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Title The Discussion of the Influences Artificial Intelligence has on Social Education Pattern

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The Discussion of the Influences Artificial Intelligence has on Social Education Pattern

Abstract

The world is under the fourth Industrial Revolution on Information Technology in the 21st century. New technology has come on stage to make huge changes for people's life, especially AI. AI represents the technology to use algorithm and machine learning to make machines react intelligently as human beings. Nowadays, simple types of AI have been put in use in different fields like manufacturing, medicine, education, and so on. This essay focuses on how AI effect education in terms of teaching methods and talents cultivation orientation. First, brief introduction of AI's working principles will be given together with some typical examples. Then we will focus on how AI effect education in terms of teaching methods and talents cultivation orientation. AI's capability of analyzing big data and high processing speed make teaching more efficiently, yet has threatened low-intelligent workers of being unemployment, which reminds educational institutions of adopting new kinds of teaching methods to cultivate more creative and critical talents in order to make them survive in this competitive society.

Key Words

Artificial Intelligence, Education, Teaching Methods, Talent Cultivation.

Full Text

Introduction

How could you imagine it when you are hanging out with your best friends or negotiating business contracts with your partners but you realize that they are actually machines? The 1999 American film *Bicentennial man* vividly depicted a robotic steward Andrew who possesses human intelligence, lives together with humans, and struggles his whole life to get recognition as a human being. Last century, intelligent machines are only considered to appear in fictions. However, as technology advanced in the last few years, we have exactly seen those intelligent machines come into stage which have the abilities to learn automatically, make emotional expressions, and even compete human in various aspects.

In 2016 and 2017, a strong opponent has been drawn great attention in the field of Go Game. From May 23rd to 27th, 2017, a machine called AlphaGo completely defeated the world's first ranking Go Game master Ke Jie in Wuzhen, China. But just as we felt shocked by the strength of AlphaGo, it improved its level by self-training. After 3 days, a new version called AlphaGo Zero appeared, beating up its old version in 100 matches without losing (Demis & David, 2017).

Those intelligent machines' existence indeed changed our life largely. We call those machines "artificial intelligence" (AI for short). Recently, the researches of AI have increased exponentially, and more and more universities and institutions have built

Department of AI to conduct deeper studies into it. However, AI's abilities are far beyond just playing chess games. Scientists have expanded their application ranges widely and now artificial intelligence can be applied in various aspects. Financial industry uses AI to collect and calculate data, thus organizing operations, maintaining book-keeping, investing in stocks, and managing properties more effectively. Healthcare industry is also developing AI to help doctors find the right treatments for cancer according to the patient symptom database. Even military is taking advantage of AI to develop its ability through information-based warfare. **More importantly, due to the development of AI and the huge changes of social employment pattern, artificial intelligence will have a great impact on education, deciding what to learn and how to learn for modern citizens.**

This essay mainly focuses on the effects artificial intelligence have on education. It first explains the basic working principles of machine learning of AI, and then analyzes the influences AI have on education in terms of improving teaching methods and guiding the orientation of talent cultivation. Finally, it reminds people to better utilize the power of AI to make our work more efficiently.

Introduction to Artificial Intelligence

Although artificial intelligence allows machines to perform human intelligence, but their ways to solve problems have shown great difference from those of us humans. Imagine how you figure out the step when you are playing chess game with your

friends. Humans are more likely to solve the problems they encounter with previous experiences and their knowledge supplement. They try to match the situation with what they have experienced or learned, and address the problem with methods which they feel are similar to the previous ones. As a result, it sounds fair for humans to get more progress when they practice for longer periods. However, machines address problems in a quite different way. They evaluate every possible solution and analyze all the advantages and disadvantages. When they finish analyzing all the methods or work up to a certain time limit, they adopt the solution which they consider is with the greatest advantages and least disadvantages. All they can do is to calculate and simulate.

And that is just the basic rules of how machines work – to set a criterion for evaluating different possible solutions. Moreover, the technology of artificial intelligence helps find more scientific and effective evaluations, and even allows machines automatically to get the evaluations by themselves. The closer the evaluations are to the thinking pattern of humans, the more intelligently machines could perform. Poole Mackworth and Goebel (1998) pointed out in *Computational Intelligence* that scientists study AI in order to figure out the principles and of intelligent agents in both natural and artificial ways(Poole & Goebel, 1998). That way they can use machines to simulate human intelligence in a more effective way.

