

A Survey on Applications of Artificial Intelligence for Enhancement in Learning Experience

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Abstract—This paper is a survey about applications of Artificial Intelligence which are implemented in education for student assessment and to enhance learning experience. Initially, we intend to focus on concepts of Artificial Intelligence. In this paper, 4 different papers are surveyed which consist different applications of Artificial Intelligence for learning. This survey is based on Proposed Model, Experimentation, Results/Advantage and Limitation. These papers present various applications of Artificial Intelligence in student assessment and to enhance learning experience.

Keywords— *intelligent auto-assessment, education, Artificial Intelligence, personalized learning.*

1. Introduction

As Artificial Intelligence (AI) is going to be essential part of our life, we can't keep education apart from it. AI is transforming the education industry with various aspects. One of the most important application of AI in education is personalized learning. In addition to this, chatbots can be the gamechanger in education industry. They can solve number of problems which are faced by education industry currently.

Moreover, AI can be more interactive option for making language learning easy. It can help to grow your language skills by communicating with you in that language just like a native speaker. AI can help in making teaching system more adaptive which can give higher-quality knowledge than traditional system according to student's capability and existing knowledge.

AI in education can provide a system which is able to provide personalized recommendation and guidance to student. For this, AI must know the things like effective ways of teaching, subject to be learned by student and student's capability. The architecture which will be followed in this system contains:

- Pedagogical Model – This model represents effective way of teaching with aspects of knowledge and expertise level.
- Domain Model – This model represents the background knowledge of subject to be learned.
- Learner Model – This model represents the capabilities of learner, particularly knowledge. [2][3][4][5][6]

2. Artificial Intelligence

It is not easy to define Artificial Intelligence (AI). Still, we are including generalized terms to define Artificial Intelligence. The term Artificial Intelligence is used for ability of program to simulate human intelligence in computer or robot.

2A. Significance of Artificial Intelligence

Artificial Intelligence plays vital role in saving human intellectual labor and time. The significance of Artificial Intelligence are as follows.

1. Management of routine tasks- AI can help us in performing repetitive tasks so that we can save the time.
2. Personalization- AI can help firms to reach right person for marketing. In a same way, an individual can get good recommendation for certain things.

2B. Types of Artificial Intelligence

Classification of Artificial Intelligence can be done in number of ways. Based on capabilities and functionalities, AI is categorized in two types.

Type I (Based on Capabilities)-

1. Weak AI (also known as Narrow AI)- Dedicated tasks which require intelligence can be performed by Narrow AI. Narrow AI is most commonly available AI. As Narrow AI is trained for specific task only, it cannot perform other operations. Hence, it is termed as Weak AI. Apple Siri, recommendations on e-commerce platform, voice recognition and image recognition are the examples of Narrow AI. [2]
2. General AI- Any intellectual task with human-like efficiency can be performed by General AI. General AI system can be smarter and think by its own just like a human. There is no such system exists which can come under General AI in perfect manner currently.
3. Super AI (Strong AI)- It is hypothetical concept which is outcome of General AI which can surpass human intelligence and can perform tasks better than human. Thinking, reasoning, solving, judging, planning, learning and communication are the capabilities of Strong AI.

Type II (Based on Functionalities)-

1. **Reactive Machines-** The basic types of Artificial Intelligence are reactive machines. Memories or experiences are not stored by these AI systems for future action. Only the current scenario is focused by reactive machines. They react on these scenarios with best action which is possible. Example of reactive machines is translation tools powered by Machine Learning which can be used by students to participate in global classrooms so they can learn in their language.
2. **Limited Memory-** For a short period of time, past experiences or memories can be stored by limited memory machines. This data can be used by machines for limited period only. The Limited Memory System is used for automatic grading.
3. **Theory of Mind-** Human emotions, beliefs should be understood by Theory of Mind. Theory of Mind should be able to interact socially. Theory of Mind machines are not developed yet.
4. **Self-Awareness-** The future of Artificial Intelligence is self-awareness AI. The machine with own consciousness, sentiments and self-awareness will be called as self-awareness AI. It is hypothetical concept of AI.

2C. Applications of Artificial Intelligence

Artificial Intelligence provides various applications. It can solve complex problems which belong to different industries such as Robotics, Finance, Gaming, Healthcare, Education and Agriculture. But this survey paper is focusing on application of Artificial Intelligence in education sector. They are as follows

1. **Personalized Learning-** AI helps students to learn any subject based on students' knowledge, experience and learning mode. This becomes easy for students to choose right content from huge number of resources. Not only learning material, AI systems make students to learn with interactive interfaces. Which helps them to learn with more efficient chatbots. [1][3]
2. **Chatbots and Voice Assistants-** The voice assistant makes informal interaction with students. So, students do not rely on teachers. Due to this feature, student can learn from anywhere at any time. Chatbots perform different tasks like mentoring students, motivating them, answering to doubts and conducting assessments. [2]
3. **Scoring System-** AI provides scoring system which helps students to improve their performance as such systems also identify the mistakes done by students while answering.

3. Enhancement of Learning Experience

AI has ability to show us the phases of learning any subject from which every student passes. Some modules in AI are able to help teachers to understand the student's capability. Such modules also make possible to create future learning experiences according to current outcomes. AI helps students by motivating them by tracking their progress. It also reflects the improvement shown by students. AI has ability to compute large amount of data. This makes AI to provide personalized and efficient way for teaching and learning.

