WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AI Based IT Training System

V R Shushma Reddy, K Yuva Sahithya Preethi, T Mounika, Nisba Kousar

School of Computer Science And Technology, Presidency University, Bangalore, Karnataka
SHUSHMA.20211CST0078@presidencyuniversity.in, KARANI.20211CST0022@presidencyuniversity.in
TIRUMALA.20211CST0015@presidencyuniversity.in, NISBA.20211CST0090@presidencyuniversity.in

ABSTRACT:

Artificial Intelligence (AI) has transformed the IT training environment through adaptive, intelligent, and individualized learning experiences. AI-based training systems utilize machine learning (ML), natural language processing (NLP), and reinforcement learning to maximize the engagement of the learner, enhance the delivery of knowledge, and automate the evaluation process. This work explores various AI-based methodologies, including intelligent tutoring systems, adaptive learning models, and recommender systems, that have been successfully applied on IT training platforms. Significant factors such as Computerized Adaptive Testing (CAT), clustering-based segmentation, and NLP-based course recommendation are analyzed to evaluate their contribution towards personalization in learning. The findings suggest that AI-based training systems not only improve learning outcomes but also provide scalable and efficient IT education solutions. Further work has to be focused on the development of more advanced AI models to enhance the ability to adapt, the accuracy of the assessments, and the engagement of the user in the learning environment.

Keywords: ML models ,NLP chatbot ,Gamification.Progress Analytics

Introduction:

The rapid growth in the area of artificial intelligence (AI) has changed many fields, with IT training not being the exception. Traditional methods of training are not able to keep up with the changing requirements of the industry, so it becomes necessary to implement an AI-based system. Our AI-driven IT training system aims to redefine the learning process by providing adaptive, intelligent, and personalized learning experiences. Our system, based on machine learning, natural language processing, and automation, optimizes the acquisition of skills and learning paths for the user. Implementing AI, we ensure that the learners receive dynamic content, real-time feedback, and hands-on coding sessions based on their skill levels, bridging the gap between academic and industry requirements.

Literature Survey:

The use of Artificial Intelligence (AI) in IT training systems has revolutionized the way knowledge and skills are acquired. AI-based training systems make use of machine learning (ML), natural language processing (NLP), and reinforcement learning techniques to provide customized learning experiences. This literature survey discusses various research and technologies that are implemented in AI-based IT training platforms with a focus on adaptive learning, knowledge assessment, and automated content recommendation.

The application of AI in learning has become popular due to the ability to tailor learning experiences to the user's preferences and performances. Luckin et al.'s (2017) work indicates the promise that AI has to enhance engagement, provide feedback in real-time, and tailor learning pathways. Research has shown that AI-based intelligent tutoring systems enhance the efficiency of learning significantly (VanLehn, 2011).

Personalization is one of the primary features of AI-powered training platforms. Adaptive learning platforms that implement reinforcement learning (Q-learning, Deep Q-learning) enable the customization of courses in real-time. Pardo et al. (2019) emphasize the efficiency with which adaptive learning optimizes the performance of the students. Clustering techniques like K-means help in the segmentation of the learners based on the level of their knowledge, facilitating easier delivery of the content (Li et al., 2020).

Computerized Adaptive Testing (CAT) is used by AI-based assessment systems to measure the knowledge of a learner. According to research by Wainer (2000) and Segall (2005), CAT adjusts the level of difficulty in the questions based on the responses provided by the learners. Automated grading systems, as implemented in HackerRank and Coursera, use NLP and deep learning to grade code and written answers, making the grading and feedback efficient.

Recommender systems play a crucial role in AI-based learning platforms. Bobadilla et al. (2013) describe collaborative filtering and content-based recommendation techniques for personalization in the recommendation of courses. TF-IDF and BERT (Bidirectional Encoder Representations from

Transformers) integration has also improved the accuracy in the recommendation of courses based on textual data and user preferences (Devlin et al., 2019).

Several online learning systems based on AI have been created to aid online learning. MOOC platforms such as Udacity, Coursera, and edX make use of AI techniques for automated grading, course suggestions, and adaptive learning. The research by Deng et al. (2021) focuses on the use of AI to improve engagement and retention levels in online learning.

