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Design and Implementation of an AI-Based Digital Media Literacy Training Platform for English Teaching

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Abstract: ***This study presents an Artificial Intelligence (AI)-driven platform designed to enhance digital media literacy in English language education. By integrating natural language processing (NLP), deep learning, and reinforcement learning algorithms, the platform dynamically assesses users' competencies in information retrieval, critical analysis, and information integration. It employs multimodal data analysis to generate personalized training tasks and real-time feedback. Experimental results demonstrate robust performance under high concurrency, with significant improvements in users' critical thinking and information synthesis skills.***

Keywords: AI technology; Digital media literacy; English teaching; Personalized task generation; Competency assessment.

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1. Introduction

Digital media literacy has become a cornerstone of modern education, particularly in English teaching, where students must navigate and critically evaluate vast digital information [1]. Traditional pedagogical methods struggle to address individualized learning needs. This study bridges the gap by leveraging AI to create an adaptive platform that assesses learners' proficiency, tailors tasks, and tracks progress, thereby optimizing learning outcomes and fostering educational innovation.

1.1 Demand Analysis for AI in Digital Media Literacy Training

The core challenge in digital media literacy education lies in cultivating learners' ability to select, evaluate, and utilize digital information effectively [2]. Traditional teaching methods often fail to provide individualized guidance, leading to gaps in critical thinking and information processing skills.

2. Personalized Assessment

AI leverages big data analytics and machine learning to analyze learners' interactions, identifying strengths and weaknesses in real time. By processing behavioral data (e.g., task completion patterns, response accuracy), the system generates adaptive assessments that pinpoint specific skill deficiencies, such as bias detection or source credibility evaluation.

2.1 Multimodal Adaptation

Modern digital environments require fluency across text, images, audio, and video. AI integrates natural language processing (NLP) and computer vision to help learners decode complex media. For example, NLP models assess logical coherence in written arguments, while image recognition tools train students to interpret visual rhetoric in advertisements or infographics.

2.2 Dynamic Task Adjustment

A closed-loop feedback system continuously refines training content based on performance. If a learner struggles with fact-checking tasks, the AI reduces complexity and provides scaffolding (e.g., guided prompts). Conversely, proficient users receive advanced challenges, such as synthesizing conflicting sources. This ensures optimal cognitive load and sustained engagement.

By combining these approaches, AI transforms digital literacy training into a responsive, learner-centric process, equipping students with skills to navigate today's information-dense world.

The platform's layered architecture ensures seamless integration of AI capabilities with educational needs. The Data Layer securely aggregates multimodal inputs, including text responses, clickstreams, and media interactions, stored across distributed databases. In the Algorithm Layer, NLP pipelines and deep learning models process this data to generate competency profiles, adaptive tasks, and progress forecasts. The Functional Layer translates these insights into actionable features like real-time feedback and difficulty scaling. Finally, the User Interaction Layer delivers these functionalities through responsive web and mobile interfaces, maintaining accessibility across devices while offering intuitive dashboards that visualize learning trajectories and performance metrics. This modular design balances technical sophistication with pedagogical practicality.

3. Core Algorithm Development

3.1 Competency Assessment Algorithm

Feature Extraction: A weighted formula computes user competency vectors from multimodal data:

$$X = \sum_{i=1}^n \alpha_i f_i(D) + \beta \$$

where DD is input data, fi*fi* extracts features, and αiα*i* denotes dimension weights.

Dynamic Modeling: Long Short-Term Memory (LSTM) networks predict competency evolution:

$$S_{t+1} = \sigma(W_s S_t + W_h H_t + b_t) \$$

3.2 Task Generation Algorithm

A Deep Q-Network (DQN) optimizes task selection to maximize learning gains:

$$Q(S_t, T_t) = E\left[R_t + \gamma \max Q(S_{t+1}, T_{t+1})\right] \$$

Adaptive Difficulty: Tasks are adjusted based on real-time performance metrics.

3.3 Progress Tracking Algorithm

Combines Hidden Markov Models (HMM) and LSTM to model learning trajectories:

$$P(S_t | O_t) = \frac{P(O_t | S_t) P(S_t)}{P(O_t)} \$$

4. Functional Modules

The platform's functional modules work synergistically to deliver a comprehensive digital media literacy training experience. The Competency Assessment Module creates tailored evaluation tasks while capturing real-time behavioral metrics like interaction patterns and response times, converting raw data into actionable insights through detailed scoring frameworks. Simultaneously, the Task Generation Module crafts diverse multimedia exercises spanning textual analysis, visual interpretation and video evaluation, automatically calibrating difficulty levels based on continuous performance monitoring. Complementing these, the Progress Tracking Module employs advanced analytics to map learning journeys, forecasting skill development trajectories and generating customized improvement recommendations, thereby closing the feedback loop between assessment, training and growth measurement in a seamless adaptive learning ecosystem [3].

5. Platform Development and Testing

He platform was developed using a robust technical stack combining Python with TensorFlow/PyTorch for AI capabilities, React.js for responsive frontend interfaces, and Node.js with Express for scalable backend operations. PostgreSQL and MongoDB handled structured and unstructured data respectively, while Docker and Kubernetes ensured reliable deployment. Rigorous testing under high concurrency (1000+ users) demonstrated strong performance - task completion rates exceeded 96%, response times remained under 3.8 seconds, and user satisfaction averaged 8.8/10. Real-world implementation with 500 learners showed significant competency improvements, particularly in critical analysis (32.6% gain) and information integration (31.2% gain), validating the platform's educational effectiveness and technical stability.

6. Conclusion

This AI-powered platform demonstrates the transformative potential of technology in education. By automating personalized learning pathways, it not only elevates digital media literacy but also sets a benchmark for future AI-driven pedagogical tools. Future work could expand its application to broader disciplines or multilingual contexts.

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