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Comparison of different types of machine learning on remote education

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Abstract

The effects of Artificial Intelligence on today's world have been life changing, but how exactly has AI had an impact on humans? The motive for these observations is to provide others a better understanding of how AI enhances our learning experience for the greater, and it also lets us comprehend the differentiation to non-AI involving situations. While accounting multiple studies into comparison, this has helped us analyze these concepts. The use of AI results in a further more personalized experience with extended learning gains when put into comparison to standard computed programs, also enabling a finer learning experience. This document answers questions regarding the dependability and the outcomes of using AI and how AI works.

Keywords: AI, machine learning, remote education, experiment, studies, pandemic, AI, trial and error, covid, process, future, personalized feedback

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1. Introduction

1.1 - What exactly is AI?

In today's world there are many programs, and many of the most significant programs (Amazon Web Services, Google Cloud Platform, Microsoft Azure, etc.) utilize Artificial Intelligence (AI). AI consists of techniques that help computers and machines mimic human behavior. Even though us humans are the ones that created AI, we can only control AI to a certain degree because AI progressively gains the ability to grow on its own.

1.2 - Types of AI

In order for a better understanding of how AI functions, it is essential to understand how AI processes data based on the type of AI it is. There are three ways that AI utilizes machine learning; unsupervised learning, supervised learning, and reinforcement learning. Unsupervised learning involves the analyses of many sets of data in order to find general similarities and useful patterns without any human guidance. Supervised learning uses mostly the same steps as unsupervised learning but YOU get to decide what happens next. You check the accuracy of the data provided by the AI and improvise based on what is needed. Lastly, Reinforcement Learning, which is the training of machine learning models to make a sequence of decisions, depending on different sets of data and comparisons of them. Reinforcement learning involves the AI trying to find methods by repeating these procedures many times. The key to reinforcement learning is *trial and error.*

1.3 - A broad usage of AI in education

AI has a lot of impacts on education, but it also has a lot of impact on other entities. It could help with automatic calls, both producing and playing games, and also contribute to the translations between different languages. The COVID-19 pandemic has uncovered many things about AI in respect to remote education. Before we dive into its effects on remote learning, we first have to have a good understanding of what Machine learning is. Machine learning is essentially the algorithms and computer programs that develop using various given sets of data. Machine learning is not the same as AI, it's rather a subset of AI focused on the learning of one specific task. The programs feed on information and simply learn the tasks that they are responsible for. Currently this is Called Artificial Narrow Intelligence (ANI). One example we can give to this topic is Intelligent Tutoring Systems (ITS), which are advanced educational programs that give different types of feedback to students based on the data that it collects and on the way it processes that data. This system per se, requires no human interaction

and does every task on its own, which is known as unsupervised learning (linking back to the types of AI).

1.4 - Hypothesis

Our hypothesis is that Artificial Intelligence has boosted the ease in which teachers can instruct and gives students a more helpful and efficient way of learning. We believe this because AI can give students help specifically based on their needs, whereas in a classroom, the teacher helps out based on the whole class's needs. A more personalized learning experience provides better understanding of the given topic.

2. Experiment/Studies

2.1 - Experiments

While researching more about the effect of AI on education, we found two very useful experiments/studies which were conducted in the past.

First experiment -In the first experiment that we found, two groups of students underwent different methods of learning. In both of the methods, the students went through a 3-hour long course about linear regression, a topic none of the kids had no insight of. There were 48 students that got split up into two groups. The first group tried to learn about linear regression using Method A, in which the students learn in a traditional way. The student watches lectures, reads academic books, and takes multiple choice tests to see where they are. The second group of students tried learning about linear regression using Method B, which is a method where the student gets personalized feedback by an AI tutor (ITS).

Second Experiment - The second experiment compared ALEKS (Assessment and Learning in Knowledge Spaces) to traditional teacher-led education. ALEKS is an online learning platform that uses AI to help students with less help from a teacher. This program allows students to take a 20-30 question pre-test to measure their skills on their respective grade level. Then, it gives students topics and ways to solve problems as they go on with learning. ALEKS provides feedback based on the student's answer to the question. Also, ALEKS provides a solved example to a question when it is requested. Then, it provides a similar question for the student to solve.

2.2 - Results

First Experiment - At the end of the first experiment the students from Method B had a 49.25% higher learning gain than the students from Method A. The Method B students also had a 90% higher confidence rate than the

students in Method A. The average raw learning gains of Method B students were 70.43% higher than Method A students.

The results of this experiment showed that Method B students (the students that went under AI education) had learned more, scored higher, and most importantly, were more confident in their skills. Meanwhile the Method A students (the students that were learning in a teacher-led system) did not score as high as the Method B students, and weren't close to being as confident with their skills as Method B students.

Second Experiment - At the end of this experiment it was made clear that the ALEKS program had a significant difference versus a teacher-led program.

2.3 - Importance of the Experiments/Studies

These two experiments are important to us because they have both helped us understand and learn more about how crucial AI is to us. In both experiments you could see that in the program where there was AI helping the students. The students in that program were doing a lot better, and their confidence levels were a lot higher than the students who were taught under a teacher-lead program.

2.4 - Effects of AI In the Real World

AI has had a great effect on in-class education. It is more reliable and available than traditional learning systems. Students have access to help 24/7, because AI doesn't sleep. AI is also able to give students speedy responses and immediate answers to questions. Also, AI can personalize the help it gives to each student. This gives students a better and more immersive learning experience, with more information learned.

Remote education has also been impacted by AI. AI has made it so that learning sessions are more reliable and effective, because covering distance isn't required to learn. Also, each student learns at their own pace, and doesn't have to adjust their learning to a teacher's pace. AI has also made remote learning more cost effective, as schools don't need to invest in other materials other than AI.

A digital divide, as the name suggests, is the digital privileges that certain people lack because of their geographic region, country, or financial status. Unfortunately, a greater digital divide is an inevitable outcome that AI and modern technology brings along, which we have been able to fully analyze in the past years as an outcome of the pandemic. The accessibility of modern technology and the usage of the internet in many countries is very low, which is a major factor to why the governments have been struggling to fight the COVID-19 pandemic in recent years. When the government or the families can't afford technology for their kids to continue their education remotely, the kids automatically get forced to go to in person school. All of

these are the results of the economic, financial, and social disparities that exist amongst the people and the governments.

3. Conclusion

3.1 - Advantages and Disadvantages of Different Teaching Techniques

	Advantages	Disadvantages
AI	Increased Efficiency	High Cost
ALEKS	More time engaged with the material	Harder for slow students to catch up
Teacher-lead learning	Better understanding and knowledge retention	Teacher/Instructor Dependency

3.2 - Limitations

The limitations of AI include the following: implementation times, integration times, missing ethics, and high costs. Firstly, Implementation times, which may be lengthy depending on what you are trying to implement. Likewise, Integration time includes challenges and lack of understanding of the state-of-the-art systems. Also, AI has no human ethics, no matter how smart a machine becomes, it can never replicate a human. Lastly, high costs, AI requires huge costs as it is installed into complex mechanisms and machines. Apart from the installation cost, its repair and maintenance also require huge costs.

3.3 - Future Outlook

AI in education has a bright future. Based on our observations, we believe that AI is strengthening education. Thus, AI continues to contribute to individuals' learning experience into something much more efficient. Hybrid education is bound to be the next wave of AI in education as it combines the concepts of online education and traditional-education. Eventually, we believe that almost all classrooms will be implementing a form of advanced AI, and soon, AI will become a part of the traditional teaching method.

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