

# Inovativni pristup poučavanju na daljinu upotrebom umjetne inteligencije

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## Sažetak

*Umjetna inteligencija (AI) danas omogućava stvaranje konteksta komunikacije između čovjeka i računalnih sustava i to kako kod verbalne, tako i kod neverbalne komunikacije, upotrebom računalnog vida koji analizira umjetna inteligencija i upotrebom kognitivnih servisa markira sentiment (emociju/raspoloženje), spol i dob osobe, analizira pokrete i time omogućava veću mogućnost personalizacije edukacije.*

*Ovaj rad otvara i mnoga druga, etička i sasvim pragmatična pitanja, pitanje hoće li umjetna inteligencija zamijeniti ljude baš na svim poslovima ili samo na onima koji su teški, repetitivni i zahtjevni, poput ispravljanja testova (koji nemaju ponuđene a-b-c odgovore), naprednih provjera znanja koje se prilagođavaju ispitaniku, pomažu kod automatske provjere izvornosti (plagiranja) itd.. Možda je ipak umjetna inteligencija danas tako potreban „suradnik u nastavi“ koji će pomoći edukatorima u modernizaciji pristupa učenju i poučavanju? Ili će takvi poslovi vrlo brzo dosaditi i umjetnoj inteligenciji?*

## Introduction

Throughout history, education needs have been changing. In order to meet the need for quality learning, regardless of the location of the learner or the time of learning, the concept of distance learning [1] has been created. In the past, it was called "correspondence learning", and the term "distance learning" was adopted with the advancement of modern technology. For most people, learning, refers to formal education, however today's way of life and work demands lifelong learning, which is often carried out in an informal, unconventional way. Especially young people like to use popular lectures published on YouTube and/or similar services. The fact that this teaching method is used by institutions such as The Stanford University, The Harvard University, The Massachusetts Institute of Technology (MIT) [2] is very clear proof that this is a widely accepted trend. Taking this into account, one has to ask the question: is a lecture (whether live or recorded) well enough prepared to be used for remote teaching, if we want to teach remotely? What if we want to run mentored lectures, with dozens, hundreds, or even thousands of people who can attend a massive open online course (MOOC) [3] and [4] can do it at the same time? How to personalize access [5] to each remote learning

participant, especially in real-time? Distance (or online) learning engages learners in new learning styles that, usually lack physical contact or even communication with other learners. One of the challenges in distance learning is the lack of personal support and human intervention [6]. On the other hand, one of the success factors is flexibility which allows us to make mistakes, and get instant feedback [6]. In this paper we are discussing how we can make distance learning better using artificial intelligence (AI) and computer vision.

## **What is artificial intelligence (AI)?**

Perhaps it is best to start with the definition of the Croatian Encyclopaedia [7], which states: "Artificial Intelligence (AI), is a part of computer science that develops the ability of computers to perform the tasks that need some form of intelligence, that can deal with new opportunities, to learn new concepts, to make conclusions, to understand natural language, to recognize scenes, etc. ". The same source states that this term denotes "... the characteristics of any inanimate system that shows intelligence (intelligent system) ...", usually refers to a computer system. The current state of the field of artificial intelligence is such that its applications are either strictly specialized a certain in an area or are used in a wide variety of different application fields.

## **What is the situation with artificial intelligence today?**

Wherever we look, everything tells us that artificial intelligence is everywhere around us, embedded in, more or less, "smart devices" that surround us. Some, until now, exclusively human characteristics, such as intuition, also become characteristics of artificial intelligence.. Until recently, technology has affected heavy, repetitive, and physically demanding occupations (Blue Collar Jobs), while technology in the form of artificial intelligence nowadays enters into a range of professions that require great knowledge, skills, and even creativity (White Collar Jobs). In its present state artificial intelligence can become a partner of humans in enhancing the quality and efficiency of one of the important human activities - education.

