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Research Paper

Artificial Intelligence - New Horizon in Indian Higher Education

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ABSTRACT

Technology is profoundly transforming our everyday lives. Artificial intelligence is about the development of machine that mimics human intelligence, which can learn from experiences and make rational decisions. Big data is data, which is exploded from internet in high volume, velocity and in variety. The large data repositories containing past and present data are the basis of predictive analytics and AI. Thus, the blending of education with ICT has shifted the education system from traditional classroom teacher centric to flexible anywhere anytime (24x7) learner centric model. AI is the best way to effectively address students and enables organization to discover their capabilities in different aspects. Today robots are accomplishing array of simple and complex tasks in various organizations. This article will give overview of AI along with its role in the field of higher education, focusing on the enhancement of human capabilities, empowering staff and interactive learning. The application of AI in higher education institution in this complex and competitive environment is associated with many contemporary challenges like high cost, lack of expert personnel, weak soft skills, lack of social skill, ethical behavior and sentiments, technical disorder, workforce displacement etc. Therefore, machines are not yet ready to replace human but are contributing a lot in enhancing human capabilities. So, to avoid the complete replacement of human by machine, teachers has to develop high order thinking, creativity, metacognition and human skill among students which machine can't learn. In this way, we can create balance between the hard skills and soft skills.

Keywords: *Big data, artificial intelligence, interactive learning, workforce displacement, human skills*

BLENDED EDUCATION

Education is the delivery of values and knowledge to develop a competent well being boosted with creativity, cognitive thinking and life survival skills. The advent of technology and its impact on various sectors is prominent. Blending of education and ICT has transformed the whole teaching learning environment across the globe. Future classroom will be 24x7 anywhere anytime classroom with complete flexibility in all facet regarding content, university, teacher, time, place etc. This will result into massive use of internet for e-commerce, e-resources, social media etc which will generate large data sets in various forms. This myriad data is the foundation of data analytics. Various data analytics techniques will help the business, health care, education sector etc in extracting competitive information by gathering, storing, assessing, and analyzing operational data to enable them to take better operational and strategic decisions.

Analytics marries large data sets, statistical techniques, and predictive modelling. It could be thought of as the practice of mining institutional data to produce "actionable intelligence" (Campbell, et al 2007). Today big data is adding value to the higher education in terms of research, administration, management, resource allocation etc. There is tremendous increase in the usage intensity of various e-resources like e-books, e-libraries, e- journals, bulletin boards, OPAC (online public access catalogue), databases etc due to increase in digital literacy ratio. This will help the institutions in the collection of mammoth data about students.

ERA OF ANALYTICS AND MACHINE LEARNING

As colleges and universities respond to the demand for greater accountability in higher education, the emerging practice of academic analytics is likely to become a new, highly useful tool for a new, highly demanding era (Campbell, et al 2007). Big data is data which is exploded from internet in high volume, velocity and in variety. Big data is generated can be structured (enterprise resource data) as well as unstructured data (picture, video and audio), which is then made fitted to beneficial purpose for teaching, health care, business etc. Techniques used for big data is data mining, neural network, machine learning etc. Data mining is a powerful tool for academic intervention. Through data mining, a university could, for example, predict with 85 percent accuracy which students will or will not

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graduate. The university could use this information to concentrate academic assistance on those students most at risk. Data mining, combined with student demographics and other information, enabled the college to improve its understanding of its student types (Luan, 2002). Considering the nature of Big Data the major steps involved in analyzing Big Data can be given as Acquisition, Extraction, Integration, Analysis or modelling and interpretation. To adapt analytics an institution should identify leaders who can use data to solve complex issues (Tulasi, 2013):

- Identify the key values, on which data can be measured,
- Identify tools and models suitable to their requirements.
- Embed analytics in institutional process.
- Install a plan for effective communication
- Generally, Big Data has come to be identified by a number of fundamental characteristics. Key among them are (Daniel, 2015):
- **Volume**—large amount of information is often challenging to store, process, and transfer, analyse and present.
- **Velocity**—relating to increasing rate at which information flows within an organisation—(eg, organisations dealing with financial information have ability to deal with this).
- **Veracity** refers to the biases, noise and abnormality in data. It also looks at how data that is being stored, and meaningfully mined to the problem being analysed. Veracity also covers questions of trust and uncertainty.
- **Variety**—referring to data in diverse format both structured and unstructured.
- **Verification**—refers to data verification and security.
- **Value**—most importantly, has the data been utilised to generate value of the insights, benefits and business processes, etc. within an organisation?