AI-powered IT training systems have revolutionized the learning environment with their ability to provide adaptive, intelligent, and personalized learning experiences. Research in the future must be directed towards enhancing AI models to make learning more adaptive, enhancing NLP capabilities for automated grading, and incorporating advanced techniques in deep learning for enhanced course suggestions. Further development in AI for education holds the promise of a more efficient and customized learning process for IT professionals and students alike.

Methodology

1.System and architecture design

The system is built using Stream-lit for a web-based interactive learning environment. It has:

- A Learner Profile section for collecting learner information.
- Mock exams with multiple-choice questions (MCQs) based on programming language and skill levels.
- Course Content selected dynamically according to the student's choice Adaptive Testing with recommendations according to the learners' performances.

2. User Profile Initialization

- Users provide their name, email, gender, and select the programming language that they wish to learn.
- The selected path of learning is stored in the session state for a personalized learning experience.

3.Adaptive Mock Exams & Personalized Learning

- The system categorizes the questions as Beginner, Intermediate, and Advanced levels.
- Relevant multiple-choice questions are dynamically pulled when a user selects a level of difficulty.
- Answers are stored in session state, allowing progress to be tracked in real-time.
- Automated grading calculates the user's score when submitted and suggests the next step.

4. Course Material Selection using AI

- Based on the programming language and level selected, the system retrieves the course material from a structured database.
- These include explanations of theories, samples of code, and practice exercises.
- Users can navigate through topics using previous and next buttons.
- If the user fails a test, the system suggests reviewing relevant topics before retaking the exam.

5. Smart Feedback & Suggestions

- A score is calculated dynamically when the exam is finished.
- If the user scores above 70%, they are promoted to the next difficulty level.
- Below 70% score, the system suggests that the user revisit the materials or repeat the test.
- On the most difficult level, the user is directed towards coding problems.

6. Practical Assessment & Coding Challenges

- Upon completing theory-based learning, users can attempt real-world coding problems.
- It allows for practical application and reinforces concepts learned in previous stages.

7. Continuous Learning and Progress Tracking

- Session-state variables track the user's progress along different learning paths.
- Users can revisit exams and material as many times as necessary.

- The system enables long-term learning through interactive quizzing and assessments.

Discussion:

1. System Description

The IT Training System based on AI has been designed to provide the learners with personalized learning experiences through interactive lessons, simulated exams, and automated tests. Developed on the basis of Streamlit, the system enables the learners to improve their programming skills in C++, Java, Python, and SQL.

2. Main Features and Functionalities

a) Personalized Learning Path

- The system collects information about the user (name, email, preferred programming language) to personalize the learning process.
- Users can select different programming languages and complexity levels (Beginner, Intermediate, Advanced).
- The system dynamically adjusts the learning content and tests based on user preferences.

b) Adaptive Mock Exams

- The system provides real-time assessment by using multiple-choice questions (MCQs).
- Questions are categorized into difficulty levels to match the user's skill level.
- The system tracks user progress, saves answers, and automatically calculates scores.
- Users with a score ≥70% are led to the next level; otherwise, they are asked to revisit the materials.

c) AI-based Course Material Delivery

Course content is dynamically loaded based on the chosen programming language and skill level of the user.

Each course includes:

i. Theory explanations of major concepts

ii. Code Examples for Hands-On Learning

iii. Structured topic progression navigation menus

d) Automated Feedback and Assessment

- The system automatically grades the user based on their scores in exams.
- Provides individualized recommendations, for example, reviewing previous topics or advancing to higher levels.
- Users can repeat the tests or go on to coding challenges based on their results.

e) Practical Coding Exercises

- After the theoretical learning, the users are able to attempt real-world coding problems.
- Coding problems provide hands-on implementation of the concepts learned.

