it possible for AIs, like humans, to spend more time thinking before they respond. They can reason through complex tasks and solve more difficult problems in science, coding, and mathematics than previous models (Open AI, 2024).

In September, Apple introduced iOS 18 with new customisation features and app enhancements accompanied by Apple Intelligence integration, which combines generative models with the user's personal context. This AI technology supports natural language and image generation and processing, making it possible to generate descriptions, summaries, and content analyses, and provides AI-powered automation across apps (Apple, 2024).

At the end of September, Ray-Ban Meta glasses were presented that incorporated new artificial intelligence functions for everyday tasks. These AI enhancements include the ability to remember where you parked, translate speech in real time, or answer questions about things you see. The new glasses will also allow you to record and send voice messages and provide continuous visual assistance when you're browsing cities or shopping. (Meta, 2024).

9 AI Development or Advancement (2025 – ?)

Development in the context of AI refers to the process of creating and improving technologies and systems that aim to mimic or simulate human intelligence. The term focuses on the steps and phases that the construction and implementation of AI goes through, both in theory and practical application. Development involves innovation and experimentation, often focusing on specific technologies and methods that will gradually lead to new versions or generations of AI. Here we have depicted the evolution of artificial intelligence with a panoramic view of the key moments and directions that have shaped the field from its inception to the present. Such an overview can be useful for understanding how AI has evolved and for identifying a chronological overview of each developmental milestone.

The development of AI is and will continue to be as a superintelligent system, many times exceeding human levels of cognitive function. It will be progressively integrated more and more intensively into everyday life in the form of personalised assistants and advanced robotics. In the fields of medicine and biotechnology, further progress can be expected in the areas of diagnosing and treating diseases, extending lifespans, or implementing bionic implants. In the area of economic life, overall transformation will accelerate, new economic models will be updated (e.g. guaranteed wages), global changes to the labour market will deepen, and human activities will shift ever further into virtual reality. Superintelligent AI systems will have a greater impact on international conflicts and security, acting both preventively and potentially destructively in the form of autonomous weapons. Last but not least, the development of AI will increasingly serve the needs of space exploration and astrophysics and will open up the possibility of colonising other planets.

Whereas the development of AI is focused on the technical side, namely on building and improving the technology itself, we interpret the advancement of AI as a measure of impact and utility in improving people's lives and solving local and global problems. Thus, we do not equate the development of AI with its advancement. We understand the panorama of AI development as a linear movement of a steadily rising curve of technological change, and advancement as a sine curve, expressing a shape of alternating upward and downward directions, simultaneously depicting the opportunities and risks. Development is always unidirectional, while advancement is potentially bidirectional, ambivalent, often involving internal conflicts, ambiguities, and inconsistencies, as well as incorporating deeper existential questions and philosophical dilemmas. The advancement of AI can be metaphorically compared to the face of the mythical figure Janus, simultaneously expressing optimism about technological developments and uncertainty about their possible consequences.

In thinking about the advancement of AI, technological enthusiasm, belief in progress, and the idea of a more perfect society are confronted with concerns about the misuse of AI, questioning basic human values and principles of humanity (Leonhard, 2019). Problematic issues of legislation, ethics, and morality emerge, characterising the risks of monitoring AI, the disappearance of the phenomenon of privacy, the deepening of social and economic inequalities,

the development of new forms of discrimination and social isolation, and the transformation of human interactions and identities.

Here we can raise several critical questions that challenge the stereotypically incorrect and uncritical acceptance of the thesis that the development and advancement of AI are the same. There is a need to incorporate the following and other similar questions in parallel into the discourse of technological development and confront technological optimism with a critical perspective on the ideals of humanity and the principles of humanity.

Will technologies and algorithms one day be a substitute for living beings, or will they be retained only as their helpers and assistants? Who and how will develop, program, manage, and control these technologies? For whom or against whom? What human characteristics and abilities will be replaced by these technologies? On the other hand, what skills and knowledge will increase in value? How will the relationship between technologies and people work to maintain social norms? Will the emotionality of human life be transformed in the unemotional environment of calculating artificial intelligence? What will be the nature of humanity; what will be its content? How will humanity be transformed, and will it indeed be replaced by transhumanity? Who will need humanity? Will humans remain human, or will they turn into transhuman beings? Will transhuman identity then be a kind of universal identity, the goal of all human endeavour? What will ultimately be considered advancement? An effort to preserve human values and principles of humanity, or an effort to move away from them, to dismantle and ultimately destroy them?

