
Exploring Programmers' Expectations in the Era of Generative AI-Hype

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I. Introduction¹

Artificial intelligence is increasingly present in our lives these days. In this regard, one of the most common disadvantages, especially concerning generative artificial intelligence, is how it will affect the labor market and workplaces. In the media, we often read speculations about the negative consequences of AI, among which one of the most frequently raised issues is that AI will take away jobs and lead to unemployment. Acemoglu (2021) points to the theoretical harms that lie on the horizon if artificial intelligence continues to develop unregulated while prioritizing the needs of governments and corporations over the interests of workers and citizens. Such harm can be excessive automation, but also ineffective wage reductions and failure to increase productivity. At the same time, speculation about artificial intelligence often includes the other side that it will create new jobs, and make work more comfortable, and efficient.

Today, several mature AI assistants can help the work of both software developers and programmers. In the case of software developers and programmers, Github Copilot is one of the most well-known AI assistants in the whole world. The use of artificial intelligence in the workplace presents challenges, including changes in work processes and concerns about the privacy and rights of employees. Therefore, social dialogue plays a crucial role in solving these challenges, as it helps to communicate between employers and employees, offers pragmatic solutions to various challenges in the labor market, and assesses skill requirements. Additionally, social dialogue, if successfully applied in a collective bargaining system, can help reduce inequality and create an inclusive labor market. In addition to the above-mentioned, social dialogue also helps to define existing and new rights, thereby helping governments to contribute to the security and adaptability of the labor market. An additional effect of social dialogue is that it can facilitate communication with experts outside the workplace, thereby facilitating the understanding of the various effects of artificial intelligence (Krämer and Cazes, 2022).

This student research paper endeavors to scrutinize the perspectives of Hungarian software developers and programmers concerning the impact of artificial intelligence on their occupations and their career prospects (1). Moreover, the research seeks to illuminate the

¹ This paper was prepared in the framework of the OTKA research The Sociology of AI Expectations: visions of the Social and Labor Market Role of Artificial Intelligence.

influence of personal experiences on their viewpoints (2) and examine how levels of education and professional experience shape their expectations regarding the future of their work (3). Additionally, the study aims to explore the respondents' reactions to the pervasive hype surrounding artificial intelligence (4). It is important what the various experts say on the subject and what they expect, but the expectations of laymen can be studied just as well. The paper does not approach only what interviewees' predictions are but rather seeks to understand why their expectations are what they are. The interviewees are closer to the technological field but not necessarily artificial intelligence experts, so interesting mechanisms may emerge. Also, it is worth keeping in mind throughout the thesis that neither the experts' nor the respondents' predictions are objective.

The investigation will culminate through the analysis of insights gleaned from 10 semi-structured interviews, aligning with the above-mentioned research objectives. The structure of the paper continues with a literature review, followed by a methodological section. After detailing the methodology, the paper turns to the results found, and their analysis, and finally draws a conclusion from the results obtained.

II. Literature review

II.1. Artificial intelligence and generative AI

II.1.1. Artificial intelligence

First, it is worth briefly summarising what artificial intelligence is actually, which will be discussed in a significant part of the thesis. Artificial intelligence (AI) is an expansive general term that focuses on the use of computational methods to replicate human intelligence. In 1950, Alan Turing introduced the Turing test, which measures the intelligence of machines based on the principle of how well a machine can show behavior equivalent to or indistinguishable from that of a human. A computer passes the Turing test if, after a few written questions, the human tester cannot tell whether the answers are from a machine or a human. AI aims to make a machine behave in ways that would be called intelligent if a human were to behave. A definition of AI is the ability of machines to perform tasks normally performed by humans, such as visual perception, speech recognition, decision-making, and language translation (Howard, 2019). Wang and Siau (2019) understood artificial intelligence in a slightly different way; instead of a concept, they focused on objects and tools that can be called artificial intelligence. According to them, artificial intelligence is an umbrella term that

influences the following disciplines and vice versa: computer science, engineering, biology, psychology, mathematics, statistics, logic, philosophy, business, and linguistics. Artificial intelligence is so broad that anything from Apple's Siri to Amazon Go or from self-driving cars to autonomous weapons can fall into this category. In addition, Müller and Bostrom (2016) go a little further than this; according to them, AI aims to reach a level of intelligence that not only rivals that of humans but also surpasses it. IBM connects artificial intelligence with machine learning (ML) and states that ML is a field within artificial intelligence and computer science that concentrates on utilizing data and algorithms to enable AI systems to emulate human learning processes, thereby enhancing their accuracy over time (IBM, n.d.).

In general, artificial intelligence can be divided into weak and strong artificial intelligence (AI). Weak AI, also known as narrow AI, excels at certain tasks (Wang and Siau, 2019). Weak artificial intelligence refers to the development of computer systems designed to perform a specific task or a narrow set of tasks. These systems are incapable of general intelligence or self-awareness and are programmed to operate within a limited range. Examples of weak AI include speech recognition software, image recognition algorithms, and recommendation systems (Müller and Bostrom, 2016). Most advances in artificial intelligence so far have been in the weak AI category, such as Google Assistant² and AlphaGo³ (Wang and Siau, 2019). Also, ChatGPT can also be classified in this category, but it did not exist when the work of Wang and Siau was published (ChatGPT was launched on November 30, 2022), but this will be discussed later. Strong artificial intelligence, also known as artificial general intelligence (AGI), refers to the development of computer systems capable of performing any intellectual task that a human can perform. These systems would be able to reason, learn, understand natural language, and adapt to new situations in a manner indistinguishable from human intelligence. The development of strong artificial intelligence is still a long-term goal of AI research and has not yet been achieved. (Müller and Bostrom, 2016). Researchers from different fields are competing to create a strong artificial intelligence (also known as human-level artificial general intelligence or artificial superintelligence) that can expertly process multiple tasks (Wang and Siau, 2019).

² In a nutshell, Google Assistant is a virtual assistant software application developed by Google for mobile and home automation devices. After saying the "OK Google" or "Hey Google" wake words, you can perform a number of tasks through voice commands, voice searching, and voice-activated device control. It is also designed to give you conversational interactions.

³ AlphaGo is a computer program developed by Google DeepMind that plays the board game called Go. It was the first to beat a professional go player without advantages on a 19x19 board.

Stahl, Antoniou, and Ryan et al. (2022) claimed that it matters how we define AI because it determines its ethical problems. Stahl (2021) argues in his book that AI is a multi-level concept that can be used in three different terms: machine learning, general AI, and converging socio-technical systems. This approach is important because later on, the paper will go into more detail about the ethical problems related to artificial intelligence. After the various artificial intelligence definitions were better presented, perhaps the most comprehensive and simplest concept formulated by the OECD remained at the end: “An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy” (OECD, 2019, p. 7.).

II.1.2. Generative AI

Based on Müller and Bostrom (2016) generative artificial intelligence can be classified as weak AI, but it stirred up a lot of dust worldwide. It was mainly the appearance of ChatGPT developed by OpenAI and its rapid development that significantly impacted the world (Sætra, 2023). Generative AI refers to a type of artificial intelligence that can create new content, such as text, images, or music that is not specifically programmed. The difference between traditional AI is that generative AI can create original and creative results, while traditional AI is more often used for tasks such as classification and prediction. The technology used by generative AI is often based on advanced machine learning algorithms, especially transformer-based neural networks, and can open new frontiers for creativity and innovation. Generative AI caused a change in the evolution of AI and can significantly impact various industries and business functions (Chui et al., 2023). Sætra (2023) formulates this statement not only in a conditional way, according to him, there is no question that generative AI has a significant impact on our lives and will continue to have a major influence in the future. According to him, generative artificial intelligence has practically revolutionized the interaction between man and machine by offering machine learning solutions for huge amounts of data that can produce output based on user instructions.

Currently, the most popular artificial intelligence is generative artificial intelligence. Generative AI has a wide range of use cases in many industries (Chui et al., 2023). Generative AI can generate any type of text, image, or video. For example, ChatGPT is a language model that produces various text-based outputs that can generate coherent text. Also, there are many different websites where everybody can create a picture or video with generative AI based on descriptions. In addition, the programming possibilities of generative AI are also remarkable,

as it can create various codes with quite good efficiency (Sætra, 2023). Chatbots are based on generative AI, so it is not surprising that Chui et al. (2023) estimated that generative artificial intelligence could contribute approximately \$310 billion to the retail industry by enhancing the performance of functions such as marketing and customer interaction. In addition, in the banking sector, generative artificial intelligence can further improve efficiency by solving lower-value tasks, such as mandatory reporting, data collection, or monitoring of regulatory developments. In addition to the above, generative artificial intelligence can significantly contribute to pharmaceutical research and development. Generative AI is expected to have the greatest impact on knowledge-based jobs, particularly activities involving decision-making and collaboration, which previously had the lowest potential for automation (Chui et al., 2023).

