Human Thinking in the Age of Generative A.I.: Values of Openness and Higher Education for the Future

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Abstract—The paper is dedicated to the philosophical analysis of the specifics of artificial intelligence and its relation to human intelligence, as well as of the very notion of generative artificial intelligence and its abilities and inabilities. Emphasis is placed on such feature of human thinking as openness, which is argued to clearly distinguish it from machine thinking, as well as on such aspects of human intelligence as nonlinearity, morality, emotionality and evaluation that could be described as extra-rational and thus unobtainable for the artificial intelligence. It is argued that artificial intelligence cannot think openly, "out of the box", going beyond the boundaries of purely rational reasoning and formal logic peculiar to classical type of rationality. The authors also conclude that the development of AI-based technologies makes it necessary to shift the higher education in the direction of strengthening the emphasis on the ethical, emotional, and volitional sphere of human intelligence.

Keywords—artificial intelligence (A.I., AI), machine thinking, human intelligence, openness, higher education

I. INTRODUCTION

The development and dissemination of information technologies in today's world and especially the ever-growing usage and application of artificial intelligence (AI or A.I.) is one of the most urgent challenges for today's education, scientific research, and philosophical thought. The emergence of neural networks capable of giving meaningful answers when "communicating" with a human person and processing huge amounts of information and particularly the opening of public access to ChatGPT in November 2022 make us question the very place of human person in the world of A.I. is able to generate data and thus outperform its creators in some traditional human tasks and even entire jobs.

Being new and urgent, the topic of artificial intelligence and its implications, both positive and not, induced by ChatGPT 4 and other neural networks making the news and drawing its attention to those issues has been discussed for the past few months mostly in mass media, and not as much in dedicated books or even articles in academic journals yet. The speakers are also either A.I. specialists or public media persons—the more broad consideration by philosophers, lawyers, sociologists, psychologists etc. is only starting to appear in 2023, so the review of the sources would be rather short. The importance of a broad consideration of the topic is indicated in particular by the fact that in May 2023 the leaders of the A.I. industry addressed the public and the US leadership with a warning that the development of the technologies they are engaged in constitutes a threat to humanity and should be assessed as a public risk, similar to the risks related to a pandemic or a nuclear war. In particular, executives of several leading A.I. companies, including Sam Altman of OpenAI, have signed an open letter warning of the risks [1]. Earlier in March it was reported that industry leaders and IT veterans, Steve Wozniak and Elon Musk amongst others, called to pause the A.I. development (and especially the training of any artificial intelligence systems that could be more powerful than the current version of ChatGPT) over its potential risks [2].

What are those risks and how probable are they? Some more information is provided by the survey proposed to experts in artificial intelligence in August 2022 [3], [4]. 4271 researchers were contacted then, but only 738 of them responded; the most

interesting results obtained were the expressed median 5% beliefs that the advanced A.I. could cause either "human extinction or similarly permanent and severe disempowerment of the human species", as well as median 10% of the responses confirming the possibility of the same extinction or severe disempowerment caused not so by the A.I. directly, but by human inability to control advanced A.I. systems [3].

We would argue that in order to analyze the problem in question, such surveys of A.I. professionals is not enough, and a broader consideration is needed. As there is a whole spectrum of issues that arise with the new agenda in sight: how are we to handle or regulate our dealings with A.I.? What is the status and value of information processed by generative artificial intelligence and could it be actually perceived as something novel enough to be denoted as knowledge and intellectual property? What is left to human being and human thinking in the age of generative AI that possesses a definite form of intelligence, and do we all risk losing our jobs now? Does it even make sense to consider artificial intelligence as something posing an existential threat for the humankind as a whole?