While it is uncertain to predict the future of the development of AI and interpret the nature, meaning, and directions of advancement, the presence of AI clearly represents one of the major strengths of Industry 4.0 and 5.0 (Rane, 2024). It is fundamentally transforming social, cultural, and economic realities, influencing people's self-concept and cooperatively forming individual and social identities in both positive and negative contexts (Floridi, 2014). AI brings innovation and profits, increases the efficiency of human work, accelerates production and distribution processes, and contributes to economic well-being. However, it simultaneously generates threats of ethical abuse, referred to as "ethics washing" (Van Maanen, 2022). While AI contributes to improving public services and their accessibility, it also poses the risk of systemic discrimination against marginalised groups and exacerbating social inequalities (Eubanks, 2018). There is no doubt that AI represents the ultimate in statistics, enabling the use of algorithms to process, mutually compare, and evaluate vast amounts of data. On the one hand, AI enables the improvement of products and services, facilitating consumers' purchasing decisions through personalisation algorithms; on the other hand, it is becoming a tool of power and control, eroding privacy and threatening the space of free and independent decision-making (Zuboff, 2019). According to Pasquale (2015), AI is increasingly responsible for people's decisions in the areas of health care, law, and finance, which has the potential to increase the accuracy and efficiency of such decisions, but at the same time can lead to opacity and unfairness in these decisions.

The ambivalent nature of artificial intelligence presents both opportunities and significant challenges for society. Research in this area highlights the need for careful analysis and regulation to harness the potential of AI while minimising its risks.

The possible future development of the relationship between humans and AI can be described using five scenarios (Koukolík, 2024). First scenario: Big Bang – an extremely pessimistic perspective in which the human species will become extinct. Second scenario: Big Eclipse – a pessimistic perspective in which humans create an artificial alter ego of themselves; humans and AI coexist as equal entities. Third scenario: Big Fork – a neutral perspective in which AI operates in different physical and digital environments; humans and AI coexist separately. Fourth scenario: Big Brag – a slightly optimistic perspective in which humans and AI evolve in parallel; humans no longer contribute to the further development of AI. Fifth scenario Big Tool – an optimistic scenario in which AI remains an effective and useful tool for humans, helping to solve problems and enhance the overall well-being of society. Humans are not replaced, dehumanised, or exterminated by AI.

Which of these scenarios will be the scenario of advancement? Who will decide what is and is not advancement? Will it still be humans or an artificial technological representation of humans?

10 Conclusion

Since ancient Greece and the beginning of human thought, people have been interested in creating machines that would simulate or even surpass human intelligence. These efforts and interest have gone through waves of development, from the first experiments with simple algorithms and models to the current era of artificial general intelligence. In recent years, progress in AI has been significantly faster, characterising the next phase of active development. With the anticipated continuing increase in investment and research in this field, we can expect to see further revolutionary applications and technological innovations with potentially profound impacts on society and the economy. With the growing importance and widespread use of AI in everyday life, a comprehensive understanding of the main concepts and chronology of its development is essential. To achieve this, however, requires sources that are not overloaded with complex technical information.

AI is primarily identified with progress, change, and determining the future development and form of society. The development of AI cannot be stereotypically considered the same as its advancement. Development and advancement are freely confused and often used incorrectly as synonyms in AI discourse. Development is a straightforward technological process, an ever-accelerating cumulative progression of innovation that reflects the state of scientific knowledge. The breakneck technological development of AI is a solitary process, to some extent independent of much slower and less flexible processes and changes in social norms and values, the structures of cultural institutions, or the legislative frameworks of life. We generally interpret advancement as an effect based on the historical application of certain socially and culturally shared values and the maintenance and reproduction of those values, which lead to a society that is more perfect, in the sense of its humanity. Thus, the meaning of advancement should be more mutual understanding, decency, freedom, solidarity, fellowship, love, conscientiousness, or trust, along with less violence, human suffering, misery, or selfishness. Thus, while advancement is most likely to be achieved in human hearts and human reciprocity, development is most likely to be achieved at the level of technological innovation in the form of more powerful algorithms and increased capacity of cloud repositories or perfect robotic systems, equipped with artificial intelligence. Development refers to changes at the technical level of AI; advancement is the result and end effect of these technical steps and changes. These results and effects are usually not unambiguous, with effects in different contexts of meaning and significance. AI simultaneously brings more freedom and more control, more prosperity for some and more marginality for others; it has more potential to create security and at the same time more potential to destroy everything altogether. While the question of the development of AI is more of a technological, scientific challenge, the question of advancement is therefore more of a legislative, political, social, and philosophical challenge. Development and advancement need not be mutually exclusive. The analogy of development is the evolution of the human species: aimless, full of mistakes and unexpected surprises. The essence of the advancement of the human species is anchored in this evolution, forms part of it, and takes shape as a concrete system of values. The idea is for these values to lead to the reduction of social risks, the growth of human prosperity, and the entrenchment of the principles of humanity. Achieving the value of advancement in the area of AI should therefore be a global priority in order to minimise other societal risks such as pandemics and nuclear war. It is therefore important to strictly distinguish between the development and the advancement of AI in media, academic, and technological discourse and in information sharing and interpretation among lay and technical audiences alike, not to conflate these concepts, and not to equate the progression of technological change with the progress of human values.