In addition to all this, we must not forget the main problems of the application and development of technology. The first and most important of these are perhaps the training data requirements, as generative AI models require diverse and large datasets for learning. However, their acquisition, adequate quality, and care are quite a challenge. The next aspect that must be considered is computing resources because training AI models is a computationally demanding task, especially if we want to create a model that can perform complex tasks. This requires significant storage resources and special hardware, which are not cheap. The so-called mode collapse can also be a serious problem. This problem arises when a generative model cannot capture a wide variety of training data and, as a result, generates repeated or limited variations. Generalization and adaptation can also be problematic for artificial intelligence, as it is difficult for AI to generalize data that is out of range or not visible; it cannot capture the underlying patterns well (this problem can be traced back to the learning dataset). Lastly, AI-related technologies raise serious ethical questions, as it is not hard to abuse this technology (Bandi et al., 2023).

II.2. Sociology of expectations and hype

When a new technology appears, you can never know if it will spread at all, but if it does, it is always questionable how it will affect different dimensions of life. The emergence of new technology involves various possible consequences: on the one hand, it is not certain that the technology will spread, even if it is good; on the other hand, if the technology spreads from then on, many possible scenarios can occur. A complex and multi-factor equation is what will happen and what effects can occur when a technology spreads. The goal of

technology is often to increase efficiency, but what if this efficiency increase has occurred? What happens after that? Artificial intelligence is likely to create new jobs, especially in information technology. However, some believe AI could eliminate labor because it can code independently. It is more complicated than that, but some people expect that scenario. A recent research found that Hungarian AI programmers perceived the present era as marked by hype, anticipating gradual and constrained technological advancements. They demonstrate techno-optimism and a tendency to disassociate from accountability. Most participants attribute societal resistance to AI to inadequate comprehension of the technology and a deficit in trust toward it. Frequently, they draw parallels between AI progress and the nascent stages of electricity, emphasizing the necessity for comprehending and embracing emerging technologies. (Horváth and Vicsek, 2023).

ChatGPT has received enormous hype since its release, and essentially the majority of generative AI research, news, and newspaper articles focus on ChatGPT and its effects. It appears both in public speaking and in academic discourse. The technology literature deals to a great degree with the concept of "hype". "Hype" as a concept is increasingly widely used (both in business and science) to describe developments in technological fields. To facilitate strategic investment decisions, various consulting companies recommend so-called hype cycle models to determine the state of development of technological areas (van Lente et al., 2013). Van Lente et al. (2013), however, draw attention to their perspective of hype, which should not be confused with hype appearing in the media/public discourse because hype appearing in public discourse is only a more or less accurate forecast. Still, their perspective sees hype as the exploration of a collective future that influences the actions taken in the present.

By exploring the cognitive dimensions of future projections, we can seek patterns in how particular cognitive structures lead people to act (or not act) in particular ways. This can help to understand better the social impact of projected futures and their role in shaping social change. Both institutional and individual factors influence our hopes for the future. Various institutional factors can influence our future cognitions, making it challenging to predict worst-case scenarios. Personal factors include our multiple levels of social embeddedness, which embed us in multiple temporal horizons and give rise to the capacity to construct our pasts in anticipation of the future. A combination of grand, totalizing aspirations and less grand, less total aspirations can also shape hopes, according to Mische (2009). Understanding the interplay between these institutional and personal factors can help us better understand the social impact of projected futures and their role in shaping social change (Mische, 2009). The

following strategies can be used for analyzing the future: backcasting, scenario planning, and anticipatory governance. These strategies aim to help researchers and decision-makers think more systematically and creatively about the future while acknowledging the contingencies inherent in it (Tutton, 2017).

Borup et al. (2006) claim that expectations and visions are important not only for engineers or scientists but also for groups of actors beyond scientists and engineers who can play a central role at the macro-, meso-, and micro-levels. They argue that expectations play a central role in science and technology. Many techniques, tools, and practices have evolved in technology and science to formulate and evaluate expectations (such as technology forecasting). These tools, techniques, and practices are designed to provide foresight competence and thereby make more strategically informed decisions about the future (Borup et al., 2006). Ruef and Markard (2010) also agree with this; according to them, understanding the dynamics of expectations is extremely important to understanding innovation processes, to be able to manage expectations, and to be able to develop strategies that promote innovation. According to the authors, expectations have a significant impact on the development of new technologies because if expectations are high, they can mobilize and control innovation activities. However, if the new technology does not live up to expectations, the disappointment can even undermine the reputation of the technology and the developer. This complicates the way of mobilizing resources and may result in the withdrawal of actors, which may ultimately lead to the complete abandonment of the technology. Expectations can be shaped by the following factors: broader political and social agendas, the results of the given technology, and the activities and discourse of actors in the field (Ruef and Markard, 2010).

Studying future projections can help us better understand the link between cognition and action by showing how beliefs and expectations of the future contribute to how people think, feel, and behave in the present. Even if our predictions prove faulty, they can still influence what we do and thus affect the course of events, sometimes in self-fulfilling or unanticipated ways (Mische, 2009). Tutton (2017) refers to the mentioned phenomenon with the term 'entanglement of matter and meaning' according to which the future is not only a matter of intangible ideas, but we create and shape the future in the present with our decisions and actions carried out in the present. This entanglement of matter and meaning makes the future 'wicked' given that it is difficult to predict the unintended consequences of our actions. By 'wicked' the author means the unpredictability, complexity, and uncertainty of the future.

Tutton (2017), therefore, considers it essential for futurists and sociologists dealing with the future to understand the entanglement of matter and meaning because this is the only way they can analyze and shape the future ethically and responsibly.

Unintended consequences can arise when we project a specific future. It is possible to document these consequences by examining how projected futures affect the production and transformation of social structures. By studying the link between cognition and action, we can identify patterns in how particular cognitive structures lead people to act (or not act) in particular ways and how these actions contribute to the production and transformation of social structures. Mische (2009) also suggests that even if our predictions prove faulty, they can still influence what we do and thus affect the course of events, sometimes in self-fulfilling or unanticipated ways. By paying close attention to the form and content of future projections, we can better understand their potential unintended consequences and their role in shaping social change (Mische, 2009). Mische (2014) suggests that future projections can be studied via their externalizations in attitudes, narratives, performance, and material forms. We can focus on these additional challenges of measurement once we identify these externalizations: understanding projected futures, establishing variability axes, and comparing them across locations. The author proposes a framework for studying how public interventions in debates about "sustainable futures" and the "green economy" differ on various dimensions of projectivity, including their temporal reach, attention to contingency and causality, and network mapping of future actors (Mische, 2014).

II.3. Future of work, automatization

The spread of a new technology ideally leads to the fact that it facilitates the work, increases the efficiency of the workers, and does not endanger their work. At the same time, the Jevons paradox can also occur, which occurs when technological development aimed at increasing the efficiency of resource use leads to an increase in resource use instead of a decrease in resource use. Jevons observed in the middle of the 19th century that the technological developments that enabled the more efficient use of coal ultimately led to the use of coal in more areas of industry and in larger quantities. Ecological economists frequently use this paradox to highlight the fact that it is impossible to successfully implement the reduction of the use of natural resources solely through technical means or technological developments (Alcott, 2005). However, it is also worth considering that even technology cannot solve everything perfectly, and it may be interesting to see how those who might use it

as a work tool react to this. Are they satisfied with the fact that it represents a lower quality and prefers to fix its faults? The development and popularity of Google Forms, for instance, greatly facilitated the creation of a questionnaire. In many cases, however, the questionnaires prepared in this way are of poor quality.

The future of work is uncertain, but artificial intelligence and automation will play a significant role in shaping the future. In recent decades, due to the persistently low labor demand, automation has not accelerated but slowed down. The reason behind the stagnation is that the companies do not invest in the development of production technologies but instead distribute the profits among the shareholders. In some cases, computerized labor can be seen to crowd out technology, especially in cases where regulation is a gray area and exploiting migrant labor is more financially beneficial than investing in automation (Kelly, 2022). However, with the free ChatGPT and other generative AI tools, this has changed significantly. It is quite certain that the focus is currently no longer on whether artificial intelligence will take away work but rather that it is presented as an efficiency-increasing work tool. But it is impossible to predict exactly what will happen with the number of jobs because this problem area is too uncertain and complex. Several scholars contend that while a substitution impact is anticipated in the short term, AI will ultimately provide more employment opportunities than it displaces, akin to the automation seen during the Industrial Revolution. The approach also argues that the adjustments might result in more engaging and lucrative employment in the future (Bessen, 2016). According to some scholars, there is a claim that the current situation is distinct from the Industrial Revolution (Kelly, 2022). They claim that, in contrast to the Industrial Revolution, the occurrence of widespread technological unemployment in the future is unavoidable. This approach contains two directions: techno-optimists and techno-pessimists. Techno-optimists envision a utopian society in which workers will be freed from the pressure to work through widespread automation and the implementation of policies like universal basic income, leading to the emergence of a prosperous post-work society (Srnicek and Williams, 2015). Techno-pessimists forecast a bleak future marked by high rates of long-term unemployment, rising inequality, and poverty (Pulkka, 2019). Despite their variations, every theory predicted employment displacement, mostly in routine occupations. Junior or entry-level white-collar occupations were stressed as riskier. All viewpoints predicted new employment would need retraining. Regarding the ratio of newly created jobs to jobs lost, there was disagreement among the various viewpoints.