Predictive insights are derived from data analytics, which predicts future from assumptions drawn from past experiences. The large data repositories containing past and present data are the basis of predictive analytics and AI, which produces new patterns, gives out hidden information, develop new correlation using algorithm and statistical techniques. By definition, predictive capability emphasizes the prediction of future trends and exploration of new insights through extraction of information from large data sets. To create predictive capability, organizations have to rely on a predictive analytics platform that incorporate data warehouses, predictive analytics algorithms (e.g., regression analysis, machine learning, and neural networks), and reporting dashboards that provide optimal decisions to users. This platform makes it possible to cross reference current and historical data to generate context-aware recommendations that enable managers to make predictions about future events and trends (Wang, et al 2018).

Machine learning is the continuation of the predictive analytics. Artificial intelligence is about the development of machine that mimics human intelligence which can learn from experiences and make rational decisions. The AI can make assumptions, test and learn autonomously. The application of Artificial Intelligence will let the machine to think like human brain without the help human or computer programming and make decision themselves. For example, Chat bots simulate the conversation with the human users without human interventions. Robots are another important field of AI. Currently, few universities are using robots for assistance in teaching.

ROLE OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION

Artificial intelligence (AI) is defined as the ability and development of information technology-based computer systems or other machines to complete the tasks that usually require human intelligence and logical deduction. Even though AI can make the world a better place, AI comes with its own issues (Siau, 2018). It has experienced major developments in recent years and represents an emerging technology that will revolutionize the ways in which human beings live. This technology is already being introduced in the field of higher education, although many teachers are unaware of its scope and, above all, of what it consists of (Hinojo-Lucena, et al, 2019).) Traditionally artificial intelligence aims at simulating filtering information, handling constraints, recognizing patterns and making logical inferences as well as other activities necessary in order to deal with real – life problems in an automated way (Drigas, et al, 2009). Over the last few years, AI is becoming more functional in all spectrum of the world. From self driving cars to drone postmen, AI is trying to replace the human as they won't get tired nor will they take leave, no union, no demands. Thus AI is building successful roads in every sector whether it is education, financial services, manufacturing services, healthcare, economics, law etc. AI is bringing revolution in the field of education (AIEd), its application can work as assistant to the teacher and can save their time by doing customary tasks like taking attendance, evaluating test, presentation of study material, easy navigation of content on screens, proving links for educational videos, grading etc. in this way teacher can wisely use their time on improvement of the weak areas of their subject knowledge. This will aid in filling the void that exist between the teaching and learning process. Once the infrastructure is developed, the time and cost on using AI based applications in institution is extremely less in

comparison to human being. Meanwhile AI can contribute in improving other routine services within the higher education on the management part too. In this article we will see the implications of emerging technology i.e. artificial intelligence on the way students learn, teacher teaches and higher education institutions evolve. Hence, strengthening organisation capabilities by virtue of big data is what will lead to competitive performance gains, and is contingent upon multiple internal and external factors (Mikalef, et al 2018). Higher education will be impacted by AI in many ways and the two major areas are curricula and enrollment. First, AI will have a sweeping impact on curriculum in higher education. The strength of AI is its speed, accuracy, and consistency. It is a lost cause to compete with AI on these dimensions. On the other hand, AI is still weak in soft skill such as creativity, innovation, critical-thinking, problem-solving, socializing, leadership, empathy, collaboration, and communication. This is not to say that we should ignore the hard skills such as science, math, and engineering. Higher education should still train the students in the fundamentals of science and math, and at the same time provides opportunities and training for students to enhance their soft skills. Some universities are already offering AI and Machine Learning courses to not only computer science students, but also business students as business managers and executives need to understand the capabilities, limitations, and implications of AI in the business world. The other impact of AI in higher education is enrollment. Liberal arts and humanities majors may become more popular as these areas are less susceptible to "AI-invasion." Areas such as accounting and financial analysis that may be hit hard by AI may see a drastic drop in enrolment. Also, with the wealth gap and potentially millions (if not billions) out of jobs, higher education may no longer be affordable to many. Other possibilities include the use of AI assistants and AI instructors in teaching (Ma and Siau, 2018). To surge ahead globally there is a need to correct our education system which is becoming dismal due to lack of excellence. Artificial Intelligence can make large contribution in improving various facets of our education system.

