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Artificial Intelligence Based IT System

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Abstract: In order to improve learning outcomes for IT workers, this study describes the development and assessment of an AI based IT training system. The system makes use of machine learning algorithms to tailor training materials and dynamically modify the learning process according to the unique qualities and performance of each student. Significant gains in participants' information retention and skill learning were found in pilot research that evaluated the system's efficacy. The design and implementation of the AI-based training system, along with the data collecting and analysis of learner performance measures, comprised the methodology of the study. The outcomes show how the system may adaptively customize training sessions to improve learning outcomes. This work makes a valuable contribution to the development of AI-powered educational technology and has the potential to enhance professional IT training approaches. In order to improve learning outcomes for IT workers, this study describes the development and assessment of an AI-based IT training system. The system makes use of machine learning algorithms to tailor training materials and dynamically modify the learning process according to the unique qualities and performance of each student. Significant gains in participants' information retention and skill learning were found in pilot research that evaluated the system's efficacy. The design and implementation of the AI-based training system, along with the data collecting and analysis of learner performance measures, comprised the methodology of the study. The outcomes show how the system may adaptively customize training sessions to improve learning outcomes. This work makes a valuable contribution to the development of AI powered educational technology and has the potential to enhance professional IT training approaches.

Keywords: Adaptive Learning, AI-LMS (Artificial Intelligence – Learning Mechanism System), Personalized Learning, Intelligent Tutoring System, Virtual Assistant

I. INTRODUCTION

In recent years, AI has changed how teachers and students teach and learn. China's Ministry of Education issued a plan for using AI in universities, asking teachers to try new teaching methods with AI's help. AI-based teaching tools are used a lot by English teachers and students in Chinese universities. But students still struggle with listening skills, even with AI's help. Traditional teaching methods don't work well for listening skills.

They can't adjust to students' preferences or needs, so students aren't motivated to learn. Many AI tools have been made, but they haven't fixed the problem. There's a lot of research on AI in English teaching, but self-learning software for students is still new and has a lot of potential. This paper proposes a self-learning platform for English listening using AI, to help students learn better.

Training people for engineering projects is hard because often the wrong people are involved. This leads to issues like not having a clear plan, goals, or good communication. Projects have a specific start and end, with limited scope and resources. They involve people who may not usually work together and can come from different places or organizations. Examples include software development, building bridges, or launching new products. E-learning lets us train people regardless of time or distance. It uses proven methods to improve teaching and learning. Artificial intelligence can help by making decisions based on how students learn. This paper focuses on using AI in e-learning for engineering projects. It aims to improve how people are trained for project work.

II. LITERATURE SURVEY

Reference [10] talks about a system that helps students choose elective subjects based on their interests and academic activities. The system analyses data about each subject and the student's performance in compulsory subjects to suggest the best option. It uses a 4R system and discusses storing user preferences.

Reference [11] discusses various recommender systems like Content-based, Collaborative Filtering, and Hybrid systems. It also talks about AI techniques like Fuzzy Sets and Swarm Intelligence, as well as problems like Cold Start and Limited Coverage.

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Reference [12] introduces a Collaborative Filtering method to learn preferences of new users in Recommendation Systems. It addresses problems like Cold-Start by considering factors like item popularity and entropy.

Reference [13] presents ARGUENET, a system for prioritizing web search results based on qualitative aspects. It uses an Argument-based Recommender Technique to address user preferences.

Reference [14] focuses on recommender systems for E-Commerce websites using implicit feedback. It discusses using pseudo rating data from implicit feedback like purchase times and user feedback to build recommendation systems.

Reference [15] proposes a Collaborative Filtering-based Recommender System using Artificial Neural Network validation. It discusses approaches for tackling Cold-Start problems.

Reference [16] analysis Evolutionary Computing based Recommender Systems and discusses various aspects of building them.

Reference [17] develops recommender systems using Swarm Intelligence and Evolutionary Computing techniques. It addresses challenges like sparsity and scalability.

