IT4010 – Research Project - 2024

Topic Assessment Form

Project ID: 24-25J-082

1. Topic (12 words max)

Enhancing Interview Preparedness a Comprehensive Web Application Approach through Machine Learning.

2. Research group the project belongs to

Software Systems & Technologies (SST)

3. Research area the project belongs to

Machine Learning (ML)

4. If a continuation of a previous project:

Project ID	
Year	

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

In the competitive job market, effective interview preparation [1] is crucial for candidates aiming to secure positions in their desired fields. Traditional interview preparation methods, such as self-study and generic mock interviews, often fall short in addressing the specific needs and skill gaps of individual candidates. These conventional approaches lack the personalization, adaptability, and real-time feedback necessary for comprehensive skill development and confidence building.

Lack of Personalized MCQ Systems:

- Traditional MCQ systems [2] provide static questions that do not adapt to individual job roles or proficiency levels.
- Candidates require a dynamic system that tailors questions based on job roles and adjusts difficulty levels as they progress.
- Existing systems lead to inefficient preparation and suboptimal interview outcomes due to lack of personalization.

Limited Access to Real-World Interview Experience:

- Access to live interview practice [3] with industry professionals is limited.
- Current methods do not adequately simulate the dynamic nature of actual job interviews.
- A customizable live interview panel system [4] can provide realistic practice, helping candidates gain valuable experience and feedback.

Inadequate Showcase of Candidate Achievements:

- High-performing candidates struggle to effectively showcase continuous learning and achievements to potential employers.
- Traditional job application processes do not highlight candidates' progress and top performances adequately.
- A performance leaderboard and recruitment controlling system [5] can prominently display achievements, enhancing job placement rates.

Overwhelming Interview Preparation Content:

- The abundance of available content can overwhelm candidates, making it difficult to find the most relevant resources.
- Traditional methods [6] do not use advanced algorithms to tailor content to individual learning histories and preferences.
- Personalized video recommendations using machine learning models (Random Forest, Decision Tree, ANN) can ensure candidates access the most pertinent and effective materials.

The research aims to develop a comprehensive interview preparation platform that integrates these four components, leveraging machine learning techniques to offer personalized learning experiences and practical simulations. The platform seeks to enhance user readiness and job placement opportunities by bridging the gap between theoretical knowledge and practical interview skills through adaptive learning systems and real-time feedback mechanisms.

References

[1] D. J. Banner, "Qualitative Interviewing: Preparation for Practice.," *Canadian Journal of Cardiovascular Nursing,* vol. 20, no. 3, p. 27, 2010.

[2] S. K. S. Dhawaleswar Rao CH, "Automatic Multiple Choice Question Generation From Text: A Survey," *IEEE Transactions on Learning Technologies,* vol. 13, no. 1, pp. 14 - 25, 21 December 2018.

[3] M. Š. A. K. Christoph van Dülmen, "The Mobility Interview: Triangulating Interview and Global Positioning System Data to Explore the Role of Mobility in Everyday Life," *International Journal of Qualitative Methods,* vol. 23, 28 May 2024.

[4] M. B. F. M. M. Charl de Villiers, "Qualitative research interviews using online video technology – challenges and opportunities," *Meditari Accountancy Research,* vol. 30, no. 6, 13 October 2021.

[5] M. S. F. A. A. Iqra Obaid, "Gamification for Recruitment and Job Training: Model, Taxonomy, and Challenges," *IEEE Access,* vol. 8, pp. 65164 - 65178, 30 March 2020.

[6] P. G. a. K. K. P. I. K. Semarayasa, "Video tutorial-based learning media: A solution to assist students in learning sepaksila sepaktakraw skills," *Journal Sport Area.,* vol. 8, no. 1, p. 76–86, 27 March 2023.

