V-Tutor

Project milestone-1

**-Tech Innovators**

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**Abstract:**

The goal of our initiative is to use emerging technology to ensure that all students receive an equitable and excellent education, regardless of where or how they learn. Not all pupils throughout the world receive a great education. This project proposes a Virtual AI Avatar designed to improve students' interview preparation for placements and internships. It enables students to obtain information in several sectors of interest while also preparing them for an interview for their placement or internship by taking mock interviews. The avatar employs powerful natural language processing and machine learning to provide a realistic and personalized simulation of interview settings. Students can also use this to prepare for examinations. We may upload a pdf from which the avatar can respond to any questions that students may have, as well as offer them questions to assess their level of preparedness. Our previous initiative "VirtueHire" is aimed at employers and may be utilized to hire a skilled applicant, whereas this project allows students to prepare for interviews.

**Introduction:**

Addressing the worldwide problem of educational equity, particularly in higher education and job placement preparations, reveals a considerable need for tailored learning and suitable assistance. Traditional techniques and restricted teacher availability frequently leave students unprepared for job interviews, despite their enthusiasm to study and achieve. According to observations from educational experiences in India, a lack of preparation and assistance are major barriers to job advancement. To address these challenges, the creation of "V-Tutor," a virtual AI avatar chatbot, stands out as a unique solution. V-Tutor mimics one-on-one teaching sessions, using the capabilities of open LLM models and a Firebase Realtime database, to provide students with a more effective, interactive learning experience. This technology is intended to bridge the gap in tailored support by allowing for personalized question-and-answer sessions that can dramatically improve interview preparation and overall learning results, seeking to better prepare students for their future employment.

**Literature/Background Study:**

Recent educational technology research highlights the rising relevance of individualized learning environments. Hwang and Lai [1] state that customized learning systems adapt to the demands of individual learners, increasing engagement and outcomes. The use of technology in education, particularly AI and machine learning, has yielded encouraging results in personalizing learning experiences to individual preferences and learning speeds[2]. Also, according to N. Boudjani, V. Colas, C. Joubert and D. B. Amor [3], it is very important to gather more information about the candidate before a job interview. It was a contemporary work by the authors. Their idea was great. However the only drawback was, the developed model was only able to process things in French Language. But in V-Tutor, we are building the application with English as the base language and also support multiple other languages, so that, it will be easily accessible for everyone. Also, we will be focusing more on the human like interaction using the virtual avatar. The use of AI in education has proven transformational, allowing adaptive learning systems to respond to the learner's knowledge level, preferences, and learning speed. Holmes et al. describe how AI-powered systems may give real-time feedback [4], tailored teaching, and adaptable learning routes, therefore dramatically improving the learning experience. AI chatbots, in particular, have been highlighted as excellent tools for engaging students in interactive learning activities, providing prompt replies, and creating a more dynamic learning environment [5]. The use of virtual avatars in educational settings has been investigated for its potential to improve student engagement and create a more immersive learning environment. Veletsianos et al. discovered that virtual avatars may function as social actors in learning environments, providing a feeling of presence and personal connection that boosts motivation and engagement [6]. Furthermore, Kim et al. [7] found that virtual avatars may successfully simulate human-like interactions, making them useful in distant and digital learning situations. While the use of AI and virtual avatars in education has obvious advantages, issues such as data privacy, ethical considerations, and the digital divide remain major concerns [8].

**A person in a brown suit

Description automatically generatedProposed Model:**

Fig.1 Proposed Model Sketch

This Proposed Model Sketch (Fig.1) depicts a method for interviewing applicants. Here are the main components:

***Candidate Interaction:***

The "Candidate" interacts with the "V-TUTOR UI application" developed using React, SASS, and Webpack. The candidate's spoken utterances are transformed to text via Google's Speech to Text service.

***Processing and Evaluation:***

The Python Flask backend processes and evaluates the received text. There are links to "LLAMA 2" and "GAN," which may be used to generate responses or evaluate the candidate's answers.

***Text to Speech Conversion:***

Responses are transformed to voice using Google's Text to voice tool. The "Documents" box contains interview-related documents (e.g., React, Python, Angular, Java).

A diagram of a document flow

Description automatically generated

Fig.2 Architecture Diagram

Figure 2 shows the architecture design of an Automated Question Answering System. Here's a breakdown of the procedure:

* **Document Input:** The system begins with documents as input. These can include various materials, such as React, Python, Angular, Java interview and tutorial PDFs.
* **Text Extraction:** The Python PDF Plumber module is used to extract text from PDF files.
* **Question and Answer generation:** Machine Learning, especially BERT Transformers, is used to produce questions and answers based on extracted text.
* **Automated Question Answering System:** The created questions are supplied into the Automated Question Answering System, which includes a Document Retriever and Document Reader. The Document Retriever locates relevant documents depending on the inquiry, and the Document Reader scans them to obtain a response.

**System Definition (Functional Requirements):**

**Virtual AI Avatar Chatbot:** Provides users with an immersive and adaptable learning environment for interview preparation by using a sophisticated conversational AI system that uses natural language processing (NLP) techniques to simulate human interaction.

**Contextualized Interview Preparation:** This method ensures contextual relevance and depth of understanding by dynamically generating interview questions and replies based on the user's selected topic [9]. It makes use of sophisticated machine learning models, such as LLAMA2.

**Integration with Firebase Realtime Database:** Optimizes resource utilization in the Google Colab environment by utilizing Firebase Realtime Database as a NoSQL cloud-based solution and effective data synchronization techniques to enable seamless storage and retrieval of application data and user-generated content.

Fig.3 System Definition

**The Intelligent Resource Routing System:** Uses a combination of machine learning-driven prediction models and heuristic-based scheduling algorithms to intelligently distribute GPU resources that are accessible in cloud environments, resulting in optimal performance and fair resource allocation for users.

**Integration with PDFLlama:** This feature integrates PDFLlama, a cutting-edge document processing tool driven by natural language understanding (NLU) algorithms, to facilitate quick information extraction, indexing, and retrieval from PDF documents [9]. This improves the accessibility and searchability of interview-related content kept in PDF format.

**Multilingual Support:** Uses multilingual NLP models and language translation APIs to enable communication and content delivery in the users' preferred languages. Robust localization and internationalization processes are incorporated to give seamless support for many languages.

**Customizable Avatars:** Provides a wide range of possibilities for creating a customized avatar, making use of sophisticated graphics rendering techniques and avatar creation tools to improve user engagement and customisation, ultimately leading to a more personalized and immersive learning environment [10].

**Lively Interaction:** This technology simulates a realistic and captivating interview setting by integrating speech synthesis and voice modulation to enhance user engagement [11]. Avatars may then dynamically narrate information and engage users in interactive discourse.

**Interview Preparation:** Offers a full range of materials and tools for interview preparation, such as practice questions, performance statistics, and simulated interviews [11]. This allows users to polish their interviewing techniques and gain confidence for actual situations.

**Demo Video:**

We have created a quick demo video to showcase the virtual avatar will be used for human like interaction.

Link to video: <https://drive.google.com/file/d/1NtzGXtXfXavO0DahEOD-EL8UhRDbbP0o/view?usp=sharing>

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