Reference [18] reviews tourism recommender systems, analyzing their interface, functionality, and AI techniques used. It emphasizes the benefits of semantic representation.

Reference [19] implements a hybrid recommender system using Collaborative Filtering for decision-making. It uses the Utilities Additives algorithm and compares it to other CF techniques.

Reference [20] reviews recent development in Recommendation Techniques, classifying them based on application fields and data mining techniques.

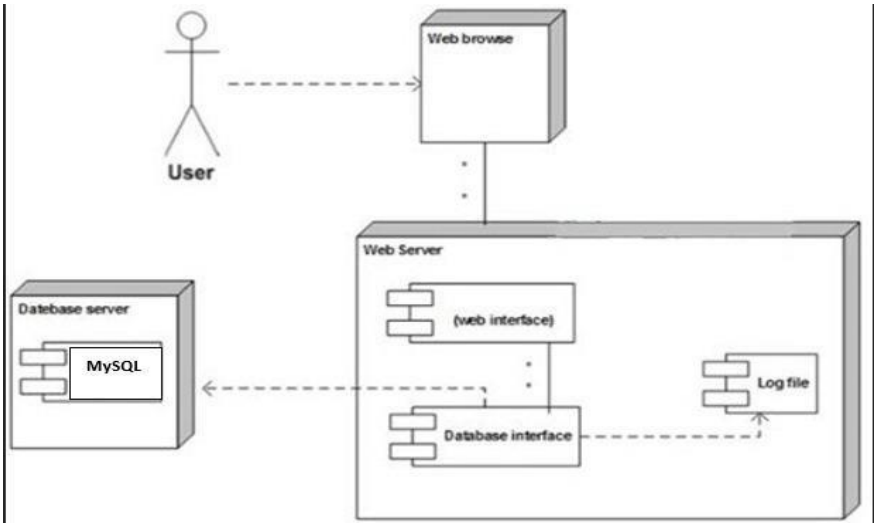
Reference [21] develops a recommender system for tourism and travel, discussing various filtering techniques and hybrid systems.

Reference [22] discusses health management recommender systems, suggesting systems based on Collaborative Filtering and domain knowledge.

Reference [23] proposes a movie recommender system based on Collaborative Filtering, analyzing user interests and providing recommendations accordingly.

III. DIAGRAMS

A. System Architecture:



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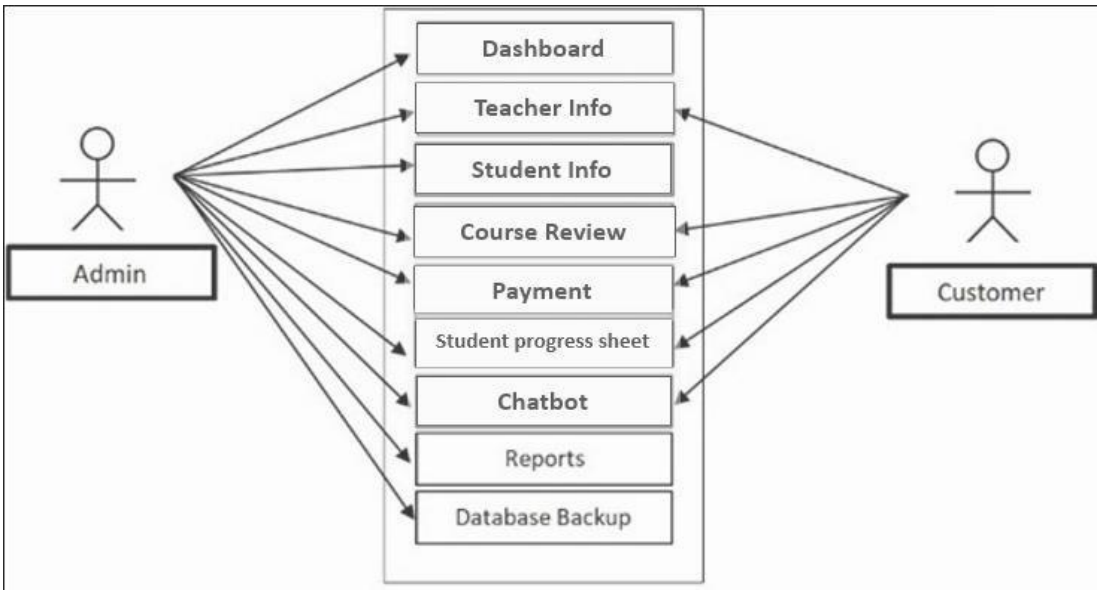
B. **Use Case:**