The degree to which a person is personally optimistic or pessimistic can also have an impact on their attitude. Róbert Pintér (2022) calls the separation between the level of employment and productivity a "controversy of faith". At the turn of the millennium, it became clear that new jobs were not being created to the same extent as before, but productivity was increasing even more than before. And this phenomenon created, according to Pintér, the "belief debate", in which those on one side claim that machines and new technologies will create new professions, while those on the other side say that machines will gradually displace people from a large part of the labor market (Pintér, 2022).

Manyika et al. (2017) claim that automation brings a new world of work and will have a far-reaching impact on the global workforce. They found that approximately 50% of the current work activities are technically automatable by adapting currently demonstrated (AI-based) technologies. Based on their calculations, between zero and 30 percent of the working hours currently worked globally could be automated by 2030, and the exact extent of this depends on adaptation. Of course, in addition to this, the estimated values of the examined countries⁴ differ from the currently prevailing wages and the activities currently performed by the employees. They argue that even when some tasks are automated, employment in those occupations may not decline but may shift to new ones instead. They also predict that automatization will have a less important effect on professions that include social interactions, managing people, applying expertise, or where the technology is not able to match human performance (Manyika et al., 2017). The possibility that up to 30% of the work currently performed by humans can be automated within the foreseeable future gives hope to ecological economists, who often conclude that with the right technology, our world can be "saved" and we can find a solution to climate change, economic inequalities, and other global problems that affect our society, economy, and environment. However, the topic, scope, and purpose of this paper do not allow for further investigation of the effects of automation, artificial intelligence, and technology from an ecological economic point of view.

It is interesting that during a research that took place between November 2019 and April 2020, Hungarian undergraduate and master's students did not feel that their own future work (none of them related to technology) was at all threatened by artificial intelligence. Also, they thought about technological change as if it did not affect them on an individual level, and if it did, they would have plenty of time to get used to it due to the slow technological development, and unemployment would affect a small part of society (Vicsek et

⁴ The focus countries were as follows: the United States, China, Germany, India, Japan, and Mexico.

al., 2022). We probably wouldn't have these results in 2023 after the COVID-19 pandemic and the explosion of generative artificial intelligence (such as ChatGPT), and probably we would have different results in 2024 because we are over the hype-peak of generative AI.

The narrative reveals a complex interplay of factors, from the sluggish pace of automation due to corporate profit distribution strategies to the transformative potential unleashed by free tools like ChatGPT. Manyika et al. (2017) present a compelling argument, suggesting that up to 30% of current global working hours could be automated by 2030, sparking hope among ecological economists for solutions to pressing global issues. The study by Vicsek et al. (2022) also unveils intriguing perceptions among Hungarian students, seemingly untouched by the AI wave during their research period. Yet, the technology hype has undoubtedly evolved post-2023, with generative AI's explosion and the ebbing of its initial hype. As we stand at the precipice of this transformative era, only time will unveil the true impact and nature of the changes that lie ahead.

II.4. (Generative) AI in IT and computer science

As explained above, (generative) artificial intelligence can perform tasks or speed up work processes in different work fields and industries. Brynjolfsson et al. (2023) supported with empirical evidence that access to recommendations generated by artificial intelligence increases worker efficiency. In addition, they found that workers who follow the AI's recommendations experience a greater increase in productivity (Brynjolfsson et al., 2023). Overall, Krämer and Cazes (2022) claim that incorporating AI into the workplace can bring significant benefits, but it is important to ensure that these benefits are maximized while minimizing potential risks. By taking a proactive and collaborative approach, policymakers and stakeholders can work together to ensure that AI is used in a way that promotes social inclusion, reduces inequality, and enhances job quality.

Throughout this student research paper, the notion of 'information technology' (IT) will be used by the following definition: information technology includes everything that businesses use computers for (building communications networks; helping employees troubleshoot with their electronic devices; database administration and creation; safeguarding data and information, developing and maintaining business information systems to ensure efficiency and security) (Gershon, 2022). It is also important to note the difference between IT and computer science. Experts have different explanations, but the main point is that we can consider computer science as a subset of information technology; IT is the study of

computer systems and networks for business operations, which is more focused on the necessary technology which is required to manage all the information. Computer science refers to mainly programming and software development (Gershon, 2022). Based on these notions and explanations, the profession of a programmer and software developer belongs to computer science. Regarding the impact of artificial intelligence on IT and computer science jobs, we find opinions suggesting that artificial intelligence is more of a tool for work and not a threat.

Jones (2023a) draws attention to that generative AI does not necessarily make coding easier for software developers. According to him, the problem is often not with the speed of coding but with the fact that the code is not thought through enough, and 'bad' codes can be created quickly. Also, the use of artificial intelligence results in the fact that if we can do things considered more complex so far more easily, then this leads to the fact that we want to create even more complicated things from the basis that we can easily make now. In addition, Jones also emphasizes that our interaction with artificial intelligence changes the way we work, just as Sætra (2023) highlighted this innovation. Brynjolfsson et al. (2023) research also reveals that adherence to AI recommendations increases over time for all employees, and interestingly, this is especially true for those who were initially more skeptical.

Wingström et al. (2022) investigated how computer scientists and artists working with artificial intelligence define the concept of creativity. They found that they see AI as a tool or method that they can work with. Artificial intelligence was seen as a partner rather than something that is intelligent and can be created independently. That is why it will be interesting to look at the programmers and software developers who use AI help in their work versus those who do not. We can find out if this maximum partner view is present in the field of work and if the fear of automation appears.

Jones (2023b) claims that artificial intelligence will not end coding, but it will change the profession, especially the work of programmers. According to him, we miss the point if we think, that with AI a software developer will be only more productive, it is true, but it is not the main point. Instead, we should think of three different groups: the jobs that can be mass transformed or replaced by AI; the new jobs that will be required due to AI, and the jobs that will be augmented. He argues that if we shift our focus towards only the third group, maybe we miss out on the first and the second group, which is problematic. He suggests that every programmer will be or could be in the second group or be replaced by automatization (Jones, 2023b). This logic suggests that no matter what software developers are doing today

they either end up replaced by generative artificial intelligence or become someone whose job is required by artificial intelligence but there is no possibility that AI will be not involved somehow.

According to Jones (2023b), among the subspecies of programming professions, the following will disappear due to generative artificial intelligence: Application Integration Specialist (they specialize in connecting different software systems and ensuring that they work seamlessly together); Experts in K8S deployment (they are responsible for configuring, deploying and managing applications within a Kubernetes cluster); Stack Overflow Contributors (Stack Overflow is a platform for community-driven question and answer discussions related to programming and development; there are developer jobs which require tasks that can be solved via Stack Overflow or Google); Framework Experts (they job is in designing, developing, and maintaining coding frameworks that provide a structured foundation for building software applications); and Package Developers (they specialize in creating, maintaining, and managing software packages, which are collections of code, libraries, and resources that can be easily distributed and reused by other developers). He also highlights skills that will become important in the future: Systems Design (developers who can plan and define the architecture, components, data, and modules for a system); “Prompt Whisperer” (developers who understand how different models work and can develop them to work better); Data Security Developer (developers who can new data security policies and frameworks realize in different applications); Trusted AI Developers (developers and experts around AI whose job is building rules and solutions for all kind of problems related to artificial intelligence) (Jones, 2023b).

Conclusively, the exploration of (generative) artificial intelligence in the realm of IT and computer science has unveiled a multifaceted landscape. Empirical evidence, as presented by Brynjolfsson et al. (2023), underscores the positive impact of AI recommendations on worker efficiency and productivity. Krämer and Cazes (2022) advocate for a proactive approach to maximize benefits while minimizing risks, emphasizing the need for collaborative efforts among policymakers and stakeholders. The distinction between IT and computer science, elucidated by Gershon (2022), defines the scope of these fields, with the software developer and programmer residing in the latter. Jones (2023a) challenges the assumption that generative AI simplifies coding, emphasizing the importance of thoughtful code construction. The evolving nature of work in the face of AI is further delineated by Jones

(2023b), who categorizes jobs into those transformed, replaced, required, or augmented by AI, prompting a nuanced perspective on the future of programming.