We need to know the working principles of artificial intelligent before we discuss the influences it has on our education. One of the key elements of artificial intelligence is

the mathematical method for evaluating the possibilities, which we call it **algorithms**. AI often revolves around the use of algorithms. It represents a set of clear and unambiguous instructions for machines to execute. A simple algorithm usually contains only ordered commands and several loops, but a complex one involves mathematical similar actions as well. Domingos (2015) demonstrate this in his book by giving an example of playing tic-tac-toe (Domingos, 2015):

> *If you or your opponent has two in a row, play on the remaining square.*
>
> *Otherwise, if there's a move that creates two lines of two in a row, play that.*
>
> *Otherwise, if the center square is free, play there.*
>
> *Otherwise, if your opponent has played in a corner, play in the opposite corner.*
>
> *Otherwise, if there's an empty corner, play there. Otherwise, play on any empty square.*

If you observe the algorithm carefully, you may discover its nice feature of never losing. It is because the board scale of tic-tac-toe is rather small and the rules are relatively simpler than any other chess game we are familiar with. Some other chess games like Einstein chess (a chess game which involves a dice to decide which chess can be moved) which includes random events, and Go game which has a quite big board scale may not fit such simple commands. As a result, a mathematical evaluation is required to help machines assess and decide. One kind of mathematical evaluation

method is called **evaluation function**. Evaluation function deals with the environment and quantifies the advantages, making evaluation easier. For example, when playing Einstein chess, you can create a function where you take the distance of chesses, the board value index, and the chess flexibility all into consideration. After the machine has computed all the function index of possible solutions, it chooses the solution whose index is of maximum among all.

But how to combine all these variables into the function is another important issue. It takes time for the machines to better understanding the rules or the surroundings, and they need more opportunities to learn and practice. Due to the fast computing speed and large storage capacity of machines, they can simulate hundreds and thousands complete games or samples and save the training data. Those data are valuable for computer engineers to better the intelligence of machines. However, machines itself can learn as well. Processed by a certain rule, machines observe the big data and compare them with data gained by another functions. After a certain period of time, they are able to find out the best way to combine those variables, or even discover new related variables which help them assess the environment better.

When it comes to the field of education, the evaluation function refers to a way to measure students' comprehensive abilities, and the big data comes from samples of students' academic performances and overall development from schools. Through artificial intelligence, the process of calculating, comparing and analyzing will be done all automatically. Such features of AI have predicted a big revolution of the

pattern of our education.

HOW TO LEARN: Improvement of Teaching Quality

The 21st Century has witnessed the arrival of the era of information technology. As the popularization of personal computer and smart phones, people have been applying those devices for elementary uses in different aspects, including education. But the early use of the technology was only to show some models and images to make teaching more visualized and clear. So strictly speaking, these kinds of application cannot be categorized into informationalized or intellectualized education. Teachers only put what they want to show into a PowerPoint file and show them to the student through a projector. However, the teachers are still giving lectures in a traditional way, standing in front of the blackboard, holding a textbook, and talking to the students in their own manners, despite some visual effects they apply.

As a result, teachers still have to do everything themselves, including assigning homework, correcting homework, revising and analyzing exam paper, and keep tracking all the students' performances. But teachers usually do not have much time and efforts for the whole class. As is known to all, the class size of China and other eastern countries is typically quite large. In China, the average class size of primary school and middle school is usually over 40 and some classes are extremely large with altogether 60 students. Nowadays government is taking methods to eliminate large classes due to safety issues and the quality of elementary education (Shuo, 2018).

However, it is still necessary to improve the teaching quality by applying high-techs. Luckily, artificial intelligence has the great feature for teachers to implement teaching in a more efficient and easier way.

We have already known that AI has the great ability of calculating and simulating by a set algorithm. By elementary uses of computers, we can save teachers from low-intelligent work like correcting multiple choices and calculating the total score when they mark the exam paper. Actually, those have already been widely adopted in schools around China. However, artificial intelligence has made evaluations more effective. Here are some examples where AI is applied to make education more efficient.