Those questions indeed relate to different fields of knowledge, including law, ethics, public administration etc. However in this paper we intend to focus our attention on philosophical aspects of the problem, as they are of the most universal kind that actually set the Weltanschauung background principles for the general attitude towards A.I. Particularly because they deal with definition of terms and notions used by other disciplines (like the most basic ones— "A.I.", "thinking", "knowledge", even "life" etc.). The paper is structured in the following way: first, we are going to review the present challenges of generative A.I., the existing views and approaches to the topics discussed; second, we are going to reflect on the very notion of machine thinking; third, we will try to single out the features of human thinking and to compare the latter to that of AI; and finally, our task is to outline strategies for the development of higher education for the future that could enable human to deal with the A.I. in the most effective way.

II. METHOD

A set of different methods has been used in the research conducted for this paper: particularly, historical, comparative, analytical and dialectical methods, as well as such philosophical methodology as hermeneutics and synergetics. With historical methods we reviewed the development of artificial intelligence and the approaches to defining machine thinking; analytical methods were used to investigate the current opinions on the status A.I., its risks and perspectives of its usage and development that have been manifested in recent articles, survey and declarations by experts in the field. Comparative method, dialectics, hermeneutics and synergetics were used to reconstruct the specific features of machine and human intelligence in their common and different features, as well as to outline the possible future trends for the development of A.I., human civilization and the system of higher education. Each of these methods has contributed to achieve the goals of the study.

III. RESULTS AND DISCUSSION

A. The Challenges Of Generative A.I.: Current Insights, Risks And Forecasts

Referring to the already cited survey results [3], we would comment that the second threat, the possibility of human inability to control advanced A.I. systems, appears to be more sound than the first one, that of "human extinction" caused by

advanced A.I.: it is totally unclear how artificial intelligence is able to destroy the humankind, considering that there is no way for us to prove that A.I. can have any intention to do that—and literally any intention at all. That is, the threat indeed lies in our ability to control A.I., but not so in the sense that it could become independent of that control as in the sense of it being misused by some humans in order to harm other humans. Probably that's what the noted "pause" that is being called for by industry leaders and IT veterans means as well: with all the due respect to the mentioned reservations expressed by experts, artificial intelligence is not something particularly new compared to some other equally artificial threats to human life, such as nuclear energy or practically almost any other potentially harmful technology.

Nuclear energy, for example, can be used for the benefit of humans (of course, with all the safety techniques observed), providing them with cheaper energy, and it can also be used as a weapon to destroy humans. But it is humans who use it either way as a means to achieve one goal or another, and not actually nuclear weapon itself suddenly deciding to lead the humankind to extinction. So the consequences that could come out of the A.I. in general and neural networks such as ChatGPT in particular obviously depend on the way they are used by humans as well.

That means that risks related to artificial intelligence are indeed a problem, but they are a problem not so for the IT & A.I. experts, but for sociologists, ethicist, philosophers and so on, just like any other problem related to human social morality. It's not that the current situation with the latter is of no concern—one could hardly disagree with Margaret Mitchell, chief ethics scientist at one of the A.I.-development platforms, who admits that some actual strengths of ChatGPT and similar A.I. technologies, like assisting with creativity, ideation, and menial tasks, are "being sidelined in favor of shoehorning the technology into moneymaking machines for tech giants" [5]. And the orientation on profit as opposed to the orientation on the common good is indeed an age-old problem of human society and morality.

However, there is one more threat, and the one much more imminent than the possibility of the artificial intelligence causing human extinction—and that is the threat of unemployment: certain professionals fear that artificial intelligence is able to take over their jobs. The developers of ChatGPT-4 comment in particular that their neural network performs the relevant functions at least 1.5 times faster than a human; about 19% of workers may feel the impact of further automatization on about the half of their professional activities. However it is worth noting that researchers do not distinguish here between the auxiliary work of artificial intelligence assisting humans in their tasks from the complete replacement of any human functions. In total, it is estimated that up to a quarter of all current work could be made automatic sooner or later, which is the equivalent of 300 million full-time jobs [2].