III. Research questions

The rise and popularity of AI is clear, the question is how it will affect different professions in the present and the future. It is also interesting to see how programmers and software developers who work in a technology environment see it, so they may have a different perspective than those working in a more technology-neutral profession. The literature review suggests different scenarios on labor market changes in the future because of artificial intelligence. In relation to the hype, it is interesting to see how people assess the popularity of AI and its capabilities in relation to this. Based on the literature collected above, the paper poses the following research questions:

1. How do programmers and software developers perceive the impact of AI on their future occupations and career prospects?
2. What role do their personal experiences with AI play in shaping their views?
3. How does the level of education and experience influence their opinion about the future of their work? How does it influence their expectations?
4. How are they responding to the AI hype? What strategy do they follow if any? What actions do they plan to take because of the development in AI, if any?

IV. Methodology and data

In this study, a qualitative research method was employed to investigate software developers' and programmers' logic behind their expectations about their future career prospects related to artificial intelligence. 10 semi-structured interviews were conducted between 2024 February and April. The choice of research design was influenced by the need to understand correctly how interviewees justify their opinions.

The participants for this study were selected using snowball sampling. The rationale behind this sampling strategy was to access this specific population because it is not so simple to find 10 people with the same or almost the same occupation. Also, this sampling method is effective in locating and recruiting participants because the recommended people are usually people who are open to participating in research. This method often relies on trust and existing relationships within social networks, which can facilitate recruitment and

participation among populations that may be hesitant to engage with outsiders or official representatives (Goodman, 1961). It was true for most of the interview subjects that they were not particularly talkative and had difficulty opening up, but in the end, each interview went well and contained valuable answers. The interviewees might not have even attempted this if I had not used this methodology. Before the interviews, an insight interview was conducted with a software developer, based on which it was precisely determined that programmers and software developers perform largely the same work, although not completely. Thus, anyone from these occupations is suitable as an interviewee.

The interview guide consisted of three larger blocks. The first part asked about general demographics, while the second part looked at what experiences they have or don't have with artificial intelligence, and what they've heard from others about AI. In the third block, we talked about current and future changes within their profession. The exact interview guide is in the appendix. It is also important to acknowledge the drawbacks of snowball sampling, including the potential for sample bias due to participants referring to similar individuals, limitations in the generalizability of findings, and difficulties in estimating population characteristics. Ethical guidelines were strictly adhered to throughout the data collection process. This included obtaining informed consent from participants, ensuring confidentiality and anonymity, and minimizing any potential harm. The characteristics of the interviewees are presented in Table 1.

Name	Age	Education	Experience in the IT field	Classification
Bob	24	High school graduation, currently learning as an operations engineer-computer scientist (BSc)	6 months	junior
Mark	28	Mechatronics engineer (BSc)	5 and a half years	senior
Daniel	27	Computer Science Engineering (MSc)	5 years	junior
Benjamin	42	Software Designer Mathematician (MSc)	17 years	senior

Daisy	28	Computer Science Engineering (BSc), started the MSc but dropped out	8 years	senior
Sebastian	34	High school graduation (also in IT subjects), expired Computer Science Engineering absolution (BSc)	8 and a half years	senior
Axel	27	Computer Science Engineering (MSc)	5 years	junior
John	25	Computer Science (MSc)	3 years	junior
Aiden	28	Computer Science Engineering (BSc)	6 years	senior
Finn	24	High school graduation, Software Developer (OKJ)	3 years	junior

1. Table: Characteristics of the interviewees. Source: self-made table.

The table, of course, does not include the real names of the interviewees, but the names used correspond to their gender, so there were 9 male and 1 female subject. The interviewees ranged in age from 24 to 42, but most of the interviewees were in their twenties. In terms of qualifications, it can be said that two of them officially only have a high school diploma, although one of them completed a bachelor's degree related to the IT profession at the university, where he did not take the final exam, so he does not have a diploma. There was a subject who attended adult education after high school, where he studied to become a software developer. Three interviewees have a basic university degree, and four have a master's degree. The classification in the table is based on how experienced the interviewees considered themselves and how much experience they have. Based on this, those with 5 years of experience or less were placed in the junior category, and it can also be observed that those who declared themselves to be less experienced were those who had not yet reached their 28th year of age. Qualitative thematic analysis of the transcripts was performed using the NVivo software.

V. Findings

During the analysis of the interviews, in addition to the dimensions of the research questions, other topics came up, such as the ethical problems related to artificial intelligence and the issue of reliability, and each interviewee was asked to define what they think artificial intelligence is. There are different definitions of artificial intelligence, but I thought it might be interesting to know what the interviewees mean by artificial intelligence. Out of all the questions, this was consistently found to be the most difficult question. 8 out of 10 interviewees described what artificial intelligence is for them with ChatGPT, self-learning, and machine learning. Although several people pointed out that artificial intelligence also includes other things, at the moment they equate artificial intelligence with these. Of the two other interviewees, one could not give a definition, while the other defined artificial intelligence as a helpful tool. During the interviews, each interviewee understood generative artificial intelligence by artificial intelligence.

V.1. The impact of AI on future occupations

Everyone agreed without question that what they called artificial intelligence during the interviews is not yet the final product but will continue to develop. Opinions were already divided as to the rate of development; some expected a slower (20-year horizon), others a faster (within 1-2 years) development until the point when AI reaches its full potential. We mostly talked about expectations for the future in a maximum of 5 years, although many pointed out that this is also an unforeseeable time frame from the point of view of the profession. In the interview guide, there was also a question about what they expected in 15 years, but none of them could even guess.

V.1.1 Junior expectations

The first research question concerned how programmers and software developers see the impact of artificial intelligence on their future occupations. When we talked about their general expectations, the topics that were dealt with in several specialized pieces of literature mostly came up. It can be said about the junior interviewees that they are not characterized by fear at all, and they mainly highlighted the positive benefits of artificial intelligence-based tools but remained critical. One by one, they all emphasized that they did not feel their work and position were in danger and that they expected that their work would be easier, more efficient, and faster thanks to AI. It is also interesting that although the juniors emphasized

that easier jobs, even for beginners, could easily be replaced by artificial intelligence, they did not feel threatened.

Given that they claimed that they are so talented, inventive, and able to add value and believed that they were necessary, AI cannot replace them, which explains their certainty about their career opportunities. They emphasized that their work does not only consist of writing code; the essential part of it is system creation, complex thinking within the system, and insight into the system, which AI simply cannot do. Overall, however, their expectations were divided as to how many software developers would be needed in the future. Two expect the number of software development jobs to decrease, and three expect an increase. One of them expects AI to be perfect for alleviating the labor shortage in the IT sector. Also, there was an idea that AI would serve as a kind of filter in the future; it would be able to simply replace professionals with poor knowledge and thinking, but it would not endanger career starters. However, they were all able to give an example of why AI is more dangerous to workplaces than to them in other industries and occupations.

Other industries have emerged, such as the automotive industry, where already in 2021 you could read the news that cars will be made almost entirely by robots.⁵ Several juniors also emphasized that, in their opinion, AI combined with robotics can bring about significant changes in the automotive industry. In addition, data scientists and writers were singled out as vulnerable jobs, considering that AI can process a great amount of data very quickly and draw conclusions about it, especially compared to humans, and AI can easily generate any text. Also, the factory workers were the ones who came up several times during the conversations. According to one of them, artificial intelligence can be compared to the assembly line, and he expects the same thing to happen when the assembly line was introduced,⁶ which resulted in much higher productivity.

It is interesting, however, what negative points are highlighted. They highlighted the deterioration of the quality of work, including the quality of codes. The interviews revealed that the occupation is that codes can be written “beautifully” and “badly,” and the use of AI can result in more “bad” code while coding faster, which represents a lower quality.

"Basically, I rate it positively, except that the code I create is probably a little less high-quality. It's a little lower quality because a lot of times if it's written for me and it basically

⁵ <https://www.szabadeuropa.hu/a/robotok-vegzik-az-osszes-munkat-a-nissan-okosuzemeben/31500813.html>

⁶ With the introduction of the assembly line, Ford managed to significantly improve productivity, reducing the previous average time of assembling the Model T from 12.5 hours to 93 minutes in 1914 (McNally, 2011, p. 66).

works fine and there's no problem with it, it just looks less nice, I don't necessarily spend extra time rewriting it just to make it look nicer, otherwise it's functionally fine." – John

Regarding this issue, another junior pointed out that in the future the AI could be further refined to produce better, more precise, "prettier" codes, but that he expected that at some point it would stop because it just was not worth it financially.