First, AI possesses a unique ability of Natural Language Process (NLP). NLP is a process in which machine commands and human language have been connected properly. Machines are able to recognize the meaning of human language and respond accordingly. Such feature can be applied in education basically in two aspects. One is measuring the essay paper. When students try to write an essay, they need to turn what they are thinking in their minds into words and sentences which other people can understand. Usually the standards of measuring the quality of an essay include language use, structure, logic and the style. Typically, the basic computer programs for essay evaluation can only check the spelling and grammar mistakes but cannot measure its logic and reasoning. Through NLP and image processing abilities, AI can assess essays in a more comprehensive function, including whether the topic is

relevant to the requirement, and how logical connected the sentences are. Some phone apps and websites have already introduced such functions for assessing English essays like pigai.org. This has saved teachers quite a lot time and efforts since teachers get tired easily when they are trying to assessing essays for the whole class. However, such assessing process still has limitations mainly due to the limitations of NLP – they cannot assess language which is rather complicated. We know that students with high literal quality usually write essays in a unique style, which is hard for machines to evaluate. Sometimes machines can make mistakes due to the drawbacks of the algorithm, for example, misinterpreting the decimal point in numbers (like £9.15) into a full stop. Although the algorithms for NLP have been improving, we still need humans for assistance from time to time. Another application is intellectual instructor system, which is still under development. It allows students to raise questions about an academic topic and get responses automatically. Actually, such communication between humans and machines for daily topics has been developed and widely used such as Siri. Some phone apps also allow students to take pictures of the questions and search for the database to get replies. However, such methods are still in low efficiency and cannot satisfy the users all the time.

Second, AI can help teachers analyze exam result, and make individual study plans for every student. Some schools have already applied such technology to help them evaluate students' academic performances. For example, Tongzhou Senior High School (TongzhouSeniorHighSchool, 2019) in Jiangsu Province has applied

zhixue.com to organize monthly examination and make evaluation with the help of its big data evaluating system. There are typically three procedures to apply such the system. The first is to construct exam papers. Teachers construct the exam paper by using academic questions in the database or originally created. After the paper is constructed, the system will analyze the main knowledge points and produce a knowledge map of the paper. The teacher can revise the paper to make sure all the main knowledge points are covered in the paper. The second procedure is to mark the paper. Usually the system applies the methods of marking paper both by machines and humans to ensure its accuracy. The last part is to analyze. Usually the system will calculate the average scores for references. For students themselves, they can get feedbacks from the system by telling them which knowledge points are in their command and which still need more practice. The system can also compare the performances between students in the same class, or with one's previous scores. Then, they will receive a specially designed study plan to help them perform better next time. For teachers, they will receive a report for their class performances including which students perform well and which perform bad. Also, their common weaknesses will be revealed as well in order to help teachers make instructing plans.

Moreover, scientists have been studying AI's features and applying them into various teaching methods. Some researches show that we can use AI to create education games for students. For example, scientists from University of Massachusetts have discovered an improvement for high-efficient automatic knowledge generation by

creating a novel game type of knowledge refinement game, whose algorithm is for automatic construction of domain level knowledge bases from student input (Floryan & Woolf, 2013). Recently, the application of such kind of technology is still in primary stage. However, they have already improved the teaching quality greatly. Since every student has his own study plan and interests, it is difficult to meet all their needs for education. But thanks to AI, education has been more efficient and all the students have been paid attention to.

WHAT TO LEARN: Guidance of Talent Cultivation

We have been talking about the great strengths of artificial intelligence so far, and people are quite impressed by its power to help us humans in any aspects. Yet still a huge number of people have not realized a potential harm AI could do to us humans. Due to the great convenience and high efficiency of AI's work, a large quantity of low-intelligence work will be replace by machines, which means thousands of manual labors are now facing unemployment. The world's job pattern is under transition.

In China, there is a trend that a number of traditional jobs will be replaced and new kinds of modern jobs will be created at the same time due to the influence of artificial intelligence. Pwccn.com (Pwccn, 2018) pointed out that in the next 20 years, most of the traditional job industries in China will be automated and the real replacement rate of manufacture, agriculture, construction and service industry expected are all over 20%, and the potential replacement rate of manufacture industry can even be up to 50%

to 60%, which is a quite shocking. But fortunately, due to the requirement of relevant skills, about 297 million new job positions will be created for those four main industries as well.