III. ALGORITHMS

Adaptive Learning: The typical classroom experience is being revolutionized by adaptive learning, which is utilizing advanced algorithms and technology. Adaptive learning platforms generate customized learning routes based on individual student data analysis, taking into account each student's distinct strengths, weaknesses, and preferences.

These platforms fit the student's competency level and learning objectives with the intelligent selection of learning resources and dynamic adjustments to content and pacing. Instantaneous feedback and evaluation systems offer priceless insights into students' development, enabling teachers to step in and offer extra help or challenges as required. By creating tests and quizzes that adjust to the student's skill level, adaptive assessments help to improve the learning process even more while guaranteeing precise and focused evaluation. Adaptive learning algorithms enable teachers to provide highly effective and individualized training through ongoing refining based on data-driven insights.

AI-LMS(Artificial Intelligence – Learning Mechanism System) : The ultimate in educational technology integration is an AI-LMS (Artificial Intelligence - Learning Management System), which combines the power of AI algorithms with conventional LMSs to produce a dynamic and individualized learning environment. AI systems integrated into the learning management system (LMS) can precisely adapt learning paths, filter content, and offer feedback by analyzing enormous volumes of student data.

Students receive focused help that meets their unique requirements and increases participation through adaptive recommendations and assessments. Predictive analytics, content modification tools, and automated grading help teachers focus on individualized education and intervention techniques. In the end, AI-LMS revolutionizes education by utilizing AI algorithms' capabilities to build a more productive, successful, and student- centered learning environment.

Personalized Learning : Personalized learning is a pedagogical approach that aims to tailor education to the unique needs, interests, and abilities of each individual student. Unlike traditional one-size-fits-all teaching methods, personalized learning recognizes that students learn at different paces and have diverse learning styles. By leveraging technology, data analysis, and adaptive algorithms, personalized learning allows educators to customize learning experiences for each student. This may involve creating personalized learning paths, adapting instructional content and pace to match individual proficiency levels, and providing targeted support and feedback. Through personalized learning, students are empowered to take ownership of their learning journey, engage more deeply with the material, and achieve their full potential. Additionally, personalized learning fosters a more inclusive and supportive learning environment where every student’s unique strength and challenge are recognized and addressed. Overall, personalized learning represents a shift towards student-centered education that prioritizes individual growth, empowerment, and success.

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Intelligent Tutoring System : An intelligent tutoring system (ITS) is a high-tech educational tool that uses computer-based instruction and artificial intelligence to deliver individualized and flexible learning. In contrast to conventional teaching approaches, ITS dynamically adjusts to each student's unique requirements, preferences, and learning preferences. ITS delivers customized instruction, feedback, and support by analysing student interactions, performance data, and learning patterns using AI algorithms. It can identify problem areas, offer focused correction, and instantly modify the level of instruction and pace. Additionally, ITS uses technologies like natural language processing (NLP) to enable interactive communication between the learner and the system, making learning more dynamic and interesting. Through the use of AI, ITS enables students to advance independently.