"In the gaming industry, for example, it is currently seen that extremely elaborate, beautiful, long games are being made, which is very good, but now it will slowly take 5 years to make a game, 500 people work on it for 5 years, which generates terrible costs, and it is slowly becoming impossible to bring it back the price of making a game, and they brought back a lot of money, but it just wasn't as much as the expenditure for it, and sooner or later, since it's so damn expensive to feed these AI models, sooner or later that will come here too the point is that, of course, it could be infinitely refined, fed with even more things, but sooner or later, it will be a lot in time and a lot in energy, so there will be expenses that will be more and more difficult to bring back." – Daniel

Another junior also emphasized that artificial intelligence as a business and as a product is currently on the table, and everyone is trying to get the most profit out of it. In connection with artificial intelligence as a profitable product, it was also mentioned in another junior interview that an innovation could come this year that could change everything, considering that one of the big tech companies has not yet entered the competition because they usually wait with new technologies, but afterward, they always create something significant.

V.1.2. Senior expectations

Regarding the senior interviewees, it can be said that their attitude towards AI was more divided than that of the juniors. On the one hand, the two oldest interviewees expressed a strong fear about their future, while two other seniors were particularly enthusiastic about AI and its effects, while the fifth took a completely neutral position. However, this neutral position is explained by the fact that in the future he wants to go in the direction of management within IT, which almost does not include software development and code writing, so from his point of view, it "does not matter" how this part of the work will be done. Those interviewees who expressed significant fear regarding their future job opportunities expect that the development of AI will suddenly reach the level where software developers and programmers will no longer be needed. One of them sees this happening within 5 years,

while the other sees it happening within 15 years, and their concern corresponds to this. The one who expects this change sooner has greater fear and a more drastic attitude towards AI. The other seniors gave the same arguments as the juniors as to why they would be needed in the future.

However, two of the seniors also brought up the fact that in the future we don't necessarily have to worry about AI taking away jobs, but specifically consider the climate disaster to be a factor that will significantly affect our lives. It also came up that the number of software development and programming jobs will primarily be determined by how salable and how much profit the business or service that is based on AI can generate (as was also the case with the juniors). In addition, there was also a peculiarity within the profession that many companies, and thus many programmers and software developers, work with so-called legacy systems or codes. These are "legacy" codes that can only be fixed continuously if a problem arises because it would be too much work to redo the whole thing, and in this type of code, the AI is simply unable to adapt or rewrite the whole thing, but an experienced developer or programmer can. In addition, it was also raised that a code or even entire software that is generated by artificial intelligence will probably not think through what security measures should be taken or will not be able to defend against a hacker attack, which is why human labor is needed.

The seniors were also divided on what they expect considering the number of jobs, three expected that more developers will be needed, while two expect that the number of developer jobs will decrease significantly. Those who expected that more programmers and developers will be needed are justified by the fact that AI will become more and more popular and will be used for more and more things, so it is logical that there will be more jobs. They all agreed that soon, AI will perform tasks that are inconvenient for humans, as well as tasks that are repetitive and can be easily automated. The senior who was afraid of his job but expected to lose it only in the distant future emphasized that AI will only become dangerous for his job if its development reaches such a level that the various companies developing AI will dare to take responsibility for AI's decisions, and, according to him, this will be the turning point that will lead to the use of artificial intelligence as a substitute for human labor. It is also interesting that this interviewee expected the codes to be of better quality from automation because the human factor is removed from them. One of the enthusiastic seniors emphasized the human factor, but she countered that the human factor is the profession's specialty and is essential for success and effective job performance. According to another

senior who is fundamentally enthusiastic about the use and development of AI, he expected that if general artificial intelligence is achieved at all, it will lead to the replacement of human labor. Interestingly, only two of the seniors mentioned that, among software developers and programmers, it might be more difficult for those starting their careers because of AI.

V.1.3. Changes in the present

Most of the interviewees have already realized changes in their work. They primarily reported that they do not use the various AI-based solutions at all or only minimally in their private lives or for their entertainment. However, with three exceptions, all of them have already actively used artificial intelligence in their work. Thanks to this, work processes have completely changed for them.

“Before the appearance of AI, there was an hour of thinking, and let's say a couple of hours before a person implements it. And now with AI, you write it in five minutes, but in the meantime, you correct it for three or four hours. Many people have said that what I have also experienced is that it really helps, sometimes speeds it up, but often it simply spoils the work, and you try to solve what it gave because it is sure to be good.” - Bob

According to the subjects, this type of workflow leads to the fact that, on the one hand, the programmer or developer does not think as much as before, and on the other hand, it makes people uncomfortable. During the interviews, the 3.5 ChatGPT was also highlighted, so of course, you have to check what it outputs, but the experience is that it generates good codes in the majority of cases. As a result, the work itself became faster and simpler overall; the question is, is it worth the price? Several subjects mentioned that they frequently use the Internet to look for solutions to issues in the course of their work, but that recently doing so has become challenging due to the proliferation of poor-quality AI-generated content on the Internet.

Not only have work processes changed, but employers have realized that different AI-based tools can be used and are also open to them. Several people reported efforts to create a working group at work that deals with AI, how it could be used effectively, or organize a playful competition to somehow integrate artificial intelligence into existing projects. Also, several employers have subscribed to Github's Copilot and encourage their employees to use it. However, at some companies, the use of Copilot or any other code assistant or generative AI is expressly prohibited, taking into account the associated data management problems. In addition to employers, it was also mentioned that clients often inquire about whether they use

any kind of generative AI for work because they are afraid of their data and do not want confidential information to get out by accident. Which is a legitimate fear on the part of customers.

“And I’ve heard of a guy getting fired because of this because he obviously copied the entire code [into ChatGPT] so he could do something with it. There are problems with this, for example, because from now on it may be on the net somewhere. And you have to be careful.”
- Bob

Although this was mentioned by several interviewees, they do not copy a unique company code into ChatGPT or other online code assistants because no one knows where this data is stored, and who has access to it. Many people do not even insert such codes into Copilot, even though Copilot is integrated into the corporate development environment for some people, and they do not even risk it.

“Well, I would prefer to put this in the way that we do not insert any code that may refer to any property of the company into the chat of the files, but we only insert our code, so to speak, or a part of the code that does not reveal the company's IP just put in what you can find anywhere on the internet. What is not so product-specific is that there is an unwritten rule that company codes should not be included in Copilot. (...) I don't know if there is an option that Copilot will not be developed further on our data or not. I would say that if the company could do it, we would pay for a version where our data is not uploaded to Copilot.”
– Axel

However, Copilot already has two versions⁷ that guarantee that it will not be trained on the received data and that no IP address data or unique code can be leaked.

V.2. The influence of personal experiences on the viewpoints

The second research question aimed to shed light on the extent to how the participants' point of view was influenced by their personal experiences. It can be observed that their experiences strongly influence their attitude towards AI. Three of the interviewees claimed that they had no significant experience with artificial intelligence, but during the conversation, it was revealed that they all knew ChatGPT and Github's Copilot. Everyone has tried ChatGPT itself, some image generator, or even uses it daily. The lack of experience

⁷ The mentioned features are also included in the Business and Enterprise versions. (GitHub.com)

(compared to the other participants) resulted in them being particularly critical of the capabilities of artificial intelligence, and self-consciousness also arose.

"I did not try it directly; it was as if someone typed in what I said." – Daniel

Some interviewees identified the fact that they do not use help in writing code because of their love of the profession and work; they experienced it as cheating or inferior if someone used these tools. Although writing code was a sensitive subject, they did not mind doing other work-related tasks and even found it to be very helpful.

"I still have principles. I still want to write the code. It's not like I push a tab and that's it. It does exactly what is good in the profession instead of me." – Sebastian

Additionally, the fact that they did not receive the outcomes they anticipated in the few interactions they had with artificial intelligence can also help to explain their skepticism and pessimism. Others who are more experienced generative AI users have pointed out that it depends on how we formulate our request because it can greatly affect the quality of the output.

"Being able to formulate the input well – the so-called prompt engineer, as we call it nowadays – is very important because it can greatly improve the quality of the output so that we can write it down well [to the AI]. If we ask something in a formatted code base that follows good conventions, it will be able to interpret the code quite well and generate something useful for it." – Axel

It is also true that those interviewed who use AI more frequently or have more experience using artificial intelligence in their work were more positive about AI. Most importantly, it can accelerate work processes. Nevertheless, each of the interviewees gave an example that negatively affected their point of view. The previously mentioned input formulation problem has all been mentioned, as have the resulting false results and the adverse effects of these results, as many times the attitude has arisen that AI models have much greater lexical knowledge. Therefore, *"(...) what it gave is surely good."* – Bob

However, they all refuted this attitude quickly and gave examples of it. After all, every interviewee has already encountered that the AI provided false output. This naturally raises trust issues.

“I fight with it [ChatGPT] on a daily basis, because it writes back the same thing for the third time, and I say that we discussed before that this is not good. Why do you return the same answer and then it generates the same one again.” – Sebastian

Not only do the possible wrong answers influence the participants' claims about artificial intelligence negatively, but also the fact that it is not possible to trace why it gives the answer it does. Also, in connection with this, it was raised that everyone who uses generative artificial intelligence should be informed separately about how unreliable it can be and that this unreliability could even increase in the future.