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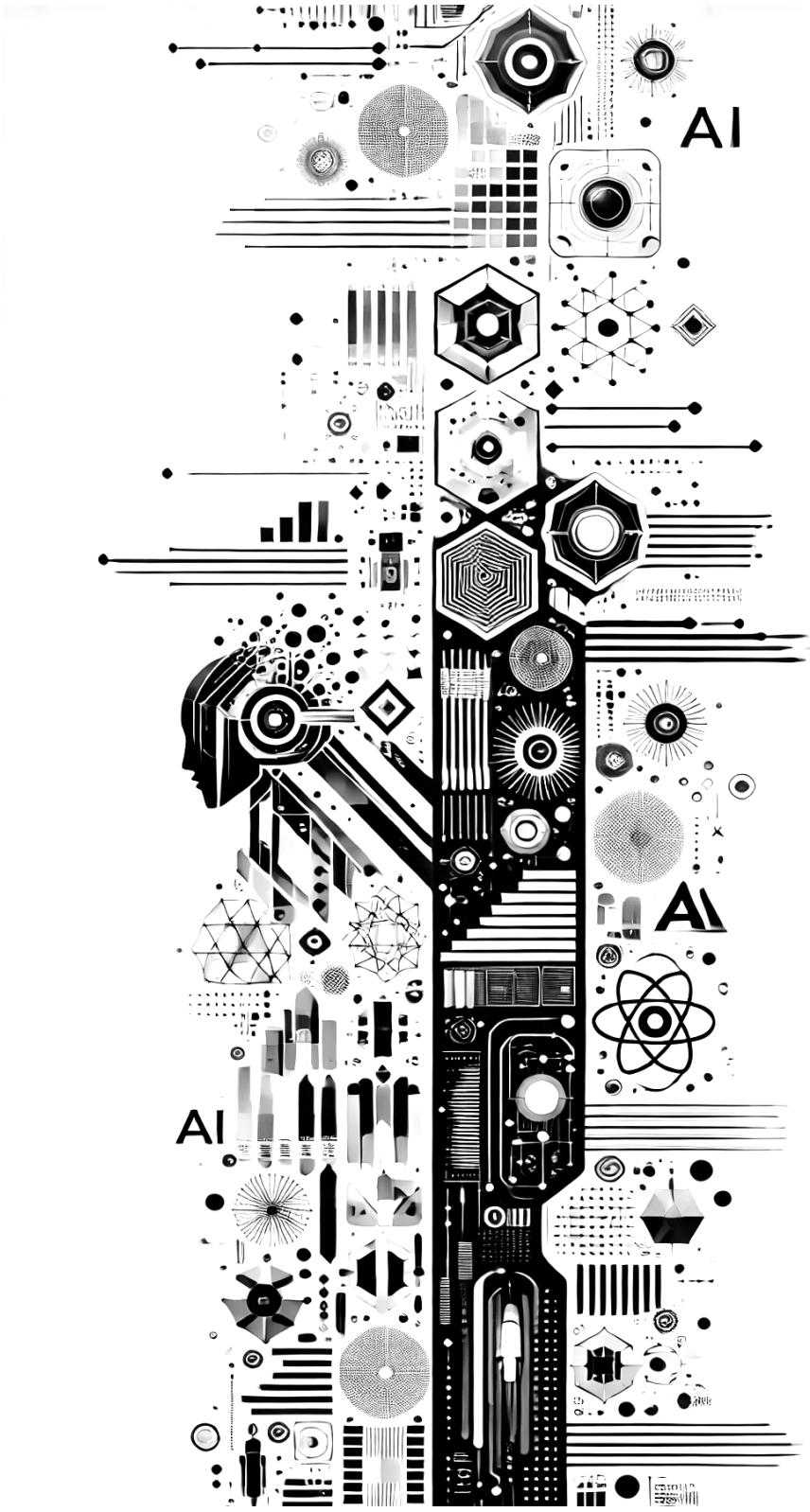
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