IV. METHODOLOGY

During learning sessions, students use an intelligent tutoring system for IT engineering projects. If they encounter a problem, the system looks for similar cases from the past where the goal was achieved or the evaluation was passed. It considers the problem context and the student's profile to choose the right case. Each case has stored information about various activities. These activities are suggested to students to perform. As they do the activities, the system records the results, including right and wrong answers. If a case is successful, its success counter goes up. If not, wrong answers are noted. This helps improve future use of the case. Activities recommended by a case might include watching videos, playing games, or interacting with virtual classmates. Teachers, experts, and the system create new cases based on specific problems. Recommender Systems (RS) are helpful in reducing the burden of information overload on the internet. They provide users with precise feedback tailored to their interests, aiding in decision-making. RSs are computer programs that suggest items by calculating similarities based on user interactions. Different types of RSs exist:

A. Content-Based RS: Recommends items similar to those previously chosen by a user based on common attributes.
B. Collaborative Filtering (CF)–Based RS: Recommends popular items among similar users (User-Based CF) or items similar to those previously liked by the user (Item-Based CF).
C. Hybrid RS: Combines Content-Based and Collaborative Filtering techniques to offer more accurate recommendations, even for new users.
D. Knowledge-based RS: Uses knowledge about users, items, and their relationships to make recommendations.
E. Computational intelligence-based recommendation techniques: Includes methods like Artificial Neural Networks (ANN) and Genetic Algorithms (GA) to build model-based recommender systems.

Building RSs faces challenges like Cold-Start (lack of user preferences for new systems or items), Sparsity (few user ratings), Limited Coverage (ineffective comparison of user ratings), Diversity (lack of diverse recommendations), and Over-Specialization (narrowing down of item selection).

Advantages of RSs include automating content analysis, recommending new items to users, leveraging the experiences of other users for better filtering, and filtering items based on complex concepts.

V. RESULTS

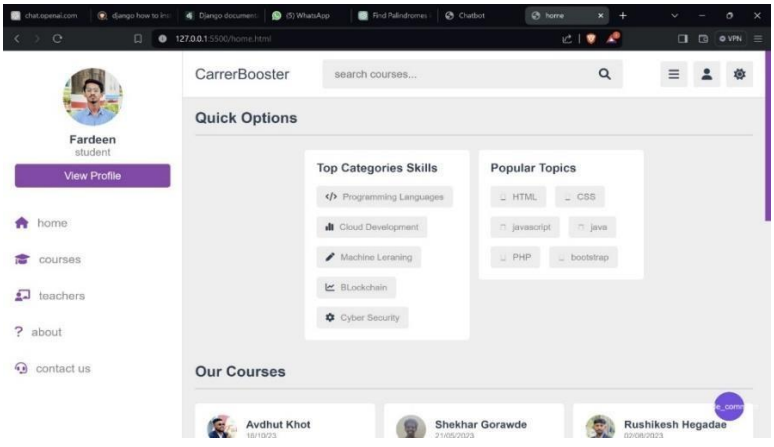

Figure 1

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To validate the proposed design, an e-learning environment called Career Booster was developed and implemented, which integrates the intelligent tutoring system techniques into those of the case-based reasoning. Figure 1 shows a typical learning session. The knowledge field is the IT engineering projects. Nowadays, Career Booster holds 20 students.