“This alone raises the danger that, so far, these models could be taught very well from public information found on the Internet. Now, if the Internet is flooded with content generated by such models, the learning material will deteriorate significantly, and it is very difficult to tell what was produced by such a model and what was not. If they learn their stupidity, then I think the Internet could reach such a complete loss of information.” – Aiden

In addition, it was also highlighted that within professional circles, it also happens that if something works well, it is talked about less or rarely, while if something does not work perfectly or has errors, it is, of course, immediately a topic of conversation. Most of the interviewees also expressed skeptical thoughts, according to which there is only a lot of hype surrounding the technology, but this will be discussed in a later section.

V.3. The influence of education and experience on the expectations

The third research question investigated how the participants' professional experience and education influenced their expectations. Based on the interviews, it can be said that the educational level does not significantly influence the expectations of the interviewees. They claimed that it does not currently matter from the point of view of employment and success, who has what kind of education, but rather the emphasis was placed on experience, practical knowledge, and attitude. They expect those who are adaptive, flexible, up-to-date, and open-minded to be successful in the future. The specialty of the profession is that it changes from month to month and determination, humility, and interest in the profession are needed to keep up with the developments. In addition, it was also suggested that professionals who can use AI in their work will have an advantage in the future. Also, those who have a master's degree mentioned that not much, but some, high education will matter, but rather soft skills and deeper, more specific knowledge will be needed.

Education was not considered important either for the present or for the future, because the current Hungarian higher education cannot keep up with the development of technologies.

"I had a teacher who said that those who want to get a job in the profession do not necessarily have to sit here in the chair. (...) The training has done a lot of good, but I think it is very far behind, and it is still trying to give us academic knowledge, which is necessary because we need theory, but they do not teach new technologies. And it's good that they also tell about the old ones, because we get to experience how they were built in the past, and it is very interesting. However, this is not so necessary anymore." – Bob

Interestingly, however, one of the interviewees pointed out that old software design mathematicians did not like to switch and keep up with new technologies, and the interviewee with such training fully justified this claim. He was the one who rejected the use of artificial intelligence the most and among all participants, he used it the least.

It was also suggested that it would be true for large IT companies in the present and probably in the future that they will take a more conservative position on the education issue.

"But there is a kind of conservatism in companies regarding the fact that a university degree is what you need, and what I know. This thinking that it doesn't matter who you are, the point is that you know, I don't see it changing dynamically at large companies, the situation is different at start-ups." – Mark

"In the case of better companies, I think it will still matter what the person's education is, but in the end, it really is that if the person has learned a lot and can show something that is impressive, then they will be hired." – Aiden

In the interviews, it was clearly emphasized that, in essence, it does not matter the educational level, it is the experience that matters for someone to be successful in this field. Also, they all linked experience to the fact that those programmers or developers who have more experience represent a much more valuable workforce.

V.4. Reaction to AI hype

The purpose of the fourth research question was to explore the reactions of the interviewees to the hype surrounding artificial intelligence. Although the interviewees work close to technology and even learned about artificial intelligence during their studies, none of them had this technology actively on their "radar". After the appearance of ChatGPT, they all

started actively talking about it, both in a friendly and professional environment, although the two often overlapped. Some also highlighted that they were completely surprised when the topic came up within the family, although the family conversations did not go too deep. About a year and a half has passed since the appearance of ChatGPT, but artificial intelligence is discussed several times a week. Some participants talk about some form of artificial intelligence on a daily basis. During the conversations, skepticism mostly arose, especially regarding the capabilities and development of generative artificial intelligence.

“I feel that there is more smoke than fire here.” – Mark

“But what I see is that right now, and this includes marketing, they are trying to sell that it will be good for everything, and they are trying to force everything on it, regardless of whether it is worth it or not, or whether it will work or neither. I don't know if people believe it, so it seems likely, that it makes a bit more sense, but it's a bit similar to the NFT⁸ hype. Isn't it true that the NFT also had practically a year when there was a lot of hype around it, and there was a lot of money in it, and then it all collapsed.” – Daniel

“ (...) I support the camp of those who see that the current development path has a support level that will be difficult to develop further, and that is why I am skeptical, so to speak, that everyone will lose their jobs, which is such a popular, so to speak, I don't know, AI-fear, or tabloid news, or I don't even know what to call it now.” – Axel

It will be very difficult to significantly surpass and further develop the current level of generative artificial intelligence, if at all, but in any case, most interviewees expect that artificial intelligence will gain more space in the future than at present, despite their skepticism. They plan to cope with this in such a way that most participants try to work with it as much as possible and learn and understand how it works, even in their spare time. Those participants who shy away from using AI or are not so open to it also plan to learn how to use it, but only if they are forced to do so.

Most of the interviewees reported that they already feel some kind of pressure to use artificial intelligence in their work, or if they do not feel it now, they expect to feel it in the future. This pressure comes from employers on the one hand and from the popularity of technology and the fact that it is an almost constant topic of conversation on the other. It is also interesting that the participants reported that five years ago, we had a completely different understanding of artificial intelligence than we do now. And what we called artificial

⁸ NFT = Non-Fungible Token

intelligence at the time had significantly weaker capabilities, which is why none of them paid much attention to it.

VI. Conclusion

In light of the technological hype surrounding generative AI, this study adds to the sociology of expectations by examining the expectations of Hungarian software developers and programmers concerning the impact on their careers and professions. The interviews conducted provided insightful perspectives on artificial intelligence and its anticipated impact on future occupations, particularly among junior and senior programmers and software developers. Defining AI proved to be a challenging task, with most interviewees associating AI with technologies like ChatGPT, self-learning, and machine learning and this coincides with the concept used by IBM. Discussions also surfaced concerns about AI's potential ethical implications and reliability, highlighting broader considerations beyond technical definitions. Regarding expectations for AI's development and impact, there was a consensus that AI is still evolving and not yet a finished product. Opinions varied on the pace of AI development, with divergent forecasts ranging from a slow progression over two decades to rapid advancements within the next few years. All interviewees considered it necessary to justify why they will be needed as a workforce in the future, however, no question regarding this was raised during any of the interviews. From this, it is clear that they are concerned with this idea even if they do not consider it likely to happen.

Junior participants generally expressed optimism about AI, emphasizing its potential to enhance work efficiency and effectiveness. They emphasized the irreplaceable human elements of system creation, complex problem-solving, and critical thinking, which AI currently cannot fully replicate. Here, however, the within profession optimism bias may arise as a possibility that people often tend to think they are better than others. Of course, it is impossible to know whether this shaped their views here, but this is also a possibility. However, opinions were split on the future demand for software developers, reflecting uncertainty about AI's broader effects on job markets. The senior participants demonstrated a more nuanced perspective, with some expressing fear about potential job displacement due to AI, particularly in legacy systems where human intervention remains inevitable. Others highlighted AI's potential to create new job opportunities and automate repetitive tasks, leading to more specialized roles. Concerns were raised about the impact of artificial intelligence on work quality, particularly in coding standards, where automation could lead to

faster but potentially lower-quality outputs. Despite these challenges, interviewees recognized AI's potential to revolutionize industries like automotive manufacturing and data science. The interviews revealed a spectrum of attitudes towards AI, from cautious optimism to apprehension, reflecting the complexity of navigating technological advancements in the context of future career prospects. The insights gathered underscore the need for ongoing dialogue and strategic planning to maximize the benefits of AI while mitigating its potential disruptions in the workforce. The findings revealed significant shifts in work processes due to AI adoption, which was described by Saetra (2023) with most interviewees already leveraging AI tools to streamline tasks. While artificial intelligence has accelerated productivity, interviewees expressed mixed sentiments about its impact, citing instances where AI-generated outputs required extensive manual corrections. Concerns were also raised about the quality and reliability of AI-generated content available online, complicating the search for accurate solutions.

Ethical considerations emerged prominently, underscoring the need for regulatory oversight in AI development and deployment. Interviewees emphasized the opacity surrounding AI's training data and raised copyright infringement issues related to AI-generated content. The desire for increased transparency and accountability in AI technologies was echoed, urging policymakers to address regulatory gaps and ensure responsible AI use, as emphasized in the literature by Acemoglu (2021). Additionally, ethical dilemmas were discussed concerning AI's broader societal impact, including concerns over data privacy and the potential misuse of AI capabilities for intrusive purposes. Moreover, the interviews highlighted employer attitudes toward AI, with some organizations actively embracing AI-based tools to enhance project outcomes. However, data security concerns were evident, particularly regarding the use of AI assistants like Github's Copilot, amid fears of potential data leaks and intellectual property infringements. The interviews shed light on the complex interplay between AI adoption, workplace dynamics, and ethical challenges. These insights underscore the importance of comprehensive regulations and ethical frameworks to guide AI development and deployment responsibly, ensuring that technological advancements benefit society while mitigating associated risks and ethical dilemmas.