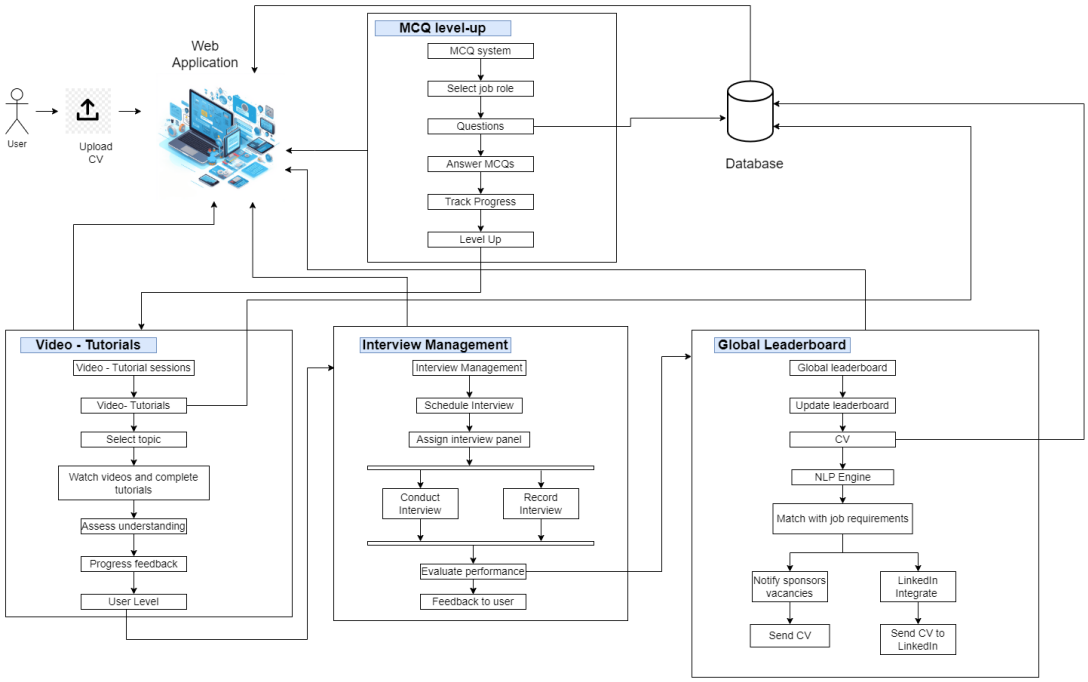
6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

Nature of the Solution:

This web application offers a comprehensive approach to interview preparation. It combines:

- **Machine learning for personalized learning:** MCQ level progression, appointment scheduling, and video recommendations are all customized based on user interaction and progress.
- **Real-world practice:** Users can practice interviews with a live panel, simulating a real interview scenario.
- **Job placement opportunities:** Top performers are automatically matched with potential employers through sponsor companies.
- **Performance evaluation and guidance**: The leaderboard provides feedback on user performance, and video recommendations help users target improvement areas.

This solution addresses the need for effective interview preparation by providing a platform that combines personalized learning, real-time practice, and potential job placement opportunities.



7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

Specialized Domain Expertise:

Educational Technology and ML Algorithms: Proficiency in educational technology is crucial for designing effective learning experiences tailored to interview preparation. Expertise in ML algorithms such as decision trees, artificial neural networks (ANNs), and natural language processing (NLP) is essential for developing adaptive learning systems and recommendation engines.

Interview Preparation Methodologies: In-depth knowledge of interview processes across various industries enables the design of realistic simulations and assessment criteria. Understanding user behavior analytics helps in optimizing user engagement and learning outcomes through personalized content delivery.

UX/UI Design: Skills in user experience (UX) and user interface (UI) design are necessary for creating intuitive interfaces that enhance user interaction and learning effectiveness.

Knowledge Requirements:

Data Handling: Proficiency in managing diverse datasets, including comprehensive question banks categorized by job roles and difficulty levels, user interaction data for training ML models, CV datasets for NLP-based analysis, and recruitment data for performance evaluation.

Algorithm Optimization: Ability to optimize ML algorithms for scalability, accuracy, and efficiency in real-time applications. This includes ensuring data privacy compliance and adapting algorithms to handle large volumes of user data effectively.

Data Requirements:

Question Bank: A comprehensive repository of MCQs categorized by job roles and difficulty levels is essential for providing tailored learning content.

User Interaction Data: Capturing and analyzing user interactions with the platform to personalize learning paths and optimize the user experience.

CV Datasets: Datasets containing CV information for users, which are analyzed using NLP techniques to match candidate skills with job requirements.

Recruitment Data: Access to recruitment data for validating the effectiveness of the platform in enhancing job placement opportunities based on user performance.

