THE IMPACT OF ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION

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Pregledni članak

Abstract:

Artificial intelligence (AI) is becoming increasingly prevalent in all spheres of life, including the field of education. The authors in this paper explore the impact of AI on higher education by analyzing its effects on education, ethics, required skills, and future dominant jobs. They also point out the potential of AI to transform higher education and develop new skills among graduates.

In higher education, there are intelligent tutoring systems that can assess the current level of knowledge of each student individually and adapt the learning content based on that. There are also other options expressed through personalized support for students, which enables more effective learning for them, while giving professors space for more serious scientific research and the realization of more complex tasks. Artificial intelligence has become a valuable tool in any case, which can significantly improve the education system.

Key words: *artificial intelligence, higher education, intelligent tutoring system, skills*

JEL Classification: O3, A2, I2

INTRODUCTION

Techniques and software solutions that in various automated ways they imitate human actions and reasoning and are included in the so-called artificial intelligence, which is formally defined as "intelligence expressed by ma which entity which are humans or other conscious beings or systems (artificial)produced"[184]

Artificial intelligence (AI) is largely involved in many aspects of social life, so higher education will not be an exception. It will bring changes related to the way we work, learn and live. In this sense, higher education institutions can also actively contribute to their development, including artificial intelligence.

Intelligent systems follow the model with their own characteristics human mind: tolerant of data inaccuracy, uncertainty of conditions/states and partial truth as a consequence of the unknowns of the real world, traditional computing methods, with logical reasoning with true/false as a result, they do not achieve that. The reaction of the intelligent system to external conditions does not programs, but is replaced by the ability of the system to learn: to adapt and match your answers with external events and earlier experience.(Bošnjak , Grljević, Dimitrijević,2018).

1. WHAT IS INTELLIGENCE ?

Intelligence, in general, is the cognitive ability to understand the world; to help achieve a wide variety of goals; and to integrate new knowledge and skills in ongoing learning. It must operate in real time, in the real world, and with limited knowledge and time.

Moreover, human intelligence (as opposed to animal intelligence) is special in that it features the ability to form and use highly abstract concepts, and to think and reason using symbols — i.e. to handle natural language. (Voss, P.,2017).

Human language is integral to our intelligence and to all of human achievement. Similarly, synthetic intelligence will require full natural language competence. While AI development focused on robotics alone (i.e. perception and dexterity) is also important, ultimately these systems will also need to be able to read and follow language instructions, and to be able to explain their decisions in natural language.

Picture 1: What is Intelligence?

[184] http://www.free-definition.com/Artificial-intelligence.html

Source: https://www.linkedin.com/pulse/from-narrow-general-ai-peter-voss?trk=article-ssr-frontend-pulse_more-articles_related-content-card

The collected result indicates that there is a good chance that more than 70% of the job functions will be replaced by machines in 50 years (Gray, 2017).

2.ARTIFICIAL INTELLIGENCE (AI)

Artificial intelligence should be no different. Truly intelligent AI — often called Artificial *General* Intelligence (AGI) — must embody at least the following essential abilities:

1. To autonomously and interactively acquire new knowledge and skills, in real time. This includes one-shot learning — i.e. learning something new from a single example.
2. To truly understand language, have meaningful conversation, and be able to reason contextually, logically and abstractly. Moreover, it must be able to explain its conclusions!
3. To remember recent events and interactions (short-term memory), and to understand the context and purpose of actions, including those of other actors (theory of mind).
4. To proactively use existing knowledge and skills to accelerate learning (transfer learning).
5. To generalize existing knowledge by forming abstractions and ontologies (knowledge hierarchies).
6. To dynamically manage multiple, potentially conflicting goals and priorities, and to select the appropriate input stimuli and to focus on relevant tasks (focus and selection).
7. To recognize and appropriately respond to human emotions (have EQ, emotional intelligence), as well as to take its own cognitive states — such as surprise, uncertainty or confusion — into account (introspection).
8. Crucially, to be able to do all of the above with limited knowledge, computational power, and time. For example, when confronted with a new situation in the real world, one cannot afford to wait to re-train a massive neural network over several days on a specialized supercomputer.