The extent of individuals' direct engagement with AI technologies significantly shapes their attitudes and skepticism. Interviewees who had limited exposure to AI expressed heightened skepticism and critical views, often viewing AI assistance in coding as a form of cheating or compromising professional integrity. This sentiment was driven by a desire to

uphold coding principles and maintain a personal connection to their craft. Conversely, those with more extensive AI experience tended to have a more positive outlook, recognizing AI's potential to enhance work efficiency despite encountering occasional setbacks such as erroneous outputs. The importance of carefully formulating requests to optimize AI performance was highlighted.

Trust emerged as a central concern, with participants expressing reservations due to AI's inherent unpredictability and the challenge of tracing its decision-making processes. There was a consensus on the need to educate users about AI's limitations and potential risks, especially as AI-generated content proliferates online, potentially diluting learning data quality. Furthermore, professional discourse tends to amplify AI's shortcomings over its successes, contributing to a broader perception of AI as overhyped. This skepticism reflects a critical evaluation of AI's practical implications within professional circles.

Professional expectations and success in the field of programming and software development are predominantly influenced by practical experience rather than formal education. The interviews revealed a consensus among participants that traditional educational qualifications, while important to a degree, are not as critical as adaptability, practical knowledge, and a proactive attitude toward ongoing technological advancements. Participants emphasized the dynamic nature of the profession, where rapid changes necessitate continuous learning and adaptability. Soft skills, specific domain expertise, and the ability to leverage emerging technologies like AI were cited as key factors for future success in the industry.

Interestingly, perceptions varied regarding the importance of formal education within different organizational contexts. While larger IT companies were seen as more conservative in their reliance on university degrees, startups were perceived as more open to hiring based on demonstrated skills and accomplishments rather than formal credentials. The interviews, however, underscored a prevailing sentiment that experience is paramount in establishing professional credibility and effectiveness. Programmers and developers with substantial experience were regarded as valuable assets within the field, possessing the practical insights and problem-solving abilities necessary to navigate complex challenges and technological shifts. This emphasizes the evolving nature of the profession and the importance of cultivating a diverse skill set to thrive in a rapidly changing technological landscape.

The findings reveal a nuanced response among interviewees to the pervasive hype surrounding artificial intelligence. Despite their proximity to technology and exposure to AI during their studies, the emergence of ChatGPT marked a turning point, sparking active discussions both professionally and within personal circles. Over the past year and a half, AI has become a regular topic of conversation. Skepticism emerged as a prevalent sentiment, particularly concerning generative AI's capabilities and trajectory. While expressing doubts about the potential for substantial advancements in AI, most participants foresee increasing AI prominence in the future despite their reservations which also match the experts' expectations (Chui et al., 2023) (Sætra, 2023). Participants plan to proactively engage with AI, dedicating time to understanding and integrating it into their work processes. Even those initially dismissive plans to acquire AI skills, anticipating growing pressure from employers and the pervasive influence of AI in technology discourse.

The paper has its inherent limitations. Notably, the interviewees can be regarded as relatively homogenous in terms of both education and age. The inclusion of subjects with greater educational diversity could have enriched the study by introducing novel perspectives. Similarly, exploring a wider age range, particularly including individuals over 35 or 40 years old, might have revealed additional apprehensions towards artificial intelligence akin to those expressed by the "older" participants in this study. Furthermore, a valuable avenue for future research would involve contrasting the responses of interviewed programmers and software developers with those from other IT professions, such as system administrators.

VII. Summary

This student research paper examined the perspectives of Hungarian software developers and programmers on the impact of artificial intelligence on their occupations and career prospects. It aims to understand the influence of personal experiences, education, and professional experience on their expectations and reactions to the hype surrounding artificial intelligence. The research concluded with the analysis of insights gained from 10 semi-structured interviews. Artificial intelligence is an expansive term that focuses on the use of computational methods to replicate human intelligence. The definition of AI could be also connected with machine learning, a field that focuses on utilizing data and algorithms to enable AI systems to emulate human learning processes.

Artificial intelligence can be categorized into weak and strong AI. Weak AI excels at specific tasks, such as speech recognition and image recognition, while strong AI, also known as artificial general intelligence (AGI), can perform any intellectual task. The development of strong AI is a long-term goal, and researchers are working to create human-level AI that can expertly process multiple tasks. Generative AI, which can create original content like text, images, or music, has revolutionized the interaction between humans and machines. It has a wide range of use cases in various industries, including retail, banking, pharmaceutical research, and decision-making and collaboration. Generative AI is expected to have the greatest impact on knowledge-based jobs, particularly decision-making and collaboration.

The application and development of technology face several challenges, including training data requirements, computing resources, mode collapse, generalization and adaptation, and ethical issues. The emergence of new technology can have both positive and negative consequences, with some arguing for techno-optimism and societal resistance. The concept of "hype" is increasingly used to describe technological developments, with hype cycle models being recommended for strategic investment decisions. However, hype can also influence expectations, leading to high expectations and disappointment if the technology does not meet them. Understanding the interplay between institutional and personal factors can help better understand the social impact of projected futures and their role in shaping social change. Strategies such as backcasting, scenario planning, and anticipatory governance can help researchers and decision-makers think more systematically and creatively about the future while acknowledging the contingencies inherent in it.

Studying future projections helps us understand the link between cognition and action, revealing how beliefs and expectations of the future influence our actions in the present. The 'entanglement of matter and meaning' makes the future 'wicked' due to its unpredictability, complexity, and uncertainty. Unintended consequences can arise when we project a specific future, affecting social structures and influencing actions. Future projections can be studied through their externalizations in attitudes, narratives, performance, and material forms. The future of work is uncertain, but artificial intelligence and automation will play a significant role in shaping it. While the short-term impact of AI on jobs is uncertain, it is argued that it will provide more employment opportunities than it displaces, similar to the Industrial Revolution's automation.

Scholars argue that technological unemployment is unavoidable in the future, with techno-optimists envisioning a utopian after-work society and techno-pessimists forecasting a

bleak future with high unemployment rates, rising inequality, and poverty. Automation is predicted to bring a new world of work and affect the global workforce, with approximately 50% of current work activities being technically automatable by AI-based technologies. However, employment in certain occupations may shift to new ones, and automation may have a less significant effect on professions like social interactions, managing people, and applying expertise. Ecological economists believe that automation can help solve global problems like climate change and economic inequalities.

The research questions aimed to explore how personal experiences significantly influence participants' attitudes toward AI. Those with limited exposure to AI express skepticism, while those with extensive experience have a more positive outlook. Three interviewees claimed that they had no significant experience with AI, but all knew and used ChatGPT or Github's Copilot. They were critical of AI's capabilities and self-consciousness. Some felt that AI was cheating or inferior, while others found it helpful. Experienced AI users were more positive about AI but faced challenges with input formulation and false results. Trust is a central concern, with participants expressing reservations about AI's unpredictability and potential risks. Professional expectations in programming and software development are influenced by practical experience, adaptability, and a proactive attitude toward technological advancements.

The interviews revealed mixed opinions on AI's potential, with junior participants expressing optimism about its potential to enhance work efficiency and effectiveness. Some senior participants expressed fear of job displacement due to AI. Ethical considerations emerged, highlighting the need for regulatory oversight, and addressing data privacy and misuse concerns. The paper emphasizes the importance of comprehensive regulations and ethical frameworks to guide AI development responsibly.

The research paper also explored the impact of education and professional experience on expectations in the IT industry. The participants believe that education does not significantly influence their expectations, as they focus on experience, practical knowledge, and attitude. They expect professionals who are adaptive, flexible, up-to-date, and open-minded to be successful in the future. They also suggest that professionals who can use AI in their work will have an advantage. However, the current Hungarian higher education system is not keeping up with the development of technologies. The paper also highlights the conservative position of large IT companies regarding education, with a focus on university degrees. The research paper also explores the reactions of interviewees to the hype

surrounding artificial intelligence. Despite skepticism, most interviewees expect AI to gain more space in the future, and they plan to cope with this by working with it and learning how it works. They also reported feeling pressure to use AI in their work, which they expect will continue in the future.

In summary, this student research paper investigated what Hungarian software developers and programmers think about artificial intelligence related to their jobs. Through interviews, it became evident that personal experiences significantly shape attitudes toward AI. While junior participants exhibit optimism about AI's potential to enhance work processes, senior members express concerns over potential job displacement. Trust remains a central issue, with reservations regarding AI's unpredictability and associated risks. Amidst the evolving landscape of AI, the study underscores the critical need for regulatory frameworks and ethical guidelines to steer AI development responsibly. The paper shows that being flexible, open-minded and proactive will be important for success in the IT field as technology evolves.