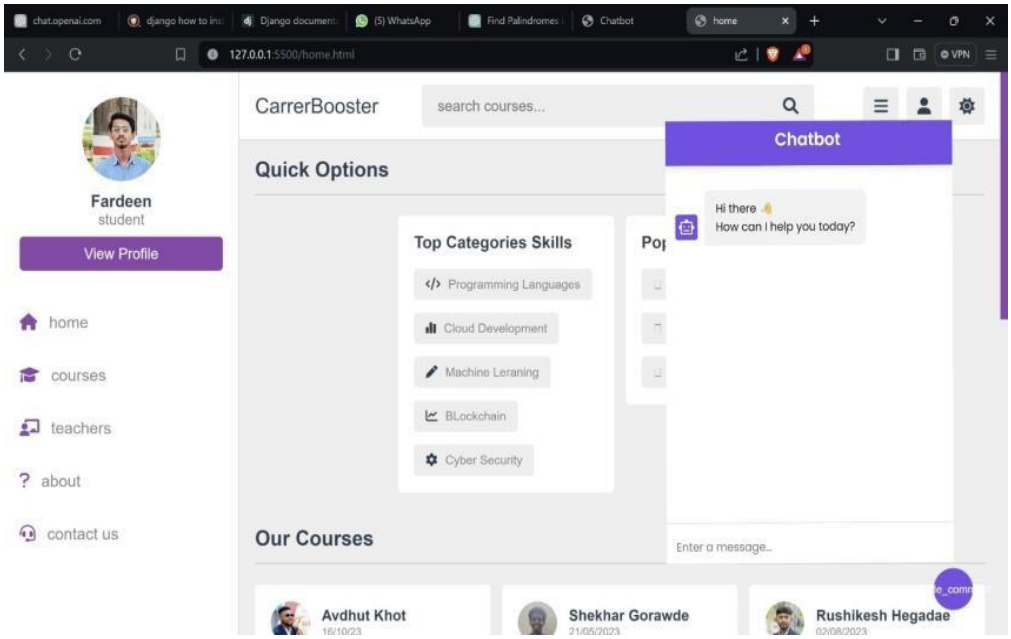

Figure 2

In figure 2, a problematic situation when a student failed an evaluation is shown. At that very moment, the case-based reasoning technique is activated.

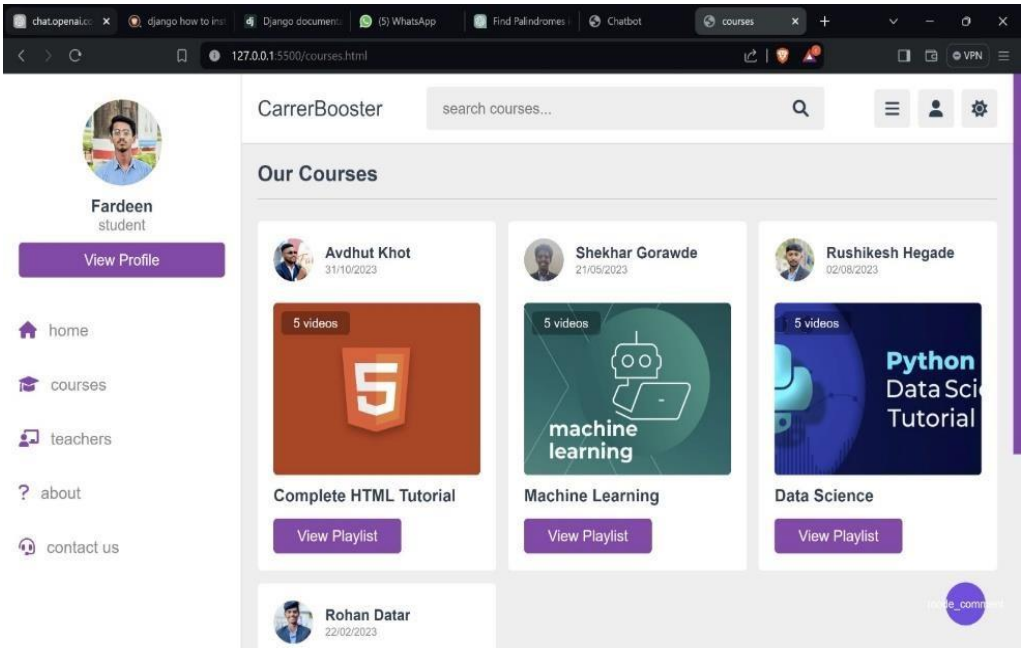

Figure 3

Figure 3 shows an example of an educational activity found in the case chosen by the case-based reasoning technique. The goal is to have the students performing a set of activities so that they manage to pass the evaluation previously failed.