8. Objectives and Novelty

Main Objective

The main objective of this research is to create an innovative interview preparation platform using machine learning. This platform will provide personalized learning experiences and practical simulations through components such as personalized MCQs, live interview panels, performance analytics, and intelligent video recommendations. By doing so, the research aims to improve user readiness and increase job placement opportunities by bridging the gap between theoretical knowledge and practical interview skills.

Member Name	Sub Objective	Tasks	Novelty
Pathirana V.P.E.P.V	Providing a live interview panel for the users	• Requirement Analysis and Data Collection: Gather user requirements for panel member selection, including necessary skills and experience. Collect data on available panel members, including their skills, experience, and availability. • Feature Extraction and Preprocessing: Extract relevant features from user requirements and panel member profiles. Preprocess the data to ensure consistency and	• The novelty of this interview practice platform component lies in its unique integration of machine learning to create a customized and efficient interview preparation experience. By utilizing decision tree models or artificial neural networks (ANN), the system intelligently matches users with appropriate panel members based on specific requirements, ensuring highly relevant and effective practice

		accuracy, removing any inconsistencies or errors. • Machine Learning Model Development: Develop and train decision tree or ANN models to match users with appropriate panel members based on their requirements. Train models to recommend relevant questions from the question bank for the practice sessions. • Booking System Implementation: The trained ML models into the booking system to enable users to book appointments with selected panel members. Ensure the system can handle payment processing and appointment scheduling. • Zoom Link Generation and Scheduling: Implement functionality to automatically generate Zoom links and schedule appointments based on the	sessions. The system's ability to automatically generate Zoom links and schedule appointments simplifies the process, offering a seamless user experience. Additionally, incorporating a question bank with machine learning enriches the platform, making it adaptable to various skills and requirements and significantly improving traditional interview preparation methods.

		availability of panel members and user preferences. Ensure the system sends notifications and reminders to both users and panel members.	
Senevirathna D.M.O.C.	MCQ LevelUp Controlling	• Data Collection and Preprocessing: Gather a diverse, categorized question bank (job roles and difficulty levels). Clean and standardize MCQ data, removing duplicates and correcting errors. • Feature Extraction and Selection: Extract features from MCQs (topic tags, difficulty, job roles, question type, answer choices, explanations). Select features that enhance engagement and personalized learning paths. • Training Data Preparation and Model Development: Split the dataset into balanced training and testing sets. Use machine learning to classify MCQs by	• The novelty of the MCQ Levelup Controlling component lies in its innovative use of machine learning to create a dynamic and personalized interview preparation experience. By employing supervised learning for initial question classification and reinforcement learning for real-time difficulty adjustment, the system adapts to user performance, ensuring a continuous and appropriate level of challenge. This personalized progression, combined with comprehensive feedback, enhances user engagement and effectively simulates real-

		job roles and difficulty levels, optimizing the adaptive learning algorithm. • Model Evaluation, Validation, and Novelty Analysis: Assess model performance (accuracy, precision, recall, F1 score) and validate difficulty recommendations. Validate the system on diverse users, testing robustness in tailored MCQ recommendations. Analyze the novelty compared to traditional question banks, highlighting real-time difficulty adjustment and personalized learning paths.	world interview scenarios. The component's ability to scale across various job roles and industries further underscores its versatility and advancement over traditional static question banks, significantly improving the efficiency and effectiveness of interview preparation.
Kavindya N.D.D	Intelligent Video Recommendation	• Data Gathering and Preprocessing: Compile and prepare user data, such as viewing and interaction histories, as well as explicit user preferences. • Model Training: Using the preprocessed data, train the Random Forest, Decision Tree, and ANN models. This entails optimizing the	• In the context of interview preparation, the Intelligent Video Recommendation System presents a revolutionary method of personalized learning. The system combines many machine-learning models, including Random Forest, Decision Tree, and

		performance of every model to guarantee the best possible prediction of customer preferences. • Real-Time Recommendation Generation: Based on the user's current profile and interaction behaviors, real-time video suggestions are generated using the trained models. • Continuous Learning and Adaptation: To enhance and increase the recommendations' accuracy over time, update the models on a regular basis with new user data. • Integration of User Feedback: Take into account user feedback to modify recommendations and improve the system's ability to respond to user demands. • Performance Monitoring: Keep a close eye on the recommendation system's operation to make sure it satisfies predetermined standards for user happiness and accuracy.	Artificial Neural Network (ANN), to produce a wide range of highly accurate and personalized video recommendations by utilizing the advantages of each model. Through ongoing analysis of the user's viewing behavior and interaction patterns, our system dynamically adjusts to the user's growing learning needs and preferences, unlike traditional recommendation systems that rely solely on user-supplied preferences or simple algorithms. By using many models, the performance is stable for a variety of user profiles, which improves the recommendations' efficacy and personalization. The system's ability to recognize intricate, non-linear patterns in user behavior is made possible by the creative

