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ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR PERSONALIZED E-LEARNING

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Abstract

Artificial Intelligence is set to herald a promising future for education. It has the potential to bring a massive change in the way education is delivered today, making it more personalized. The integration of AI into the classroom will help teachers address the gaps of traditional methods of teaching a group of students with diverse needs. In such a traditional learning environment, teachers are not able to cater to the demands of every student. AI can aid teachers by identifying factors of successful learning for each student that are not possible to capture otherwise. A personalized learning environment can analyze student performance data in real time and automatically provide customized content, learning parameters and feedback. It also allows teachers to better understand student performance and as a result, teachers can design effective learning plans for their students. Education is a domain largely ruled by human-human interaction. It is difficult to develop learning systems that exhibit human-like attributes of responsiveness, adaptability and understanding. Yet, the advances in educational technology have brought in a plenty of smart learning systems which have utilized AI's inherent strengths to meet the ever growing demands of the new age learners. Though it may seem that these AI backed smart learning systems will replace teachers in foreseeable future and render them jobless. In fact, the future of learning with AI will give rise to a hybrid approach where AI will assist teachers in effectively meeting the varied needs of many students simultaneously. In future, the role of teachers will evolve. Human educators will be able to spend their time more efficiently and effectively in teaching and research. Mundane and repetitive roles of a teacher will be relegated to AI and

complex and creative tasks will be performed by humans. By using AI in their classrooms, teachers will not only be able to teach their subjects with greater depth but will also be able to cultivate curiosity and creativity among students. Teacher will play a pivotal role in creating personalized learning environments that are dynamic, scalable, robust and economically viable.

Keyword: AI, Machine Learning, E-Learning, Student performance.

INTRODUCTION

The prevailing education system is static, generalized and does not focus on individual self-development [1]. It purely works on the principle "one-size-fits-all", where students with diverse interests and different progress rates learn together. Such a learning environment makes it difficult for teachers to identify and deal with educational needs of the students especially when class size is large. These gaps can be filled by adopting the new age Artificial Intelligence techniques in the teaching learning process. Artificial intelligence is a branch of computer science that deals with the development of intelligent machines that are able to perform tasks which normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages [2]. The use of artificial intelligence technologies in the learning environments offers numerous benefits like, open, collaborative and lifelong learning. Apart from these benefits, one chief

advantage that AI can offer to the education sector is the ability to provide personalized and adaptive learning.

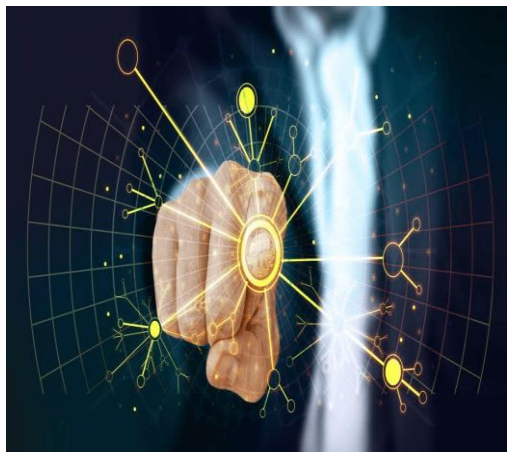


Fig 1: AI Based E-Learning

Personalized learning refers to a diverse variety of educational programs, learning experiences, instructional approaches, and academic-support strategies that are intended to address the distinct learning needs, interests, 208 | P a g e aspirations, or cultural backgrounds of individual students [3]. The growth in educational technology has given rise to personalized learning systems that use AI to track information about the learning process of each student. These systems can record information about how students learn, analyze these findings and also generate warnings about certain students' slow progress. When this information is combined with the knowledge about students' behavioral patterns, it is possible to gain valuable insights into ways students' learn. A personalized learning system would recommend a different style of learning according to the subject being taught and the learning capability of the student. For example- It is possible that such a learning system would recommend self-paced learning if a student excels in history, while it may suggest teacher led learning for mathematics subject.