Improvement in Teaching Quality: Teaching excellence can be enhanced using various machine learning tools and frameworks. A teacher can improve their own practices and pedagogy by making use of massive students data collected from various source. By analysing large datasets, a teacher can improve themselves by focussing and learning that particular concept / topic in which students are facing problem in understanding. Meanwhile learning analytics can furnish teaching staff with better information on the quality of the educational content and activities they are providing, and on their teaching and assessment processes, to enable its continual enhancement (Sclater, et al 2016). New pedagogy can be used by the teacher to help students to learn and understand effectively.

Determining Student Interest Areas –Repositories of student data will also help the teacher in better understanding of students interest areas, accordingly cohorts can be formed for students having common interest areas for interactive learning. This can bring reforms in the student's life and make them better problem solvers. Infact the content that is searched by students on the internet will also help in determining the interest areas of the students, which will again help the teacher in redesigning the curriculum as per student interest.

Understanding Student's Problem- Similarly analysis of these datasets will let the teacher be familiar with the problems that most of the students are facing. Analysis of the data related to their scores in various tests, quiz, assignment, projects etc that take place in classroom can give clear picture of weak areas where students are lacking behind. It will also help in assessing those areas where students are facing problems in their understanding any topic. Accordingly, teacher can design their lecture series for upcoming classes. AI tools can work like personalised tutor who can improve student learning and engagement.

Student Retention: The analysis of student data will help the management and administrative workforce in investigating the reasons behind the drop outs. So, after lining up the reasons behind the drop outs, management should interact with students and give advice and support, and try to eliminate the problems. This will help in the retention of the students.

Increase in Student Enrolment: Student's data will provide the insight to the management about the current need and wants of the students. Accordingly management can design new courses or redesign the existing ones for catering the students demand. This will help in increase in the student's enrolment in the universities and colleges.

Better Decision Making: Everyday is challenging day for the management, where they have to take number of operational decisions as well as strategic decisions for reaping benefits in all terms. This big data will be an aid to the decision makers as the data analysis will help them in making timely and good decisions. Decision regarding fee, scholarship, grants.

Easy Assessment: AI will assist the teachers by easily doing assessment of the student performance. This will definitely save the time of the teacher, which they can use for their professional development by doing interaction with students and improving their own content delivery where students are lacking behind. AI will help in identifying the gap between teaching and learning, by alerting the teacher when large number of

students will give wrong answer to the same question. Big Data in higher education also covers database systems that store large quantities of longitudinal data on students' right down to very specific transactions and activities on learning and teaching. When students interact with learning technologies, they leave behind data trails that can reveal their sentiments, social connections, intentions and goals. Researchers can use such data to examine patterns of student performance over time—from one semester to another or from 1 year to another (Daniel, 2015).

Identifying Of Their Own Goals: Learning analytics can provide students with an opportunity to take control of their own learning, give them a better idea of their current performance in real-time and help them to make informed choices about what to study (Sclater, et al 2016). Big Data can help provide insights to support student's learning needs. For instance, learning analytics as a fundamental component of Big Data in higher education provide researchers with opportunities to carry out real-time analysis of learning activities. By performing retrospective analysis of student data, predictive models can be created to examine students at risk and provide appropriate intervention, hence enabling instructors to adapt their teaching or initiate tutoring, tailored assignments and continuous assessment (Daniel, 2015).

