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Social Contract Theory: AI for Good in Education

Introduction

Education is one of the most important and integral parts of our society. Giving people an opportunity to understand more about themselves and the world around them gives them a chance to make an impact in their lives and in the lives of others. However, there are many deep rooted problems with education. At its most basic level, education suffers from issues of availability. For every student, there needs to be people willing to educate them, and systems in place that can create the necessary environment for learning (Woolf, Beverly Park, et al. "AI grand challenges for education."). Furthermore, in our current society, there are many issues of inequality that affect the level of education an individual can receive.

These problems have the potential to be solved with Artificial Intelligence. Artificial intelligence in education, or AIEd, is a field of research that is focused on creating AI solutions for classroom use as well as lifelong learning (Luckin, “Intelligence unleashed”). While AIEd does not currently have the capabilities to solve these major issues in education, AI provides an opportunity. Artificial intelligence is extremely powerful because of its computational advantage in dealing with data and information. By expanding on the current AIEd tools to create systems that can truly benefit education, it is possible to make systematic changes to the way people learn and understand the world.

While AIEd has amazing potential, there is danger in the possibilities that come with giving algorithms control over our learning as well as access to massive amounts of data about how people learn and think (Holmes, Wayne, et al. "Ethics of AI in Education"). Despite this, from the lens of social contract theory, a moral reasoning that focuses on giving members of society rules and rights, these AI solutions are the correct solution. After all, AIEd is able to educate and improve the lives of more people around the world who would not have an opportunity to otherwise, despite their right to education.

For these reasons, we will consider the potential for good in AI in regards to improving Education for learners around the world. Specifically, we will first look at how AIEd can help provide personalized learning for students regardless of their background. Finally, we will consider how building AI-based learning environments can systematically improve education at all skill-levels and promote lifelong learning.

Intelligent Tutoring Systems

Overview

The first problem, or challenge, is to be able to give everyone an opportunity to a high level of education. What this means is being able to provide individual personalized learning systems to every student. An AI solution is necessary for this sort of ambitious challenge because it is not feasibly possible to train teachers to personally tutor students everywhere in the world.

Stakeholders

In this situation, the stakeholders are every student, which, at an extreme, is potentially everybody in the world. While it will take time to extend the means of using technology to remote places and different cultures, the challenge is being able to provide an equal opportunity and system to every student. In particular this is focused on improving the level of education that

people who may normally not have the time or money or access to education may now have the opportunity to learn. Here governments or large private companies will likely be the developers of these systems and bear their cost and responsibilities.

AI solution

Intelligent tutoring systems (ITSs) are one of the most deeply researched AIEd currently (Hwang et al. “Vision, challenges… of AI in Education”). While these AI systems can vary in complexity and performance, the idea is to create software that can function as a personalized teaching assistant or tutor for the user. This software should have the functionality to assess the progress of the student, give them advice, and offer experiences and tools that make the learning process enjoyable and digestible. It should be able to adjust to the level of the student and give them appropriate guidance as they make their way through personalized learning material (Holmes et al. “AI in education”).

Different types of AI techniques that are used in this include condition-based reasoning, data mining, and Bayesian Networks. These AI techniques are often used to develop models of students with information about how they adapt to different feedback, path navigation, learning content, and more, using all sorts of evaluative techniques (Mousavinasab, Elham, et al. "Intelligent tutoring systems”). Other than model-based systems, different ITSs also use machine learning and neural networks to form knowledge bases for algorithms to generate decisions on (Luckin, “Intelligence unleashed”).

Overall, these techniques are used with the purpose of creating a system that can interact with a student and stimulate a real tutoring session for a student to make the most out of their studying.

Impact

The potential impact of widespread ITSs has many positive and negative outcomes. For starters, normalizing and giving learners access to ITSs can streamline their education, creating more opportunity for a wider range of people. More people would have access to knowledge that could help them succeed in their livelihood and make changes that improve the world as well.

One large downside with providing ITSs to students all around the world could be an over reliance on AI and potentially the AI lacking the tools to sufficiently educate a student. What this means is that the ITSs need to be trained to promote an understanding of collaboration between AIs and humans. In addition, there will need to be tools like videos and games that students can interact with in order to further their learning. Another major downside is the difficulty in providing this type of ITSs to people all over the world. While it would certainly be easier than providing real teachers to everyone, it would still be necessary to have access to a device that can connect to the internet for long periods of time as ITSs are mainly web-based systems. What this means is that bringing ITS to everyone, is still a long way off.

Ethics

In Social Contract theory, the idea is that people living in a society will agree to follow a set of rules, as it is in their best interest if everyone in society follows them (Hobbes, "Social Contract Theory."). If everyone is able to follow the social contract, it allows people to gain “rights” to certain things under the social contract. One example of a right that people have under a social contract is the right to an education, while another is a right to privacy. An AIEd personalized learning system has many advantages over our current system that make it a morally correct choice to implement. In our current system, many people have restricted access to education, or don’t have the money or time to participate in higher levels of education. ITSs

can give an opportunity to these people as a flexible and cheaper alternative to other methods of education. In this way, ITSs are helping provide the right to education to people who deserve it under social contract, but are limited by their backgrounds.

However, when considering ITSs, we must also take into account if they could be taking away any rights that we have under social contract. One issue that people may have with ITSs is that they may take away from demand for human tutors. However, this doesn't break the social contract that we live under. After all, while humans have a right to a minimum wage, it is not against the law to fire someone from a job. In fact, despite this argument, educators will be in just as much demand as before, with AI and human collaboration being an integral part of potential ITSs development.