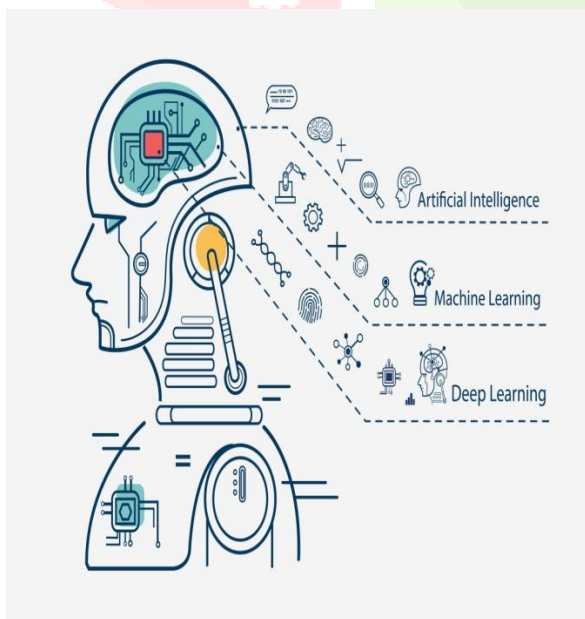


Fig 2: AI With Machine learning

These data-based learning systems allow teachers to provide individualized assignments, tutorials and practice exercises to students. At the heart of these personalize systems is a set of AI techniques like- machine learning, deep learning, natural language processing, and speech recognition. These AI techniques when synergized with traditional teaching methods can change the quality, delivery, and nature of education. This paper first examines the features of Artificial Intelligence building blocks. It further discusses the brief history and benefits of using AI in education. The major focus of this paper is on identifying AI powered learning systems that can redefine the teaching learning landscape. There are several projects already in work that use AI tools and techniques. This paper reviews the features of some popular AI driven smart education applications that are addressing the challenges of learning. The paper also suggests future directions for using AI in education.

LITERATURE SURVEY

i)Title: Intelligent Recommendations for E-Learning Personalization based on Learner’s Learning Activities and Performances Authors: DamindaHerath, LashmanJayarathne This paper introduces the practical type of learning for ELearning personalization which uses Education Data mining frameworks. It distinguishes the student's conduct like Here, Utility matrix is used for anticipating the results of unaware entries depending on the results of known entries. After the analysis of the system developed, the results demonstrated that the conduct was improved. Yet, here the teaching strategies were not taken into consideration and there is no interaction between the Learner and the system[1]

ii)Title: Analysis of Personalized E-Learning system on the basis of Behavioural Data Mining. Author: Duoduo Liu, Lihua Zhang This paper analyses the behavioral data mirroring the intrigue highlights by using Data Mining Techniques. After the analysis of behavioral data it models a Personalized Recommendation System. This system helps the Learner in an effective manner. It takes Learner requirements into notice and then it suggests the Learner depending on Behavioral Data Mining.Educational Data Mining can help to recommend which Learning Activities, Resources, Tasks as well as experience. Educational Data Mining incorporates five techniques: In any case, the selection to Learning resource matches with Learner’s interest on specific content. In this paper Data Mining Techniques is used for the behavioral data and personalized E-Learning system helps to recommend content based on Learner’s interest. However, it does not take the Learner’s knowledge into consideration.[2]

iii) Title: A Systematic Approach to improving E-Learning implementations in High Schools Author: Bens Pardamean and Teddy Suparyanto For the most part inspects the existent pattern of actualizing E-Learning in High School. The strategy used is said to be Learning Management System (LMS). E-

Learning for the most part partitioned into three segments: The Educating Process, The Process of Learning and The level of Knowledge. The interaction between the learner and system is also depicted. Here, a study was conducted to determine the connection between students' computer abilities and their academic accomplishments within Information Technology courses. Pearson's Correlation Analysis is utilized to discover the level of relationship. It reflected the degree of linear relationship between learner's computer skills and the Curriculum accomplishments. This paper says that student's achievements are not based on the scores. They are based on the psychomotor and affective scores. These two factors can be further explained.[3]

iv) Title: A Personalized E-Learning based on Recommender system Author: OutmaneBourkokuou, Essaid El Bachari and Mohamed El Adnani In this paper, their main work is to propose a Personalized E-Learning Recommender system (PERS) by using Collaborative Filtering Methods. The Learning content will be offered to the learner in a personalized way. The Learning style of a learner is recognized by using the Questionnaire with the goal that Cold Start problem is resolved.

v) Title: An Approach to Personalized E-Learning Author: Matteo Gaeta, Sergio Miranda1, Francesco Orciuoli1, Stefano Paolozz, Antonella Poce The use of Semantic web is also an innovative way for Personalization in E-Learning. In this paper Intelligent Web Teacher (IWT) is proposed where E-Learning activities are performed. This paper discusses about the E-Learning domain. Parser tool is used to structure a personalized plan based on Learner's goals. Another technique examined in this paper is Web Mining. It is used to deliver the learning content to Learner according to his/her preference. It was also mentioned that not only Learner's preferences but also Learning courses and Teachers preferences affect the Personalization system. Learning content is included in the learning object, learning object metadata includes data like type of Learning object, Format and Teaching or Interaction style.

METHODOLOGY

1. Authentication: New user must be registered into the system, once he/she completes the registration, and then they can directly login into the system.

2. Knowledge Test: In this module a test is conducted which analyses the knowledge level of an individual. And the result obtained is considered while clustering the learner. The learner selects his/her preferred programming language. By doing this the system gets an idea of what content to be displayed to the learner in the beginning.