## **What is the role of artificial intelligence in education?**

Before we start the discussion of the role of artificial intelligence in education [8], it is necessary to analyse the educational process and to find those elements that could be improved

or accelerated or eliminated. Like in every business there are boring activities in education that are not the central part of teaching but are important to education such as: correcting homework or exams, keeping attendance records, creating lessons' notes, creating student reports, or preparing exam questions. Technology and computers have helped to make easier some parts of the tiring endeavour, such as preparation of teaching materials in PowerPoint or similar tools which is very common and often repeated. But technology has also brought new challenges, so for example, students can find, online, already completed, written book essays or seminar paper. They copy them or rewrite them and hand them over as their own. In the ocean of information on the Internet, it is difficult for educators/teachers to determine the difference between original work or plagiarism [9] every time, but artificial intelligence can identify not only identical copies but also distinguish properly listed quotes and sources of slightly altered copies of original works. Part of artificial intelligence covers the area of so-called cognitive services [10] that, for example, can write a textual note of a lecture based on a real-time lecture video analysis. Software like Microsoft Video Indexer [11] can describe what was happening in that video and write down notes about that lesson specifically for this lecture. Artificial intelligence can easily count the attending students, prepare an exam based on a set of questions prepared by the educator as well as assist in their evaluation, whether they are a-b-c based questions or essays.

### **How to use artificial intelligence in education to achieve more?**

To get rid of boring and repetitive jobs is one thing but to achieve a higher level in education core business - teaching and mentoring - is something completely different. Each educator/teacher wants the best possible way to transfer knowledge, skills, and experience to their students, but it is neither easy nor a simple job, particularly at present. For each student to reach their maximum, personalized access to learning is required. In our opinion, the most important role of artificial intelligence is to help the educator/teacher gain information on how a student thinks and what form of learning best suits him/her. Computers can work simultaneously with a large amount of information, but only artificial intelligence can understand what this information represents in the context of education or teaching.

## **How can artificial intelligence improve the way we teach and learn?**

As stated in the introduction, one of the challenges in distance learning is the lack of personal support and human intervention [6]. It's almost impossible for educators/teachers to stay in contact with each student when dealing with a large number of people. Also, it's hard to schedule human-to-human communication when students learn at a different time or even time zones. This is where artificial intelligence can help to improve distance learning experience – by serving as a “bot-mentor”, that communicates with the human student, not just verbally but also using the camera to recognize non-verbal communication [12] of the student. While there are several bot frameworks that support verbal communication, non-verbal communication is less researched.

It is often forgotten that non-verbal communication makes, depending on the source, 65-85% of the total communication. Knapp and Hall [13] claim that non-verbal communication makes up 65% of interaction between people, while Grant and Hennings [14] claim that 82% of teachers' communication is non-verbal communication. It is especially important for very young children or people who learn a foreign language and is often used when a person cannot find the right word or would like to point out a fact. On the other hand, in 1967, based on scientific studies, one of the authorities in the field of verbal and non-verbal communication professor emeritus Albert Mehrabian psychology professor at The University of California, Los Angeles (UCLA) [15], set the rule 7-38-55, which means that for communication the importance of the spoken word is 7%, how it is spoken (loud, silent, sharp, etc.) is 38%, and the expression of the face is 55%. Although it was a simple experiment, which may not be fully applicable in everyday communication, it still provides a good basis for all subsequent analysis and research. Artificial intelligence can help in continuous monitoring and analysis of that particular part of the non-verbal communication during the educational process, regardless of whether an educator/teacher and students are in the same place or it is a matter of distance learning. The result of this analysis can help the educators/teachers to understand better how to address their students or allow virtual teachers to be created through new computer user interfaces that use non-verbal communication, and gender and age group information to create a context of communication that is verbal, voice or text.

Another use of artificial intelligence, specifically the application of deep learning [16] area of computer vision called Generative Adversarial Networks (GAN) [17] is to generate a video of the artificial human face that is very realistic and that helps in non-verbal communication with the human student. It's very important for humans to see the face of the

“person” with whom they talk. A newly generated face can be the one of an educator/teacher or a completely new, computer generated face [18].