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IX. Appendix

VIII.1. Interview guideline

INTRODUCTORY BACKGROUND INFORMATION + EDUCATION

1. How old are you?
2. What do you do?
3. How long have you been working at your current job? What are your main tasks?
4. How long have you been working in the profession? Have you always worked as a programmer/system administrator? (ask about your profession) If not, since when?
5. What is your education? (Very important!)
6. Do you have any other qualifications related to the profession?
7. Have you completed any additional courses or training?
8. What training opportunities are there within the profession?
9. What is your opinion about the training opportunities within the profession? What do you think is the most profitable? Why?
10. What work experience do you have?
11. What career path have you followed so far?
12. What programming languages do you know?
13. For you, what is included in the concept of artificial intelligence?
14. What are your general experiences with artificial intelligence?
15. What experiences do you have with tools that are based on AI?

I. ABOUT AI FROM OTHERS AND MY OWN EXPERIENCES

1. In the past year, artificial intelligence and its capabilities and effects on various occupations have become popular in the media. What did you perceive/feel about this? Either about specific solutions such as ChatGPT or in general. Please tell me about it.

If he doesn't talk about it:

· Specifically, in connection with your occupation, or in connection with other IT occupations, have you heard anything about its expected impact and if so, what?

2. What did you think and feel when you came across this media contents? (either the first time or later)

3. How much have you engaged in online or face-to-face conversations with other people about these AI solutions? How topical is this? Tell me about them.

4. Have you discussed these in a professional environment? What opinions were expressed?

(With whom - within this, is it in an interesting professional environment, how often, what opinions were expressed about its strengths, weaknesses, future impact on the IT professions, and specifically regarding the profession; what was your opinion about what others said; how much is the topic with acquaintances on social media)

Do you know someone who has tried it? What did you hear from him/her about their experience?

Do you know someone in the profession who has tried it?

5. Have you tried any AI solutions, or do you use them in your work?

If so: Tell me about it.

If you do not cover them, then:

- How did it happen that you tried it? Which ones? Roughly when did you first try them?

- When you tried it, were there already more people in your environment who tried it, or were you one of the first to try it in your environment? (among acquaintances, professionals, family members)

- Why did you try it?

- How often do you use it and for what?

- What was your experience?

- How did your experience compare to what you heard about it from others or in the media?

- Has your experience changed the way you think about the possibilities of AI? How?

- Have you shared your experiences with others? what did you say

If not: Did it occur to you to try it? Why yes, why not? What do you think caused you to not try it? (E.g. I wasn't that interested)

II. OWN PROFESSION – PRESENT AND FUTURE CHANGES, PROACTIVITY

6. If he has not mentioned these before: Have you already felt a change in your profession in connection with artificial intelligence solutions or not? If so, what? How much are these used and for what?

From those who do: How do you evaluate the changes that have already taken place, positive or negative, or even both and why?

7. What effect do you think artificial intelligence will have on the work of a programmer/system administrator (first on his profession, then on the other, more briefly) in 5 and 15 years? Please tell me about this in detail.

8. For programmers: Do you know Copilot/Codex or any other code assistant? Do you use it? What are your experiences with it? Are they allowed to use them at work? Why? What quality suggestions does the assistant make? What do you think about it? Does it make work easier? Why yes, why not?

If you don't cover it, ask about it:

- How will it affect the nature of work (what tasks it consists of for people), the quality of work (e.g. how enjoyable the work is, how creative it is, etc.), and why?

- How will it affect the number of jobs in this area (will it take jobs away from people or not?) and why?

- How will it affect the contents produced, what they will be like?

- What are your feelings and opinions regarding the expected developments in the future? (e.g. you are afraid of it, you condemn the way it turns out, etc.)

- Who will be successful and unsuccessful in the profession in the future - will this change? Why?

- Education will matter in terms of who will be successful in the profession in the future - will this change? Why?

- How certain or uncertain do you see what will happen?

- Will this vision of the future appear in Hungary and abroad? What is the situation in Hungary in the future compared to e.g. with Western European countries and the United States?

- Looking into the even more distant future, how do you see the impact of AI on the profession of programmer/system administrator?

10. How do you feel, how will AI affect your own future and career opportunities? (e.g. do you feel you can be successful despite the circumstances because...) How prepared or able do you feel to adapt to the changing labor market needs caused by artificial intelligence?

11. To what extent do you think the work you do can be automated?

12. How do you see your opinion about how artificial intelligence will affect the future of your profession changing over the last 5 years or so? How did your opinion change, if it did, and under what influence?

- For example, what was your opinion before you could not know about the new ChatGPT developments?

- Has it changed as a result of your experiences with AI and why? Or as a result of conversations with others?

- Were there any minor or major fluctuations in your expectations? If so, what are they like? (If it is necessary to give an example: For example, I am thinking of something like a friend of ours who, when he heard about ChatGPT in the media, reassessed that until then he thought that AI would not have a big impact on IT jobs. He was scared because he thought that relatively soon too much will have a huge impact. When he tried it and gathered more information, he calmed down a bit. Compared to him, what characterized you?)

13. Just in case you haven't said enough about them so far: In your opinion, what are the strengths and weaknesses of the MI solutions in use about your profession today, and how will they change in the future? If you've mentioned this much before: You've mentioned things related to this before, is there anything else you'd like to add to what you've said before?

14. Activity, proactivity

· Have you taken or are you planning to take steps in the future in terms of your own career because of AI? If so, what? Why? If not, why not?

· Have you thought about leaving the occupation? If so, why? If not, why not? (If not mentioned: self-training or by an employer, some kind of adult training)

- Do you plan to use AI solutions? If so, why and how, if not, why not?
- Do you feel pressured to use it? From where?

15. How do you think AI will affect professions requiring IT knowledge, now not just based on your profession?

16. At the end of the interview, I would like to ask if there is anything that you feel is important to say related to the topic of the interview? (either AI in general or something specific?)

VIII.2. Interview consent form

Kutatási projekt címe: Exploring Programmers' Expectations in the Era of Generative AI-Hype - A programozók várakozásainak feltárása a generatív MI-hype korszakában

A kutatás interjúztatója: Rózsa Nóra

Elérhetősége: nora.rozsa2@stud.uni-corvinus.hu , 06301527308

Kutatási intézet: Budapesti Corvinus Egyetem, 1093, Budapest, Fővám tér 8.

A kutatásban résztvevő neve:

Elérhetősége:

Köszönöm, hogy elfogadta a fentebb említett kutatásban való részvételt, és segíti munkámat az interjúval!

A kutatás megköveteli, hogy az interjúalanyok elfogadják az interjúban való részvételt, valamint azt, hogy az elhangzottak felhasználhatóak egyetemi kutatás során. Ez a beleegyezési nyilatkozat biztosítja, hogy Ön megértette részvételének célját, és elfogadja a közreműködés feltételeit. Ezért kérem, hogy olvassa el, és aláírásával hitelesítse az alábbiakat:

Téma: mesterséges intelligencia hatása a különböző foglalkozásokra

Gyakorlati információk:

Az interjú előre láthatólag 60 percig fog tartani. A részvételével semmilyen egészségügyi, fizikai, mentális kockázatnak sem lesz kitéve, azonban joga van bármikor megszakítani az interjút, vagy kilépni a kutatásból.

Adatfelvétel, átírás, hozzáférés:

- Az interjú során hangfelvétel készül, amelyről átírás is keletkezik.
- Az interjú átírata az interjúztató által (Rózsa Nóra) lesz elemezve.
- Az átíráshoz kizárólag konzulensem, témavezetőm (Dr. Vicsek Lilla Mária, lilla.vicsek@uni-corvinus.hu) fog rajtam kívül hozzáférni.
- A hangfelvétel az átírás után törölve lesz.

Publikáció:

- Bármilyen tartalmi összegzése, közvetlen idézése az interjúból anonim módon történhet: Ön, az interjúalany nem lesz felismerhető, beazonosítható.

Idézéssel kapcsolatos beleegyezés

A nyilatkozat aláírásával elfogadom, hogy:

1. Önként veszek részt a projektben. Megértettem, hogy nem vagyok köteles részt venni, és bármikor megállíthatom az interjút.
2. Az átírt interjú, vagy egyes részei felhasználhatók a fentebb leírtak szerint.
3. Beleegyezem, hogy közvetlenül idézhető, amit elmondok, és az a fentebb aláhúzott rész alapján lesz használva az idézés során.
4. Nem várok semmilyen juttatást, fizetést a részvételemért cserébe.
5. Feltehettem bármilyen felmerülő kérdést, és megértettem, hogy bármikor felvehetem a kapcsolatot a kutatást végző személlyel a kérdéseimmel.

Dátum:

Részvevő aláírása

A kutató aláírása