Of course, that relates to some professions only. The already quoted 2022 survey suggests (as assumed by 89 A.I. experts) that in 20 years artificial intelligence would replace 60% of truck drivers, 20% of surgeons and 50% of retail salespersons, while in 50 years those figures would rise up to correspondingly 90%, 50% and 80% [3]. On the one hand, it is rather clear that the further development of information technologies is aimed at relieving humans of the burden of mostly mechanical tasks while leaving them to the more enjoyable creative work, so that the threat in question should not lead us to some luddite crusade against ChatGPT and its analogues. After all, "computers were human", to use the apt title of David Grier's book [6], only a few decades ago: in 1940s, there were women computers doing

calculations for industries like military aviation or the development of the atomic bomb in the USA (due to women having been considered then to be more accurate and still less paid workers than men), and when computers finally replaced humans in jobs that required making monotonous mechanical calculations, it was arguably for the benefit of both the jobs and the humans.

That is, if, say, people engaged in accounting, financial analytics, web-design or copywriting do fear a threat of competition from the developed artificial intelligence, that tells us more about their professional qualities than about the A.I. threat: a skilled person has nothing to fear if his or her work is creative and thus unique. Especially considering the possible perspective of the emergence of many new jobs and types of jobs aimed at training, controlling and supervising the A.I. doing its mechanical and non-creative tasks.

On the other hand, the consideration of this threat leads us further to the question about what artificial intelligence can do—and what it cannot do at all, even in the perspective of its further development. Is it safe to assume that only some jobs could be performed by intelligent machines? After all, the experts who took part in the quoted survey and who talked about the future unemployment for the majority of truck drivers and salespersons, predicted that only zero to 10 percent of A.I. researchers could be substituted with A.I. itself! Is it just some wishful thinking, or is there a profound pattern visible here?

B. A.I., Intelligence and Machine Thinking

The question we have come to is again that of philosophy rather than IT or A.I. research. And, as we already noted, we should start by trying to articulate the notions we are dealing with—including the very term of artificial intelligence. According to the current version of the corresponding article in Encyclopedia Britannica, artificial intelligence is defined as the ability of a computer to perform tasks commonly associated with intelligent beings, particularly the ability to reason, discover meaning, generalize, or learn from past experience [7]. Still, all those tasks are done by computers who are *programmed* to carry them out—they can't do anything otherwise. Learning could be done by trial and error, and the ability to reason or to generalize could be achieved by following the strict and clear rules of formal logic, but arguably there is nothing besides that. That is, artificial intelligence is not human intelligence—it is a much narrower entity and set of functions. Joseph Weizenbaum, one of the earliest and most prominent researchers in the field of A.I., had it stressed already half a century ago: "...an entirely too simplistic notion of intelligence has dominated both popular and scientific thought, and that this notion is, in part, responsible for permitting artificial intelligence's perverse grand fantasy to grow... Man is not a machine. I shall argue that, although man most certainly processes information, he does not necessarily process it in the way computers do. Computers and men are not species of the same genus" [8, p. 203].

We think it is important to note that the intelligence is not about mind and not about consciousness, which is characterized by such psychological processes as understanding and meaning-making, but rather about the ability to gather and process information. Actually, information—in contrast to knowledge—is a fundamentally subjectless phenomenon: it has a material carrier, whose role could be performed by, say, paper or artificial intelligence to practically the same effect, but it is not connected to its impersonal carrier in any significant way. Knowledge is information acquired by a certain sentient person; accordingly, information is knowledge alienated from a person that can be transferred or sold [9], and therefore artificial intelligence is quite capable of operating with it.

There is no doubt that an advanced machine can process information, including reasoning and learning, and it definitely can do it faster and maybe more efficiently than humans. But can artificial intelligence, well, *think*? When Alan Turing tried to consider that question in the 1940s and 1950s, he famously turned it from philosophical or psychological perspective into more practical one—by proposing the idea of what later got the name of the Turing test. The computer was declared to be considered as an intelligent and thinking entity if it could actually pass as a human—if an unknowing interrogator will not be able to distinguish between a human answering questions and a machine answering the same questions. Still, even by the end of 2022, no A.I. program has ever come close to passing such a test: even ChatGPT-4 is not believed to have passed it by all of the experts [7].