3A. AI and Student Assessments

AI is able to collect data of student's attendance in classroom. It can also analyze the assignments submitted by student. In addition to this, AI can assess student automatically. Based on this, it can generate personalized recommendation for students.

3B. Survey on Applications of AI in Learning Experience

1. **Automatic Assessment of Student Homework and Personalized Recommendation**
 - a. **Proposed Method-** Author has proposed solution which is based on machine learning. Also, they have introduced automatic reviewing system for student's answers along with adaptive knowledge recommendation.
 - b. **Experimentation-** In the first part, they collected data of students' answers to certain questions from specific subject. They processed and classified this data to find out the result using TF-IDF, NLP and Machine Learning methods like Logistics Regression, Random Forest Classifier and Linear SVC. In the second part, as they have assessed the student's homework, they worked further to generate personalized recommendations.
 - c. **Result/Advantage-** They conclude by stating that the system is able to assess the students and generating recommendations with accuracy. The approach is feasible.
 - d. **Limitation-** The system is purely based on datasets. So, used method for student assessment and scale of data is insufficient to get real performance of students after recommendations. [1]
2. **Adoption of AI-Chatbots to Enhance Student Learning Experience in Higher Education in India**
 - a. **Proposed Method-** Author has used quantitative approach through data collection. The design used in study was empirical research.

- b. Experimentation- Firstly, data was stored in the form of excel. For analysis part, data was exported to SPSS. After that two methods of statistics (descriptive and inferential) were used. In inferential statistics, 2 hypotheses were formulated.
 - c. Result/Advantage- Result from Quantitative method was, most of the students would go for chatbot to get help in education. Result from Pearson Chi-Square test indicated that level of education of student does not affect adoption of chatbot technology in the Indian higher education sector.
 - d. Limitation- This research does not include solution for addiction prevention regarding chatbots. [2]
3. Interactive AI for Linguistic Education Built on VR Environment Using User Generated Contents
 - a. Proposed Method- Author has proposed learning program for language education with the help of VR device and native speakers.
 - b. Experimentation- First tool used was Voice RSS to convert the text to audio. After that, api.ai used to create dialog script. Then parameter which is a function used to extract information from user's sentence. So, conversation will be continued. In total, four parameters were used. Words from api.ai recognized by automated expansion. The JSON format was used to store the resulting script of conversation. api.ai was integrated into Unity development environment using api.ai Unity SDK.
 - c. Result/Advantage- An environment was developed which can communicate with chatbot in foreign language in easy manner. This was implemented using VR graphic environment by Unity.
 - d. Limitation- New dialog can't be entered by user. [3]
 4. A Teaching System of English Online Course based on Artificial Intelligence
 - a. Proposed Method- Author has proposed an Online English Intelligence learning system by using combination of Java and Artificial Intelligence. Allocation is done by using framework which is integration of Struts, Spring and Hibernate.
 - b. Experimentation- Firstly, knowledge base was prepared. Knowledge package used for

manipulation and maintenance of knowledge base. The storage operation was established for each type of knowledge base. Knowledge was input through affair and rules. Forward inference technology and control structure applied for reasoning. Repetitive cycle contained teaching knowledge, student information, teaching action and student feedback.

- c. Result/Advantage- Student was able to learn curriculum of own interest by choosing suitable content to learn.
- d. Limitation- The login method and cycle of curriculum planning is time consuming. System is less feasible. [4]

4. Discussion

In this paper, the concept of Artificial Intelligence was studied. After this, some good methods for enhancement of learning experience using various approaches is taken into consideration. Initially paper started with definition, importance, types and applications of Artificial Intelligence. In the section of Artificial Intelligence, classification of AI discussed on the basis of capabilities and functionalities. On the basis of capabilities, the three types are Narrow AI, General AI and Super AI. Functionalities give four types of AI as Reactive Machines, Limited Memory, Theory of Mind and Self-Awareness. Applicability of Artificial Intelligence was wide spread but this paper mainly focuses applications like Personalized Learning, Chatbots, Voice Assistants and Scoring System. Followed by how Artificial Intelligence suited best in enhancing learning experience is discussed. To do this survey of total 4 papers having different approach towards learning experience enhancement were conducted which has flavor of Artificial Intelligence.

Papers surveyed in Learning Experience Enhancement, there are some findings

- Large training data with relevant attributes could give more accurate results.
- Authenticated dataset must be used only.
- Extraction of data must be done carefully to get proper dataset as training input.
- Assessment if done on basis of comprehension, application and knowledge of student, then it will give more accurate result which help in generating relevant recommendations.

Conclusion

This paper starts with concept of Artificial Intelligence. Then various types of Artificial Intelligence and learning experience enhancement techniques included in this paper. Then survey of different methods that can be applied along with Artificial Intelligence to enhance learning experience is included. A flow and content of this paper is described in last part of paper which is Discussion. This survey illustrates possibly all techniques related to Artificial Intelligence for enhancement of learning experience. It is clear that interactive AI is favorable technique for enhancing learning experience of student. Survey concludes the approach of assessing the student to analyze capabilities like comprehension, application and knowledge will give better results in terms of student's performance. Also, it will enhance the accuracy of model.

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