It is no wonder that AI can beat human in the fields which it is good at. As is mentioned above, artificial intelligence can process calculation and simulation in a very fast speed and will hardly make any mistake, which is much more effective than human beings. Also, as long as the machines are told to do a certain analysis, they are able to work for as much time as we want when we give them enough electricity and storage capacity. However, humans get bored and distracted easily when dealing with large numbers and big data. The longer time they work, the more likely they are to make mistakes. These jobs featuring a set working process and repetitive tasks are called “low-intelligence jobs”. Generally, AI can perform better than man for this kind of occupations. Yet there is also another kind of jobs which requires critical thinking, personal interaction and knowledge of high technology. This kind of jobs is called “high-intelligence jobs”, in which AI is now not capable at present. Those jobs all have something to do with dealing with ambiguous and vague expressions, and making individual judgments and decisions. Those tasks usually cannot be done only through algorithms. Of course, it is hard to let machines to fully understand human emotions and intelligence through calculation of numbers and bits.

In some regions in China, traditional view said that it is fair enough for the kid to find a normal but stable job to live smoothly. However, such view may not stand to the

point in this modern and competitive society. Both educators and students should be aware of the current social employment pattern and make wise talent-cultivation orientation. First, for instructors, it is more important for them to teach how to learn instead of what to learn. In other words, we should teach students to think independently and try to solve problems creatively on their own. It is what we lack especially in high school teaching. Teachers only tell students a set template to answer the questions, but rarely teach them to research and raise questions by themselves. So it is common for top students in high school to be under huge pressure when they just enter college. Those set template and methods are of low intelligence, which machines can be done in just a few seconds. Creativity is a quite significant characteristic in the society, especially for AI engineers. Those engineers need to keep track on the social needs and create algorithms logically to meet their satisfaction. It is common for high-tech workers to come across problems that need their original solutions.

Moreover, universities should set up courses introducing machine thinking patterns and logic. Since manual labor skills cannot afford us to survive in this society, it is necessary for college students to grasp some basic knowledge of technology to help them with their major studies. AI has a special way of thinking with a high logical pattern, and humans can learn from them to expand our ideas and thoughts. Try to learn from them and cooperate with them. For example, for manufacturing workers, it is certain that AI will not be building skyscrapers. However, with the help of them,

accurate data can be provided for workers to work faster, more efficiently, and more safely.

More importantly, students must be aware of what they are interested with, and develop their interest for the best. It seems not much relevant to machines, but one's interest is just what can compete with those machines. During the chase for the interest, one's aesthetic judgment and critical thinking will develop, and he or she is able to make wiser decisions where AI cannot reach the level. Humans express their own feelings of love, hatred, compassion and ignorance which machines cannot comprehensively understand. Also, developing interest is a good way to gain curiosity and creativity. It is more likely for people to think independently and creatively when they are dealing with something they really love. So when they reach a high level in the field of what they are interested in, they may create values which machines cannot create through numbers and algorithms.

As a result, education institution and instructors should start to think about how to educate their kids to explore the world by themselves. Human's critical minds and creative thoughts may be the best weapons when competing with AI. We are supposed to cooperate with AI to develop ourselves, to build up our strengths, and use machines for help to make for our weaknesses.

Conclusion

Artificial intelligence uses algorithm to help us humans to finish some simple,

repetitive and large-scale work with its fast calculation speed and large storage capacity. It can simulate human intelligence in mathematical and logical way. Those features of AI have highly influenced the development of high technology and the social employment pattern, and have decided a new tide of heuristic way of education. However, we should not be panic at all. Although artificial intelligence is superior to humans in many aspects, it is impossible for them to completely replace human in the society. Human's emotional expressions and critical minds are irreplaceable. All we can do is to improve ourselves and try to cooperate with machines to make our society work more efficiently. Humans need to learn from machines to refine our way of thinking and reasoning, try to come up with creative methods for ourselves when we come across problems, catch every curious and interesting idea, and develop your own interests. To put it simple, learn more, think more, and do not forget to hold your hopes and dreams!

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