Indeed, artificial intelligence is still a special function of a computer, of a machine. That is why modern considerations on defining the capabilities and limitations of A.I. are not unlike the vivid discussions that took place in the 1960s on the topic of "whether a machine could think". That issue had been brought up by the previous industrial revolution in the age of technocratic optimism associated with the successes of science—and gradually declined in the 1970s, only to come back in a new form half a century later. However, in our opinion, the development of A.I. in particular and information technologies in general is in this regard rather quantitative than qualitative: the ideas of thinkers of the middle of the 20th century who argued about the inability of a machine to "think" (in the full, philosophical sense of this word that could not be reduced to performing some formal logical operations), remain relevant even today.

As Pavel Kopnin, who was one of the founders of the Kyiv School of Philosophy in Ukraine, has noted back in 1961, in order to think, the matter must live not only in biological sense, but also in social as well. Thinking is a product of social history, and therefore a machine cannot think by definition—it is a human person *who thinks with the help* of a machine, just as the earth is being dug not by an excavator, but by a human person *with the help* of an excavator [10, p. 106]. It is worth noting by the way, that the very word 'excavator', just like the very word 'computer', were used to name a human job before having transferred their meanings to a machine, the latter still being meaningless outside of the application given to it by humans. Yes, Kopnin agrees, "machine thinking" (which is actually what we now call "artificial intelligence") has practically unlimited possibilities for its development, but it can never act as a substantial, independent thinking, separated from a human person: no matter how "intelligent" machines could become, they will remain only means for human activity, so that humans will empower them with an increasing number of auxiliary functions while leaving the most important tasks for themselves—including, first of all, the very thinking as a creative activity [10, p. 112].

In fact, even today, just like in the 1960s, it turns out to be necessary to stress out the very idea that a computer can never duplicate human intelligence. As explained by Adriana Braga and Robert Logan, technologies could never encompass the full dimension of human intelligence: the latter is not based solely on logical operations, but rather includes a long list of other characteristics that are unique to humans and thus cannot be duplicated by silicon-based forms of intelligence [11, p. 133]. That opinion is shared and expressed not only by humanitarians who can envy the A.I.; for instance, Jaron Lanier, a prominent

computer scientist and philosopher, who is considered to be the founder of the whole field of "virtual reality" research, argues that the very term "A.I." is misleading and even dangerous because it implies something it is not and could never actually be: "A program like OpenAI's GPT-4, which can write sentences to order, is something like a version of Wikipedia that includes much more data, mashed together using statistics. Programs that create images to order are something like a version of online image search, but with a system for combining the pictures. In both cases, it's people who have written the text and furnished the images. The new programs mash up work done by human minds. What's innovative is that the mashup process has become guided and constrained, so that the results are usable and often striking. This is a significant achievement and worth celebrating—but it can be thought of as illuminating previously hidden concordances between human creations, rather than as the invention of a new mind" [12].

In other words, according to Lanier, A.I. is more like a tool and certainly not a sentient being—in no way should it be considered as an independent autonomous entity. Artificial intelligence is not a creation; neither, we can add, it is capable to create on its own—already by its nature and by its very definition. However, it would be more fruitful if we now turn our attention to specific features of human thinking which make it qualitatively different from machine thinking. That should make all the arguments about the incompleteness (if not impossibility) of machine thinking (and thus of artificial intelligence in its true non-misleading sense) more sound and elaborate.

C. Openness as the Major Feature of Human Thinking

We would argue that the first and the most important feature of human thinking is its *openness*. Artificial intelligence is able to perform only "closed" tasks and functions—that is, those pre-defined in their basic principles, those that can be logically described using a limited number of operators, those that correspond to a clear pre-set goal (or goals) and are amenable to formalization. Artificial intelligence, even if it is based on neural networks and is capable of learning by trial and error, is still a computer program that operates according to some set of instructions: it is in principle incapable of acting openly—freely, creatively, in a way that would deviate from the given program and oppose those instructions. Of course, by saying so we do not take into account the possibility of any bugs and glitches in programs: they do happen, but, just like the programs themselves, they are errors made by humans who wrote them, and not at all the result of a machine's free will and independent action.