Innovative Learning: Moving from teacher centric model to learner centric model to create lifelong learners. There is need to inculcate creativity, team spirit, resilience, empathy, life survival skills among students, so that they can contribute well in the society. Big data emerging technology with analytic process provides particular advantages to transform the pattern of information fitted into the innovative learning environment to enhance in developing the learning resources. Both prototype and model of data extraction value could be enhanced to facilitate the learning environment in supporting implementations with ease and convenience (Huda, 2018). It can help educators and course administrators to analyze the students' course activities and usage information to get a general view of a student's learning. Statistics and visualization information are the two main techniques that have been most widely used for this task (Goyal and Vohra, 2012).

Useful Feedback: AI systems will provide feedback in form of alerts to the both teachers and students during the successful completion of the course. This feedback will help teacher in designing lecture customised as per the need of the students. Similarly such feedback will help in monitoring the student performance and progress during the course. This will definitely contribute in better student engagement

CONTEMPORARY CHALLENGES

The Horizon report of 2016 is indicating the use of robotics is at least four years away from mainstream use in higher education; its potential uses are starting to gain traction, especially in the medical field. (Roll and Wylie, 2016) has highlighted several ways in which education has shifted beyond the traditional AIED model, and this pivot offers a wealth of opportunities (and challenges!) to the field of AIED. The use of AI in higher education institution in this complex and competitive environment is associated with many contemporary challenges which are as follows:

1. **Expensive Technology and Experts**: The application of AI needs lot of resources, time and infrastructure along with human skills and leadership. There is a need of giving more time and space to staff for development and change. So, that they don't consider the technology as a burden but as a tool for improvement.
2. **Human Intelligence:** Efficiency of human brain is always a big challenge for AI. AI is not yet ready for competencies like high order thinking, metacognition and creativity like human brain.
3. **Social Skills**: Machines are performing outstandingly in all areas affecting our everyday lives but they lack emotions and can't support our culture and traditions. Therefore the role of teacher is quite important in development of more human side in students which machine can never learn.
4. **Ethical Behaviour and Sentiments**: Ethical behaviour is extremely hard to automate (McDermott, 2008). If any situation require, then machine can't take ethical decision. Then who will be responsible for the unethical decision taken by any advanced machine which results into any unbearable loss to anyone.
5. **Workforce Displacement:** Machines can never replace human but can decrease the number of workforce required in any organisation. Cognitive technologies have created fear among the people of getting out of work. For example, use of teacherbot (machine based software or hardware) in institutions to teach, supervise, monitor, evaluate and to give fast answer to many question of the students.
6. **Lack Kinesics:** Kinesics completes the communication effectively. Machine can't use gestures, movement of fingers, facial expressions, eye contact etc which are the essential part of pedagogy.
7. **Technical Problems**: AI is a machine not a human. If wrong code is written then AI can

read but not able to correct its code and mistakes automatically.

CONCLUSION

Machine learning, subset of AI is still in its nascent stage of growth in India, yet much more to explore. It has shifted the whole education system from traditional classroom teacher centric to flexible anywhere anytime learner centric model. It can contribute greatly in achieving excellence in teaching and learning, and providing student's flexibility in academic work and completing the course of their choice successfully. AI can't replace teacher but can contribute in enhancing teaching capabilities, empower the employees, making the pedagogy more flexible, personalised and interactive which will not only enrich student but also give opportunity to reflect their own learning. The application of AI needs lot of resources, time and infrastructure along with human skills and leadership. In coming years, big data and analytics is going to improve, support and extend teaching, learning and creative inquiry in higher education across the world. AI Application will provide the golden opportunity to fill the teaching-learning void which can result into higher productivity, innovation, work satisfaction and prosperity in lives. Despite of many challenges in term of weak in soft and social skills and ethical behaviour, this field is making significant progress in all dimensions of our lives. It is also suggested that government should take initiatives to integrate machine learning, deep learning, and robotics in curriculum at UG & PG level to address the industry needs of a trained workforce. There is also strong call for redesigning of curriculum in order to increase the enrolment in other courses, to develop high order thinking, creativity, metacognition and human skill among students so that machine cannot replace human easily.

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