Similarly, an argument can be made that the massive amount of modeling data and knowledge base training set data that AI techniques use is a breach of the student's privacy, and that using these algorithmic techniques may increase biases found in the original training data (Holmes, Wayne, et al. "Ethics of AI in Education"). This issue is prominent when thinking about the ethics of AI under Social Contract theory, as our social contract gives us a right to privacy. In this case, scenario would be to have these ITSs algorithms be as transparent as possible for users who want to look into them, while also making sure that users understand that their data is being taken with only the goal of improving the learning system as a whole.

With these factors in mind, while ITSs may need special permissions in order to not break social contract, as a whole they help provide for the rights to education and rights to equality that people have, making them the correct choice for improving opportunity equality among students.

Large-Scale Learning Systems

Overview

In education, there are many issues that cannot be solved by giving a student an ITS. While having access to a mentor may be a step in the right direction, in order to pursue lifelong learning, students need access to classrooms to interact with other students and learn critical thinking skills. Interacting with peers and discussing knowledge can create a foundation for a lifetime of learning and can provide necessary motivation for younger learners. However, providing a global classroom environment is even more difficult than providing personalized learning assistants to individuals (Woolf, Beverly Park, et al. "AI grand challenges for education."). In practicality, the only way to manage information on such a large scale and provide necessary support for all students in an equal way is through AI systems.

Stakeholders

The main stakeholders here are students who will participate in school systems that use these AI solutions for classrooms. The stakeholders will also include teachers and educational content creators who work as part of these systems as well. The stakeholders who bear the costs and main responsibilities for the AIEd are going to be private companies and governments, with taxes, as well, as these systems will be implemented in public schools.

AI solution

This classroom environment is an amalgamation of AIEd solutions to create a large-scale learning system (Hwang et al. “Vision, challenges… of AI in Education”). Tools like ITSs may be incorporated into the platform in order to assist teachers and students in personalizing the learning process for each student. AI tools like voice recognition, and translation tools can be powerful methods in forming a cohesive system (Chui, Michael, et al. "Notes from the AI frontier”). Other AI tools can be used to help teachers form sub-groups of students to interact

with each other, and make choices on what styles of learning, assignments, lessons, and assessments will help their students learn the most. These decisions can be made by using machine learning to form comprehensive data sets similar to with ITSs to teach the system how students act and what they need in order to learn productively.

Impact

Positive outcomes of this AIEd classroom environment can include providing easier access to education for students. It will also improve the quality of education that students receive with more personalized programs. Also, by using an AI to form groups of students who may work well together, students may find it easier to discuss what they learn and make progress towards a lifetime of learning. Finally, the biggest benefit of this large-scale learning system is the emphasis it has on assisting the teachers. Many educators are already very good at what they do, and this system is a tool that they can use to help improve their interaction with their students. For example, this could mean that the learning system also evaluates the teacher's needs and habits and gives them training and support. In particular this can help teachers avoid extra stress and work that can come from their difficult job as an educator (Luckin, "Intelligence unleashed"), which would allow them to focus their energy on educating their students to the best of their ability, as well as teach more students.

Possible pitfalls here could include biases appearing in AI decision making. The whole concept of a large-scale learning system means that there will be many large and complex models and datasets being formed in order to best predict what can help students. Whenever these sorts of large datasets are formed, there are possibilities for unintended bias. For instance, by allowing AI to make decisions about the social interactions between students, it would mean that algorithms are making decisions that could easily be influenced by factors that are developed

by the background of a student and could generate greater segregation between groups that the system is attempting to treat equally. In order to combat this, the developers of these algorithms and systems would need to be as transparent and careful as possible.

Ethics

From the point of view of Social Contract Theory, this AI solution to creating learning environments is a morally correct choice. It provides greater opportunities for learners to participate in their right to education from a young age. Similarly to ITSs, other AIEd solutions and large-scale learning systems suffer from taking away privacy from students in order to create data sets that will be used to improve their own learning. In addition, these AIEd solutions can have great impacts on young students and their own thought processes, considering their scale and influence (Holmes, Wayne, et al. "Ethics of AI in Education"). With this in mind, it is very important to ensure that the developers of these solutions have strong morals and make decisions in order to benefit rather than harm students, as well as do their best to avoid biases. In order for this sort of system to fit into our social contract, not only do the developers need to keep in mind how the system may infringe on user rights, but there would need to be heavy supervision from a third party. Despite this, if the learning system is successfully implemented under supervision, then using AIEd to help create stronger learning environments would be an extremely beneficial tool for teachers and students alike in their pursuit of learning.

Following this logic, it is indeed the morally correct path to create these large-scale learning environments because they will help enable so many students to have their own rights to education and equality.

Conclusion

AI solutions to issues in Education are powerful tools with upsides and downsides. When considering social contract theory, we can reason out that these AI solutions are morally good and should be pursued. Our world has a fundamental issue with people of lower-class backgrounds being unable to enjoy a real education as those who were born with more privilege. These AIEd systems allow for a far more flexible classroom environment with many more students getting better opportunities and levels of education due to the assistance of AIEd. This will help all students to strive despite their background, with their right to an education being fulfilled in an environment where they can grow without impediment. By improving learning on such a large scale, people can be more educated and create better lives for themselves, their family, and for the entire world.

Works Cited

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