Apparently, such abilities of A.I. describe some image of a "perfect executor", an ideal soldier that is 100% adherent to all the predetermined standards and always follows the instructions. That's why an electronic computer was found to be more capable and efficient than *a human computer* of the 1940s in doing virtually any kind of calculations. That A.I. computer could be a model laborer in the age of Modernity with its relatively simple picture of the world. However, under the conditions of the contemporary world of the 21st c., which is characterized by fundamental uncertainty, unpredictability and supercomplexity, and therefore by the absence of any guaranteed prescriptions for many kinds of activity, such a figure of an ideal "mechanical worker" is obviously less adequate and less preferable than that of a person capable of changing his or her behavior in accordance with the rapidly changing circumstances, which changes are not and could not be reflected in the pre-determined programs and sets of instructions.

In other words, artificial intelligence cannot think openly, "out of the box", going beyond the boundaries of purely rational reasoning and formal logic peculiar to classical type of rationality. As an example, we can refer to the experiments by Alexander Luria, one of the founders of Ukrainian psychology (particularly, of the Kharkiv Psychological School), conducted in 1931–1932 in rural areas of Uzbekistan. Luria proposed local residents a question representing a simple syllogism. It is known that there are no camels in Germany, and Berlin is the capital of Germany—so the question is: are there any camels in Berlin?

It was found that elder people who did not receive any kind of formal education usually said 'yes' in response to the question. When asked to explain their answer, they replied that Berlin is a big city, which means that there should be a bazaar there—so it is quite probable then that an Uzbek with a camel could come to that bazaar. At the same time, younger people who have studied in at least elementary modern school solved that syllogism problem just immediately and without any hesitation—the correct answer is "no": there are no camels in Germany [13].

A researcher can, of course, consider this example as an evidence for the inability of poorly educated people (or, to be more precise, traditional people unfamiliar enough with formal logic and with the European cultural tradition of rationality in general) to think logically. However, we suggest considering this example from yet another angle: the opposition between formal logic and common sense should not be evaluated solely in the sense of the absolute correctness of the first of them. In the logical example with camels in Germany, we are dealing in fact with an abstract game with some predetermined assumptions: "If...", "Suppose...". In this case, the assumption that is assumed to be true without any questions asked is that there are no camels in Germany at all, and only then we can get some new information out of the premises according to certain rules of logic. A person who has learned such rules since childhood (due to studying in a formal school) may not even notice all those conventions, even if their probability is not absolute and even questionable: that person simply accepts the rules of the game a priori.

In contrast, an elder person (and/or simply a representative of a traditional culture) tends to consider the question of the presence of camels in Berlin *substantively*, that is, outside of any pre-established limits of abstract thinking and formal logic. And therefore, despite all the illogicality and paradoxicality of the "non-classical" (or non-formal) answer to the question posed by the researcher, such an answer is actually more adequate! Regardless of the fact that Germany is in no way a natural habitat of camels, a single camel may well be found in Berlin—if not in a bazaar, then maybe in a circus or in a zoo. Such feature that we call *openness of thinking* becomes even more topical under the current situation thanks to the development of such ideas as open science and decolonization of knowledge, which present even more prominent features of human thinking that machines are incapable of following and which deal with values and non-linearity.