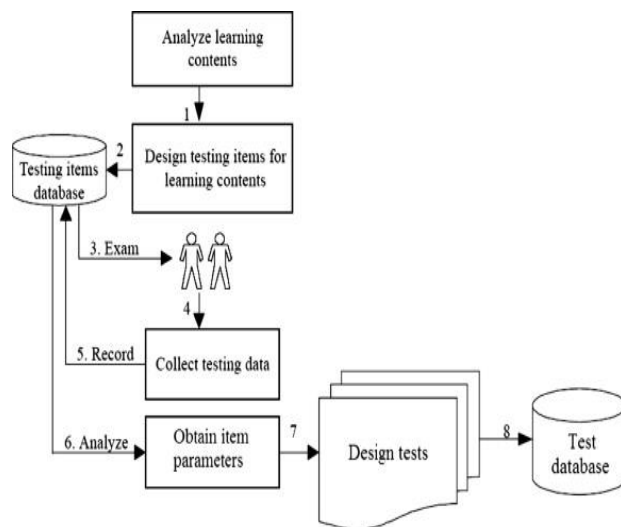


Fig 3: Work Flow

3. Clustering and Content Display: Based on the results obtained in the above module learners will be clustered. A learner based on his ability will be under any of the 3 clusters labelled Beginner, Intermediate, and Advanced. He will be provided with the required and necessary content. The learners of advanced category can also access the beginner level contents and tests. The learners of beginner level can also access the advanced level contents and tests provided they complete all the tests in his/her level by meeting the threshold value for each and every test.

4. Performance Monitoring and Analysis: After completion of a chapter the learner will be assessed by conducting a test which contains questions based upon the preceding chapter learnt and will be graded accordingly. If the learner's performance is degrading, he might be asked to learn the content again or can be relegated to other category and vice versa. The above grades will be used in clustering the learner again while displaying the next chapter's content and this adaptation continues until all the chapters are learnt. During the course of time learner performance will be monitored, tracked, and analyzed. Even the learner can monitor his/her performance which is available in progress where one can view all the test scores.

EXPERIMENTAL SET UP AND RESULTS

- A. DATASETS In our project Registration is done for 50 users and Knowledge test is taken for different users covering all the possible scenarios. Considering these results we explored all the possibilities and checked if all the validations were perfectly applied.
- B. EXPERIMENT
- C. Step 1: Registration is done, and Knowledge test is taken. According to the test results they were assigned any one of the 3 categories Basic, Intermediate or Advanced.
- D. Step 2: Among the available languages C language is selected.

E. Step 3: Selected few of the registered users covering all the three categories.

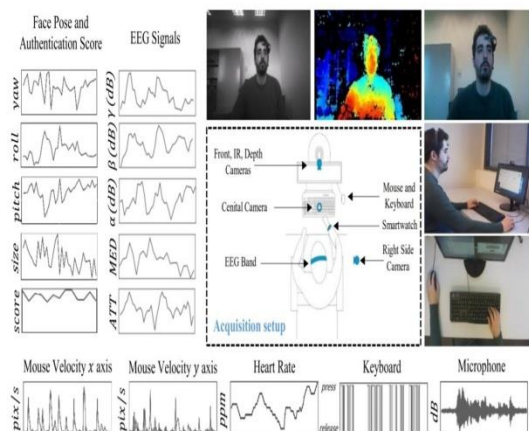


Fig 4: E-Learning Analysis

F. Step 4: Tests were taken, and responses were stored, and results were noted. All these results along with number of attempts were tabulated. Best score among all the attempts was taken as the final score.

G. Step 5: Progress of the user was checked, where the user's whole progress along with all the results was displayed. Bar graph can also be used to know the progress of each test in each level.

H. Step 6: Admin's view is checked after signing out. All the users list was displayed and can delete or view progress of any user. Also, the number of users taking tests in each level can be known with the help of a Bar graph.

CONCLUSION

In this paper we have discussed the importance of personalization for enabling proficient e-Learning forms. It gives the learner the right content based on one's performance so that it fits well. As the data is increasing day by day and searching requires a lot of time, Initial knowledge test as well as student profiling enables the system to provide the right content from the very beginning. As the content in the learner's level is viewed one after the other it enables the learner to learn in an organized way, with perfection and the following topics can be understood clearly. Even if learner in higher levels are given access to lower levels. We are not limiting the user to the higher levels with a view that they may want to refer or learn previous topics in any circumstances. The tests conducted after each chapter not only allows the learner to know his abilities and can keep track of his performance and the areas yet to be improved but also the system to keep track of user's performance and provide the necessary suitable content. Moreover, learner can easily access the right content without searching for longer time. The learner can view the complete

progress along with the number of attempts and score obtained for each attempt, final score, Percentage of tests completed.

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