Benefits:

1. Personalized Learning Paths: AI learns the strengths and weaknesses of individual learners and gives specific recommendations for increasing the efficiency of learning.
2. Real-Time Assessment and Feedback: The system provides real-time feedback on projects, coding assignments, and quizzes, allowing the user to learn and correct mistakes immediately.
3. 24/7 Access: Unlike traditional training programs, AI systems are available on a 24/7 basis, offering flexible learning opportunities.
4. Hands-on & Interactive Experience: Learners gain practical skills by using AI-driven simulations, coding platforms, and solving problems, all within settings that mimic real-world environments.
5. Scalability and Cost-Effectiveness: AI reduces the need for human trainers for IT basic training, making quality training more scalable and cost-effective.

6. Industry-Specific Training: The system keeps updating its content to reflect current industry trends, so the learners gain skills that are in demand.
7. Data-Driven Insights: AI tracks user performance and engagement, providing detailed analytics to enhance training programs and individual learning plans.

Conclusion:

The use of AI in IT training marks a significant step towards more efficient and effective learning. By providing individualized learning experiences, real-time feedback, and industry-focused training, our AI-driven system allows individuals to learn required IT skills at their own pace. The scalability, accessibility, and flexibility offered by AI-based training solutions enable the ability to stay ahead in the dynamic digital space. As technology progresses, AI-powered IT training will play a pivotal role in shaping the future workforce, bridging skill gaps, and fostering innovation in the technology industry.

References:

[1] Upadhyay, Ashwani Kumar, and Komal Khandelwal. "Artificial intelligence-based training learning from application." Development and Learning in Organizations: An International Journal 33, no. 2 (2019): 20-23.

[2] Harika, E. "AI Based IT Training System." (2024).

[3] Hollan, James D., Edwin L. Hutchins, and Louis Weitzman. "STEAMER: An interactive inspectable simulation-based training system." AI magazine 5, no. 2 (1984): 15-15.

[4] Xu, Min, DongAo Liu, and Yan Zhang. "Design of interactive teaching system of physical training based on artificial intelligence." Journal of Information & Knowledge Management 21, no. Supp02 (2022): 2240021.

[5] Chen, Zhisheng. "Artificial intelligence-virtual trainer: Innovative didactics aimed at personalized training needs." Journal of the Knowledge Economy 14, no. 2 (2023): 2007-2025.

[6] VLASOVA, Elena Z., Svetlana V. GONCHAROVA, Elizaveta A. BARAKHSANOVA, Natalya A. KARPOVA, and Tatyana S. ILINA. "Artificial intelligence for effective professional training of teachers in the Russian Federation." Revista Espacios 40, no. 22 (2019).

[7] Bogoviz, Aleksei V., Svetlana V. Lobova, Marina V. Karp, Evgeny V. Vologdin, and Alexander N. Alekseev. "Diversification of educational services in the conditions of industry 4.0 on the basis of AI training." On the Horizon 27, no. 3/4 (2019): 206-212.

[8] Yang, Shuiqiao, Kun Yu, Thorsten Lammers, and Fang Chen. "Artificial intelligence in pilot training and education–towards a machine learning aided instructor assistant for flight simulators." In International conference on human-computer interaction, pp. 581-587. Cham: Springer International Publishing, 2021.

[9] Landsberg, Carla R., Randy S. Astwood Jr, Wendi L. Van Buskirk, Lisa N. Townsend, Natalie B. Steinhauser, and Alyssa D. Mercado. "Review of adaptive training system techniques." Military Psychology 24, no. 2 (2012): 96-113.

[10] Chen, Boyuan, Mingzhi Wen, Yong Shi, Dayi Lin, Gopi Krishnan Rajbahadur, and Zhen Ming Jiang. "Towards training reproducible deep learning models." In Proceedings of the 44th international conference on software engineering, pp. 2202-2214. 2022.

[11] Bourahmoune, Katia, and Toshiyuki Amagasa. "AI-powered Posture Training: Application of Machine Learning in Sitting Posture Recognition Using the LifeChair Smart Cushion." In IJCAI, pp. 5808-5814. 2019.

[12] Lee, Yong-Jik, Robert O. Davis, and Jeeheon Ryu. "Korean in-service teachers' perceptions of implementing artificial intelligence (AI) education for teaching in schools and their AI teacher training programs." International Journal of Information and Education Technology 14, no. 2 (2024): 214-219.