D. Non-Rational Aspects of Intelligence and Higher Education

If we try to formulate other major features of human thinking that make it different from A.I., then it would definitely include not only informal logic and openness to new ideas, but even more profound things: "There is a subjective, non-rational (or perhaps extra-rational) aspect of human intelligence, which a computer can never duplicate" [11, p. 134]. However, the modern, post-non-classical type of scientific rationality [14] is actually based on some aspects that could be called extra-

rational, like human dimension, non-linearity, and notions of values being accepted into the very core of scientific knowledge. Still, it is all rationality and intelligence: in the 1960s, Pavel Kopnin was one of the first philosophers to stress the inclusion of not only the rational side of human nature, but *will and emotions* as well into the notion of human intelligence. That idea is well evident today: for example, in 1990 John Mayer and Peter Salovey have proposed the concept of *emotional intelligence* as an ability of humans to identify their own emotions and those of the others, to distinguish them and to apply emotional information for controlling their behavior, as well as to manage emotions to achieve reasonable goals [15]. The researchers confirm that emotional intelligence is crucial today for online communication, for workplace success, and for effective management, amongst else [16].

We would argue that A.I. lacks extra-rational qualities like emotional intelligence as it lacks, well, emotions and will at all and thus lacks empathy. Moreover, it is not something artificial intelligence can learn or develop—machine learning is done by trial and error, according to the same rules of formal logic and logical thinking we already mentioned, not by forming senses or an aspiration. That's why computers can, for example, play chess: the game of chess follows a limited set of simple rules on how the figures move and on what the conditions of victory are. What is needed then is pure computational power, and that's why it is naturally for artificial intelligence not only to play chess well, but also to outplay human world champions due to its ability to process huge amounts of information faster than human minds.

However, it is still information based on "if... then..." formal logic, and not creative knowledge—nor it is some independent thinking. A.I. can calculate and even evaluate, but only within the boundaries of pre-set goals, not outside of them, just like it can follow the rules of formal logic, but not those of dialectical logic based on contradictions. Post-non-classical rationality requires solving problems relating not just to the truth, but to values as well, like global ecological problems. That is, there is no linear pre-set goal for a human person: he or she is able to reevaluate and reconsider many possible scenarios of the future by ranging them as desirable or undesirable and changing the behavior of a system so it would follow optimal routes rather than destructive (Fig. 1). It would be also quite hard to say that artificial intelligence is capable of critical thinking: there are numerous reports that ChatGPT shows a certain selectivity in compiling its references and even generates fictitious papers, so that the error rate in the answers could be up to 30% [17], [18].

The same could be said about the issues dealing with safety—even if not such global as ecological safety, but rather practical safety of A.I.-assisted car driving. According to Autonomous Vehicles Collision Reports in California [19], in the six months of 2023, there were 28 Cruise autonomous
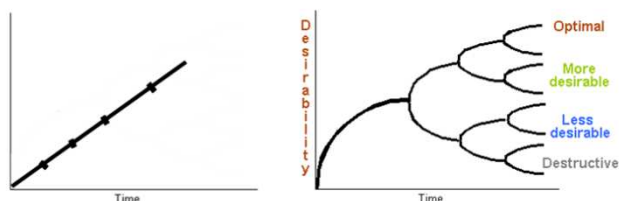

Fig. 1. Linearity (left) and non-linearity (right) require quite different type of intelligence for their consideration

vehicle accidents, 24 Waymo accidents, and 11 Zoox accidents. While this number seems to be small, it becomes more dangerous if we consider the correspondingly small number of autonomous vehicles on California roads (388

Cruise, 688 Waymo, 142 Zoox): 7% of Cruise cars, 3% of Waymo cars, and 17% of Zoox cars were involved in one or more incidents within those six months (to say nothing of minor incidents with blocked ambulances, injured pets and so on, including spontaneous combustion). For comparison, the annual accident rate of conventional (not A.I.-assisted) vehicles is 1.8% (5 million accidents per year / 278 million vehicles) [19], [20]. From these figures, we see a very different picture of the safety of self-driving cars: the "best" of them get into accidents almost 2 times more often than non-autonomous cars, and the "worst" get into accidents 8.5 times more often.

Of course, such conclusion is not aimed against A.I.-assisted cars, but against the so called automation complacency—an illusion that artificial intelligence is capable of doing things it can't do by its very definition, an illusion that A.I. can be completely trusted about such things as safety. On the contrary, the proliferation of A.I.-based technologies, while helping us with many simple tasks, gives rise to more profound problems related to humanities, social sciences, and philosophy. As noted by Naomi Klein, it is social problems we are talking about when planning the ways of further A.I development [21], and Jaron Lanier even defines the whole A.I. as "an innovative form of social collaboration" [12].

