

Impact of Artificial Intelligence in the Field of Education

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Abstract— The field of Artificial Intelligence (AI) has seen unprecedented growth in the 21st century. With its multi-disciplinary nature and high growth rate, make this field vast and has high implications in the development of Science and Engineering. There is a lot of work being carried out on AI and new technologies have come into existence at a fast rate. With this high speed growth, the development of AI and neural networks has gained high popularity in the world over[1]. Inclusion of AI in machines can be considered as connecting machines with the capacity of human brain, which acquires more efficiency. In this paper, we explore the emergence of importance of AI in the field of education. It helps in learning about educational implications of emerging technologies on how the students learn and the way the institutions teach and evolve. There are challenges for organizations about education in higher fields and students learning about the technologies, for teaching, administration and also explore further ways for research and development in various disciplines of Science and Engineering[2]. This helps both the students and teachers to acquire in depth knowledge about AI and also helps in adapting newer techniques. By this, students get better experience in the field of education. It provides an opportunity for the teachers and organizations to implement the scope and practices of AI in education for gaining excellence [3].

Index Terms— Artificial Intelligence, Education, Organizations, Students, Techniques, Technologies, Teaching.

I. INTRODUCTION

In this era, of 21st century AI growth has been astronomical and has influenced its need in all walks of life. AI has shown its need in multidisciplinary fields in science, engineering and technology, thereby bonding and creating an interdisciplinary in various fields. Early in 1950 and 60's it started off with the exploration of intelligent programming in Computer Science and Mathematics. But today, it is an emerging field with a high impact on various branches mainly Robotics, Neural networks, Space exploration, Automotive industry, Social networks, Cyber, Cryptography, Transportation network, Genetic engineering, Speech synthesizing, Medical science and in short in all walks of science and education.

Usually when we hear the term artificial intelligence, it would frighten up some minds, with the images of a robotic scenario, where machines replace all walks of human working life. Stephen Hawking theorizes that the greatest threats to our species are overpopulation, air pollution, and artificial intelligence, with his famous quote "*once machines reach the critical stage of being able to evolve themselves we cannot predict whether their goals will be the same as ours*". Some might not be comfortable with the idea of AI specially teachers and tutors as they serve as a profession in a student's life where many believe that one cannot replace it with robots. The main point that must be understood is that AI tutors are not going to replace teachers, instead they can be useful for teachers to improve teaching practices and might be helpful for the teachers to show if they are missing something during their sessions. AI uses metrics for better teaching practices to show teachers the best way to teach or instruct a lesson to the students. For example, if the instructor goes off the topic while teaching, this might help in guiding the instructor to get back on the track. Thus, AI would also tell an instructor to slow down if he is too fast while teaching so that students reap maximum benefit with interest on the subject being kept alive.[4]

Knowledge Engineering is one of the most important part of AI research. Machines can act like humans only if they have various information related to real world and has the ability to adapt to changes. AI must have access to various resources to implement knowledge engineering and trying to initiate problem solving. Common sense in machines would become difficult and a tedious task. AI can be defined as a computing process that can adapt and engage in human like process such as learning, programming, synthesizing, adapting to environment, self-correction, task processing with the available huge complex data and optimization. Here machine learning plays an important role. Thus, it forms one of the main aspects of AI.[5].

From the above graph, it can be said that AI is progressing every year. AI is improving and growing exponentially every year. This graph shows the increase in AI's effect from the year 2016 to 2025 which predicts the future too. As we can see, there is a lot of increase in AI every year. By this we can conclude that AI is one of the most important aspects of science and technology and would be used in various fields like medical, robotics, education and many more

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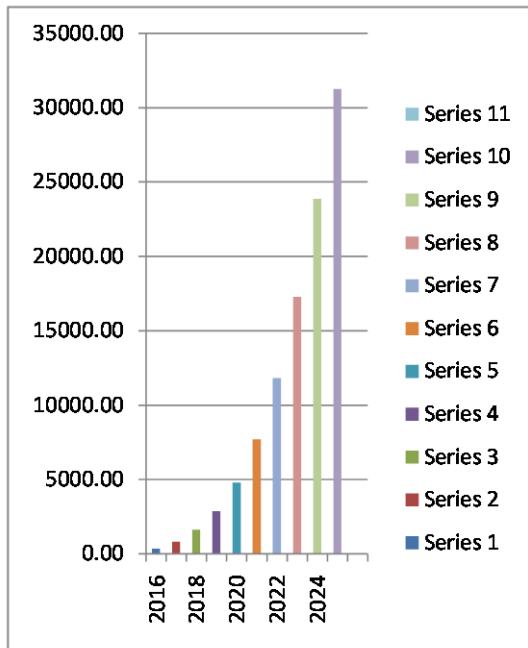