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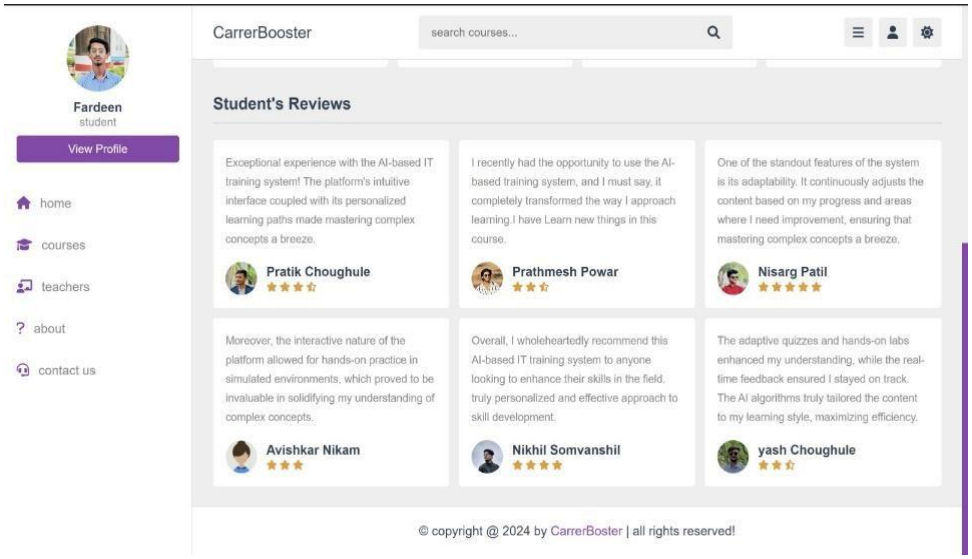

To our valued students who have taken the time to review our AI-based IT training system, we extend our sincerest gratitude. Your feedback is invaluable to us as it helps us continuously improve and tailor our platform to meet your learning needs. We are thrilled to hear about your experiences and insights, whether they are positive or constructive. Your reviews not only highlight the strengths of our training system but also pinpoint areas where we can make enhancements. Rest assured, we are committed to implementing your suggestions and refining our platform to provide you with the best possible learning experience. Thank you for your support and dedication to advancing your IT skills with us. We look forward to continuing this journey together towards excellence in IT education.

VI. CONCLUSION

In conclusion, the AI-based IT training system's creation and evaluation shown how much it can improve IT workers' learning results. The system effectively tailored training materials and adaptively modified the learning process to each learner's unique traits and performance by utilizing machine learning algorithms. The pilot study's outcomes demonstrated significant gains in participants' information retention and skill learning, underscoring the system's efficacy. The results demonstrate how AI-driven educational solutions are revolutionizing the field of IT training. The AI-based approach enhanced the training program's efficacy and maximized the participants' overall learning trajectory by providing individualized learning experiences and customized support. This presents a viable approach to meeting the various needs.

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FUTURE SCOPE

Hybrid Recommender Systems (RSs) combine Content-Based (CB) and Collaborative Filtering (CF) methods, offering better recommendations and avoiding common challenges. The use of AI techniques like Artificial Neural Networks (ANN), Fuzzy Sets, and Swarm Intelligence in RSs may increase in the future.

In the legal field, AI and Machine Learning (ML) can automate tasks like document generation, case discovery, search, and outcome predictions. According to a report by Deloitte, over 100,000 jobs in law could be automated in the next twenty years, leading to improved efficiency for legal professionals. While fully automated judges and lawyers may not be likely, there is a possibility. The report also predicts that 39% of legal jobs could be automated in the long term, with significant changes expected. McKinsey estimates that 22% of a lawyer's tasks and 35% of a clerk's tasks could be automated. Professionals should embrace AI and ML to enhance the traditional legal system, with regulatory frameworks needed. As a future research direction, authors plan to propose a prediction system using AI and ML to help reduce pending cases in India.

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