However, we would say that the most important issues are those of education, especially higher education. These are not just practical questions about how to regulate (or prohibit) the usage of ChatGPT-4 in order to ensure students would do their course papers creatively and independently: the challenges to education relate to a whole new paradigm of understanding the contents, the goal and the mission of higher education. In full accordance with what we already noted about the features of human vs. artificial intelligence, the spokesmen of the Club of Rome call to the new education for the sustainable social development of the future: such educational objectives are said to "require a fundamental shift... to learning how to think in new, systemic ways. The real challenge is to develop in all students a capacity for problem solving, as well as critical, independent and original thinking. Education that focuses exclusively on the mind alone is no longer sufficient" [22].

The prospects of using A.I. make us argue about the necessity of the development of higher education in the direction of strengthening the emphasis on the ethical, emotional, volitional sphere of human intelligence. Already in the 1970s, Evald Ilyenkov used to outline the importance of esthetic education related to the development of the power of imagination: the latter was defined as an acquired skill and ability to see and to notice something unknown, that is, something that lies outside of the available models and programs—and to see things "through the eyes of another person", "through the eyes of mankind", "from the point of view of the long-term interests of the human race" [23, p. 82]. Our higher education is still mostly grounded on the rational traditions of the Modernity age [24], [25], [26], and it would require a lot of efforts to turn in towards multicultural education, with its non-linearity, poly-paradigmality, decolonization of knowledge [27], with recognizing and empowering the extra-rational sides of human intelligence [28].

Such a development is quite problematic today, and finding the ways to make it possible would constitute a significant amount of further research on the topic. However, it can be mentioned that the Ukrainian philosophical tradition, represented by such names as Hrihoriy Skovoroda, Pamphil Yurkevich and Pavel Kopnin amongst others, has always emphasized precisely this aspect of emotions, empathy and values in human intelligence, and therefore it can act as a basis for the formation of higher education for the future by enabling

humans to control the sphere of the developing artificial intelligence and to ensure the very existence of the humankind in the 21st century.

IV. CONCLUSION

In this paper we tried to outline the main problems and prospects of the current situation with the artificial intelligence. It is argued that the term 'generative' does not actually mean 'creative': A.I. does not create new data or knowledge, it either processes the available information or follows some patterns, like imitating an artist or a writer. Thus, intelligence here is quite different from human intelligence, so the very usage of the term, albeit already established, is dubious. Artificial intelligence is a closed intelligence: even its learning is based on certain programs and sets of instructions. It cannot think openly, "out of the box", going beyond the boundaries of purely rational reasoning and formal logic peculiar to classical type of rationality.

Paradoxically enough, the artificial intelligence being developed in the 21st century reproduces the image of an ideal human worker of the Modernity age of the 20th century—the one capable of following the instructions precisely, but unable to think creatively and independently. Artificial intelligence can reason, but cannot think; it can evaluate, but it cannot value; it can follow a pre-determined goal, but it cannot set itself a new one. The forecasted risks of humans losing jobs or even the humanity facing the threat of destruction do not come from A.I. itself, but rather from it being used as a means to achieve certain human goals opposed to the common good.

Correspondingly, such a situation with the proliferation of artificial intelligence leaves us with the necessity to reform our higher education, so it would form human traits necessary for controlling the growing sphere of A.I.-assisted technologies. The emphasis should be made on those aspects of human intelligence that cannot be imitated by computers; that is, the value-moral aspects of knowledge should be stressed upon, alongside the strengthening of the ethical, emotional, volitional spheres of human intelligence. It could be done using A.I. technologies to relieve humans of non-human tasks and jobs relying on mechanical actions and calculations, so we can focus more on our creative activity. And it is the way to achieve such goals that could constitute the basis of further research on the topic.

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