Figure 1: AI growth & progress from the year 2016 to 2025

II. AI IMPACT ON DIFFERENT ASPECTS

From the below pie chart, we can say that AI is affected by different factors. The major factor affecting AI is that it is getting hacked and there is a great loss in personal information. Nowadays for the companies and consumers data security is a major problem faced due to hacking exploits. The potential scale of AI in IOT applications and consumers makes data security more crucial. According to recent studies, people are more concerned about the security of data as in where the data is stored in a network whether it is in edge devices or cloud. [10].

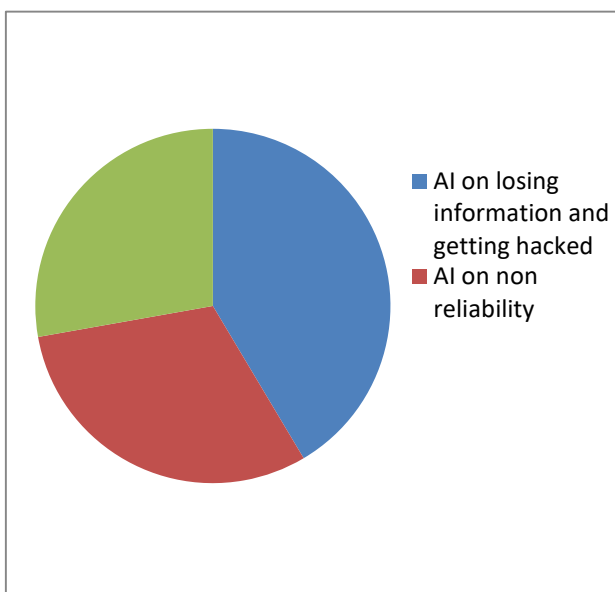


Figure 2: AI impact on different aspects

Another major factor affecting AI is its non-reliability. Since human systems are prone to fault, AI's are highly unreliable. As we humans are slow to find and correct errors, we might not be able to notice the errors for years, if that particular error was in the human system and not in the AI system. As we humans are unreliable, AI is also unreliable. [11]

Now this factor where AI is becoming more and smarter than humans is something which is very important. We never know when this will exactly happen. Some believe it will happen in next 10 to 15 years, some believe it might take hundreds of years and many even believe that this will never happen. According to the data from the graph, this is the least affecting factor. It is not that easy for machines to become smarter than humans. Humans will always be faster than computers to adjust. Maybe after many years that is sometime in the future, these computers will be able to catch up human abilities to define new categories. But by that humans would have learnt how to control computing to augment their own capabilities. So, we humans might end up always staying smarter than machines.[12]

The future of education is linked with developments on new technologies and computing capacities of new machines. Advances in AI leads to development of new challenges for teaching and learning in higher education. A computer can provide information very fast about anything reducing the humaninvolvement. So from this only we can say that machine learning is one of the most promising fieldsfor AI. Sometimes AI depends on programming while some recognizes pattern and make predictions.[6]

The field of AI in education can be used for a lot of important works like studying and developing machines like robots, automatic pilots for space ships and air planes and also for smart military weapons. AI is often referred to as machine intelligence. This practice of AI leads to a great development of artificially intelligent tools. Some tools of AI would solve a lot of problems under human guidance. Ofcourse, from various surveys it is observed that for around 50 years before 2010, AI has produced very few results which are helpful to students, teachers, organizations and also to our society.[7]

III. HISTORY OF AI IN EDUCATION

In 1956, John McCarthy got the term "Artificial Intelligence" when he held the first conference on this subject. Even much before that, the journey to understand if the machines can actually think, started.

AI in education focuses on research, development and evaluation of computer software which improves learning. There are many goals proposed like interpreting complex student responses and learning ability. Goals include, offer hints to help students understand the study materials and simulate a human tutor's behaviour and guidance, from time immemorial.