On the other hand, as mentioned before, one of the success factors is flexibility which allows us to make mistakes and get instant feedback [7]. Due to the fact that artificial intelligence can, owing to its large processor power, handle a large amount of information in a short time and quickly make more or less complex decisions, easily adapting to new situations, it is not a problem for artificial intelligence to imitate a human-mentor who is focused on only one student and therefore help to personalize learning and adapt to each student’s/learner’s personal needs. Artificial intelligence also allows the creation of images of so-called feedback link that gives the educator/teacher information on how many of the students have understood the presented content, or whether a learner achieved his/her goal, regardless of whether or not he/her sees the teacher.

### **Is there a danger of artificial intelligence being abused?**

As time goes by the difference between artificial and human intelligence [19] is diminishing. Since artificial intelligence has advantage of almost instantaneous availability of information and the possibility of much faster communication, there is fear, on the one hand from possible abuse, and on the other hand, that it would take primacy over people. The fears are very strong especially if we take into account different, in theory possible, scenarios where artificial intelligence develops its own consciousness. Although there is still plenty of room for the progress of artificial intelligence, the speed with which it enters into our everyday business and personal life demands of mankind to redefine social relations, adjust ethics, as well as the legal framework for applying artificial intelligence. One of the most best-known examples of ethical dilemmas are the decisions that artificial intelligence must make in autonomous driving systems. For example, artificial intelligence has to decide for the least bad scenario when there are no positive outcomes (casualties of one or more persons, a child, or an adult, in the vehicle or outside it, etc.). One of the methods of dealing with such a dilemma is that in such situation the decision has to be made exclusively by humans. If we look at artificial intelligence as just another tool that can help people (teachers) then we should always remember that each tool can be used both for good and for evil. So, humans have to set rules that will protect humanity from the abuse of artificial intelligence and use it for their progress, and not for down fall.

## Conclusion

Communication is *conditio sine qua non* for human beings. To communicate equals to live/exist. Whether it is verbal communication or/and non-verbal communication it is one ongoing process 27/7.

Every day we are witnesses to the very fast development of new technologies and gadgets and their influence and impact on our lives. The ways of communication are also inevitably changing under their influence. They enable innovative human-computer/machine interaction through natural user interface that uses gesture and/or voice commands instead of keyboard/mouse. Advanced algorithms detect user gender, age, and sentiment to enable new channel of communication. Therefore, it is not anymore just communication in the relation human to human. Today it is human to machines.

Artificial intelligence is already here among us. It is on the humans, in this case, educators/teachers that they use it in the best possible way to improve education, especially the processes of teaching and learning. It can help to increase the productivity of educators/teachers by helping them with repetitive tasks, such as preparation of interesting and always different questions for exams, with fast and accurate grading of these exams as well as making notes from the lessons, and keeping attendance records. The more complex application of artificial intelligence is certainly the creation of personalized teaching and learning for each student. It can be achieved through the understanding of the context in which these processes occur, based on gender and age group recognition, as well as continuous monitoring of the verbal and non-verbal communication of students' feedback. Artificial intelligence can take into account all these elements and dynamically adapt the contents and the manner of communication with a student, expanding or deepening topics that the student has not understood or shows an additional interest in. Although it is too early to talk about the emotions of artificial intelligence, the latest research and testing in this area shows that so-called deep learning enables artificial intelligence to develop intuition. The usage of artificial intelligence in education is at the very beginning, so, therefore, it is necessary to define new teaching and learning frameworks, to carry out a series of practical researches that will make it possible to measure the contribution of artificial intelligence to education and show us which is the best way to apply it. We cannot ignore the fact that artificial intelligence enters into all human activities. Therefore, it is necessary to look at what is the best way to get it involved in the process of education, regardless of whether we are teaching or learning. We should start with experimentation, without fear, because human intellect is still, in many areas, superior to computers.

Appearance of COVID 19 strongly hit our way of life. Nothing in human history have ever had such strong impact on communication and education/teaching/learning as COVID19 pandemic. Unprecedented new era of education/teaching/learning has started. Existence of advanced IT solutions helped the transition to the “new normal” where social distance creates new standards in verbal and non-verbal communication. Hygiene and social distance, due to COVID 19, are now absolute imperatives. Today it is COVIS19, tomorrow it will be something else, but the presence of AI in human lives is irreversible.

Therefore, it is very clear that what we call today advanced IT technologies are becoming standards in everyday life.

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