			application of ANN, which gradually raises suggestion accuracy. This all-inclusive and flexible suggestion system is especially innovative for platforms that help candidates prepare for interviews, where users' satisfaction and results can be greatly impacted by personalized material distribution.
Sathkumara S.M.P.U.	Performance Leaderboard and Recruitment Controlling	• Requirement Analysis and Data Collection: Gather user requirements for CV analysis and job matching, including skills, experience, and preferences. Collect data on available job opportunities provided by sponsor companies and their requirements. • CV Analysis and Matching with Sponsors: Develop NLP algorithms to analyze users' CVs and extract relevant information. Match users' CVs with sponsor companies' job	• The uniqueness of this interview preparation platform component stems from its innovative incorporation of machine learning, which enhances user experience and boosts job placement prospects. By leveraging Natural Language Processing (NLP), the system intelligently analyzes users' CVs and matches them with relevant job opportunities provided by sponsors (IT companies). The real-

		requirements using machine learning techniques. • Performance Tracking and Leaderboard Management: Track users' performances in tutorials, videos, MCQs, and interviews. Develop algorithms to calculate overall performance scores and update the global leaderboard in real-time. • Automated CV Submission to Sponsors: Implement functionality to automatically send top performers' CVs to sponsor companies for available vacancies. Ensure seamless integration with sponsor companies' recruitment systems for efficient job placement. • CV Suggestions through LinkedIn: Develop algorithms to suggest users' CVs to companies through LinkedIn based on their performance. Ensure	time global leaderboard tracks users' performances across various activities, such as tutorials, videos, MCQs, and interviews, providing immediate feedback and motivation. Moreover, the automatic suggestion of users' CVs to companies through LinkedIn based on their performance further enhances their chances of securing employment, creating a seamless and efficient job placement process.

		compliance with LinkedIn's API guidelines and data privacy regulations. • User Engagement and Gamification: Incorporate gamification elements such as badges, rewards, and challenges to enhance user engagement and motivation. Develop interactive features to encourage users to participate actively in the platform's activities. • Continuous Improvement and Feedback: Collect user feedback to identify areas for improvement in the platform's functionalities. Iterate on machine learning models and algorithms to enhance accuracy and effectiveness over time.	

9. Supervisor checklist

a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes	y	No	

b) Does the proposed topic exhibit novelty?

Yes	y	No	

c) Do you believe they have the capability to successfully execute the proposed project?

Yes	y	No	

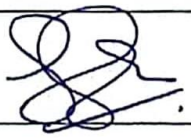
d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes	y	No	

e) Supervisor's Evaluation and Recommendation for the Research topic:

Research will help Students to be able to face interviews and perform well.

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Mr	Harshanath	SMB	SMBHarshanath
Co-Supervisor	Dr.	HARSHA DA	FERNANDO	
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

Harshanath SMB<harshanath.s@sliit.lk>
To: Pathirana V.P.E.P.V it21175084

Sun 6/23/2024 10:04 PM

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458 KB

[EXTERNAL EMAIL] ***This email has been received from an external source – please review before actioning clicking on links, or opening attachments.***

Dear Pathirana,

Accept the Proposed project.
Consider as signed by myself, in the TAF.

best regards,

SLIIT UNI
THE KNOWLEDGE UNIVERSITY
ICAC

Buddika Harshanath
Lecturer
SLIIT | Metro Campus
Department of Information Technology
Faculty of Computing
MIEEE, MCSSL, MCAD, MSc in IT(SLIIT)

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Topic Assessment Form

<u>This part is to be filled by the Topic Screening Panel members.</u>

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

The Review Panel Details

Member's Name	Signature

*__Important__:

1. According to the comments given by the panel, make the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.
2. If the project topic is rejected, identify a new topic, and follow the same procedure until the topic is approved by the assessment panel.