The major contribution of AI to the technology is that the system is able to solve the problems that learners have to solve. The system is well known in the domain to be taught. Some system in AI is designed to solve the simple subtraction like '234-98', while any computer language can give the correct answer. This was proposed by Burton and Brown in

1982.[13].

IV. ADAPTIVE USE OF AI IN GRADING

AI can be used for grading in education. Usually teachers find grading as one of the task which is tedious and can lead to errors over time and fatigue. The results from AI grading will be more consistent, as long as the pattern is not abruptly deviating. Thus this time could be used to interact with students for other activities working on professional development, exchanging information with students and also learning new activities. Already AI has been implemented on different types of questions like multiple choices, fill in the blanks etc...Most competitive exams involving huge number of students adapts to automatic examination and grading system, thereby reaps the benefit of smooth conducting as well as the results declared in least amount of time. In few days automatic grading system can also be used in student writing. Essay grading software is on its way to improve and over upcoming years it would allow teachers to focus on classroom activities and better student interaction.[8]

The gaps in the educational materials or lectures and the assignment questions can lead to confused concepts in certain cases. This may not be easily noted in many cases. AI has evolved an answer to this. Many online courses, has adapted a correction tool. By studying where most students has gone wrong in some particular questions, and feedback is automatically generated in AI based system, to alert and adapt the changes in the way of expressing the questioner or include additional concepts in the educational materials or lectures to clear the confusion in the students mind. This feedback mechanism aids the students to gain confidence and helps to have a better understanding of the subject

V. ADAPTIVE USE OF AI IN LANGUAGE TRANSLATION

In the field of education, a teacher might be best in the language in which he/she is proficient. So will be the students in learning, understanding and thinking, able to be best in the language in which they are proficient. Though it is theoretically the best but there are practical limitations for both the teachers and students. AI comes as a boon to solve this problem. AI has the most advanced linguistic transliteration and adaptively evolves with the latest tools and technologies in carrying out translations similar to that of a skilled professional translator in a jiffy. Of course, we know it is not true to say that, if one takes onto deep learning and huge data, a neural network will be able to do anything which a human being can do. So is the language translation done by machines. Presently, this is an emerging scenario, at its infancy and has its own glitches and with improved deep machine learning will attain an error free translation in the near future. AI transliteration also helps teachers and research students to download latest international papers and articles without any worries about the language in which paper is written. This helps in education with no barrier on language

VI. CHALLENGES OF AI ON EDUCATION

Assigning mentors for all the learners is one of the challenges faced by AI. Mentoring system should also support learners with their decision making and reasoning in volatile and rapidly changing environments. To create mentors for every learners one(learners) need to know how people learn. Art of learning explains both how people learn and how learning is used in real world situations. The main challenge is to build systems that can interact with the learners and to act as mentors with every person to form groups even when a teacher is unavailable. AI tools can be used to find student's strengths, weaknesses and challenges like human tutors while interacting with students. Many AI machines are able to generate information about student's emotion, motivation and their views on learning

One of the challenges AI can address effectively is to create a cost effective and time effective ways a student can learn with optimum use of infrastructure and technology available. Thus such an intelligent system models the changes, in accordance to learner's competence or emotional state and dynamically adapt to the teaching system. The adaptation, is to mainly create a new learning experience breaking away from the current linear flow to more technology based simulation and virtual laboratories. Thereby, make learning more fun. Such method of learning, is referred as learning by design and will bring out the students ability, scientific reasoning and their skills and motivate them to achieve higher goals.

VII. CONCLUSION

From this study, we can conclude that AI plays a very important role in Science and education. AI's progress is really very impressive in every field. Nowadays, the application of AI is spreading everywhere. According to a research, the application of AI in education sector will grow up by 47.5% through 2021. AI and the technology are one side of our lives that always make us feel interesting with new ideas, innovations, products etc. It is common for educators to fear that their role would go to an end due to use of technology such as ERP systems. But then it would be wrong to ignore the improvements and new possibilities that AI can offer in the field of education. It is concluded that AI can bring a great improvement in the overall education system. If there is a right teacher using AI, it can do wonders in the field of education that even the traditional methods might not be able to do.

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