In addition, there are strong arguments to be made that intelligence requires some kind of sensory-motor grounding in reality. Clearly, understanding the dynamics of the real world is crucial for being able to reason about human affairs. It requires a grasp of such characteristics as size, shape, and texture of objects, as well as temporal and spatial relationships. Abstract concepts must be 'grounded' in some way to underlying objects, changes, and movements in the world (Voss, 2017)

We can distinguish between weak and strong artificial intelligence.

Weak AI, also known as artificial narrow intelligence,is designed to be focused on a narrow task. One example of Weak AI is the self-driving vehicle. It is specialized for a specific task. Another category is the Strong AI, also known as artificial general intelligence. Strong AI is capable of most (if not all) cognitive functions that a human may have and can apply intelligence to more than one specific problem (Voss, 2017). Strong AI is considered by many prominent researchers and industrialists such as Stephen Hawking, Bill Gates,and Elon Musk as an existential threat to human civilization. In this research, we focus on Weak AI and the use of the term AI subsequently in this article means Weak AI (Ma, Yizhi and Sian,Keng L.,2018).

Progress in artificial intelligence and machine learning has been impressive, but there is still much work to be done to advance learning science. While some progress is being made to bring artificial intelligence to the education space as described above, these efforts pale in comparison to advancements in the non-education space. Most of the exciting breakthroughs in 2015 were in fields outside of education.

For example, companies such as Amazon and UPS have been piloting the use of drones to deliver packages and other goods to customers. Google recently purchased an AI software company, DeepMind, from a British startup for half a billion dollars.

Google has dedicated more than 140 computer scientists to DeepMind, and the software recently taught itself how to play 49 retro video games so well that it consistently outperforms human players. Google has also been testing its driverless cars. PR2, a robot from Cornell University, learned how to perform various small tasks, and then "taught" Baxter, another robot from Brown University, how to perform the same tasks in an alternate setting. Another robot, ConceptNet 4, took an IQ test with tasks in vocabulary, comparisons and comprehension and was found to have the intelligence of a 4-year-old.(Kurshan,2016).

Picture 2. Artificial intelligence

Source: https://www.linkedin.com/pulse/from-narrow-general-ai-peter-voss?trk=article-ssr-frontend-pulse_more-articles_related-content-card

3. ARTIFICIAL INTELLIGENCE AND HIGHER EDUCATION

Multiple studies concluded jobs that involve tasks that are routine and structured are easier to automate and will be replaced by AI soon. On the contrary, job tasks that are more unstructured and involved managing people are harder to be replaced by AI. Higher education needs to be adaptive and evolve continuously.

Higher education will be impacted by AI in many ways and the two major areas are curricula and enrollment. First, AI will have a sweeping impact on curriculum in higher education. The strength of AI is its speed, accuracy, and consistency. It is a lost cause to compete with AI on these dimensions. On the other hand, AI is still weak in soft skill such as creativity, innovation, critical-thinking, problem-solving, socializing, leadership, empathy, collaboration, and communication. This is not to say that we should ignore the hard skills such as science, math, and engineering. Higher education should still train the students in the fundamentals of science and math, and at the same time provides opportunities and training for students to enhance their soft skills. Some universities are already offering AI and Machine Learning courses to not only computer science students, but also business students as business managers and executives need to understand the capabilities, limitations, and implications of AI in the business world.

The other impact of AI in higher education is enrollment. Liberal arts and humanities majors may become more popular as these areas are less susceptible to "AI-invasion." Areas such as accounting and financial analysis that may be hit hard by AI may see a drastic drop in enrollment. By incorporating AI education into various disciplines,higher education institutions can foster a well-rounded and adaptable workforce for the AI-driven future. AI's influence on higher education

extends beyond its instructional applications to its impact on enrollment trends. In light of the threat of automation, majors within the liberal arts and humanities disciplines are poised to experience a surge in popularity. These areas are generally considered less susceptible to being overtaken by AI advancements. Conversely, fields like accounting and financial analysis, which are more vulnerable to AI disruption, may witness a significant decline in student enrollment.
Moreover, the growing wealth disparity coupled with a potential surge in unemployment may render higher education financially unattainable for a substantial portion of the population student enrollment. Moreover, the growing wealth disparity coupled with a potential surge in unemployment may render higher education financially unattainable for a substantial portion of the population.(Riswan, Kumar, Sambandan, 2023)

Traditional information technologies are unable to respond to the array requirements that are placed before higher education institutions that want to stay competitive (e.g. cannot provide insight into the behavior and opinions of students, no can direct activities in attracting and retaining students, predict success in studies, etc.), and the need for support is becoming more and more important intelligent technologies. (Bošnjak , Grljević, Dimitrijević,2018).

Picture 3. The evolution of communication

4. WHAT ARE THE EFFECTS OF ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION?

4.1 LOSS OF CREATIVITY AND CRITICAL THINKING

Educators also worry that students who fully rely on AI tools may develop a lack of critical thinking skills and creativity. They believe that students who use AI too much will lose their ability to develop their own ideas and solutions. Rather than coming up with ready-made (computer-generated) answers to questions, teachers want their students to learn how to think critically and come up with their own ideas. Without these integral critical thinking skills, students may not develop the problem-solving skills necessary for success in their future careers.

4.2. TEACHERS REPLACED BY AI TECHNOLOGY

The thought of AI technology taking over the role of educators in the classroom has caused concern among many teachers. Although AI has made grading and providing feedback to students more efficient, it cannot replace the human element that teachers bring to education. Teachers offer emotional support, mentorship, and personalized learning experiences that artificial intelligence simply cannot replicate. Additionally, teachers are responsible for designing lessons, creating engaging activities, and promoting critical thinking skills. While AI technology may be able to assist in some aspects of education, it will never fully replace the role of a teacher. Take the example of offering students feedback on their assignments; teachers may use artificial intelligence to generate an initial critique of student work, but then they must look through that critique, add or remove anything that needs to be tweaked and track the student's progress. Without this step of human input, the teacher's feedback becomes as pointless as a fully AI-generated essay submission.

Although some school districts have blocked access to ChatGPT on their internal networks, this has not prevented students from using the tool at home. With the rise of remote learning, high schoolers are increasingly turning to AI-powered platforms like ChatGPT to help with their studies and assignments. Despite being blocked by some school districts, AI continues to be a valuable resource for many teachers, too. Some liken the controversy behind AI technology to the fear many people once had about allowing students to use calculators in school. Artificial intelligence may have a greater potential for task completion than a typical calculator, but it is still just a tool. Concerns over AI technology are certainly valid, but those concerns won't make it disappear. The educators have over artificial intelligence highlight the importance of understanding how to balance the benefits of new technology with the need for responsible usage and monitoring.

CONCLUSION

Many jobs will become obsolete and new skill sets will be required. Higher education needs to rise to the challenge to prepare students for the AI revolution and equip students with the necessary skill sets to compete in the AI age. This nascent research aims to shed light on the higher education evolution and revolution as AI advances (Yizhi and Sian,2018).

As AI continues to improve, it's understandable that high school educators would become increasingly concerned. After all, effectively teaching students greatly depends on accurate data from quizzes and assignments. If students use AI to cheat, that data will be inauthentic and unhelpful. ChatGPT and other AI-powered writing tools have made computer-generated essays appear to be written by humans, making it possible for students to pass off 100% AI-created papers as their own. Additionally, some students may use AI to answer test questions. This, of course, would further undermine the integrity of information the teacher could use to address learning misconceptions.

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