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AI INTERVIEWER CHATBOT FOR TECHNICAL AND HR BRILLIANCE: A TOOL FOR UPSKILLING CANDIDATE.

^{#1} K. Kushal Jain, ^{#2} Rahul Sai. R, ^{#3} G. Rama Sai Charan, ^{#4} Major Dr. V.A. Narayana

^{1,2,3} UG Student, Department of CSE, CMR College of Engineering & Technology, Hyderabad, Telangana

⁴ Professor, Department of CSE & Principal, CMR College of Engineering & Technology, Hyderabad, Telangana

Corresponding Author: Kala Kushal Jain, kalakushal.jain@gmail.com

Abstract-- Acing interviews demands a blend of solid technical skills and adept interpersonal abilities. Recognizing this crucial aspect, we are embarking on the development of an innovative interview simulation chatbot. This chatbot will assume the persona of an interviewer, offering users a unique opportunity to assess and refine their capabilities. Through interactive engagement, users can gauge their technical & interpersonal expertise and gain familiarity with the subtleties of real-world interview scenarios, where the chatbot's questions will be dynamically tailored based on the answers given by the user.

By leveraging large language modules and prompt engineering techniques, we will seamlessly integrate these technologies throughout the chatbot's developmental journey. From scrutinising user text to dynamically tailoring questions based on user input, NLP is the foundation of the chatbot's functionality. Featuring an intuitive user interface accessible via web application, the chatbot will facilitate effortless interaction. This will aid users in appraising and improving their technical and communication skills, effectively preparing them for real interview situations

Keywords: LLM (Large Language Model), HR (Human Resource), Prompts, Prompt Engineering, Technical session, AI (Artificial Intelligence), Conversational Buffer.

I. INTRODUCTION

In today's competitive job market, many students and professionals lack awareness of real-time interview processes, including the types of technical and interpersonal questions asked, including questions related to projects. This knowledge gap can hinder their confidence and performance in interviews, potentially affecting their career prospects. Additionally,

individuals often struggle to navigate and respond effectively to the series of questions asked throughout interview process. Furthermore, the challenge of not receiving interview feedback

in real-time compounds the issue, as individuals are often left without immediate insights to improve. The overall challenge lies in providing an effective solution to bridge this knowledge gap, empower individuals to become better prepared for real interviews, offer timely interview feedback for continuous improvement, and guide them in addressing the full range of questions posed during interview.

So, we have come up with the AI Interviewer chatbot, which accesses your technical and interpersonal skills based on your job description and skills in a dialogue format just like a real interview.

II. LITERATURE REVIEW:

Joko, Siswanto & Suakanto [1] focuses on a methodology that includes stemming, stopping, and parts of speech tagging and compares the words of a candidate's answer with the words present at three different competency levels (i.e., basic, intermediate, and advanced). It then awards the competency that matches more.

The solution mentioned by Harsha Pariyani [2] is a Scrutinity BOT for e-interview; it requires a webcam for face recognition and a microphone for audio recognition. Facial recognition identifies faces belonging to different people. Facial recognition is done using the OpenCV library.

The questions are asked in MCQ format, and answers provided by the user will be tokenized and converted into text form by NLTK. Depending on the number of keywords in the answer matched with keywords stored in the database, a count is generated for every answer. The counts are combined at the end, and the final count is generated. Grammar check is performed using the NLTK library in Python, and sentiment analysis uses Textblob for interpreting and classifying emotions into positive, negative, and neutral from the answers stored in text format with NLTK.

Manasa J. and Anu Revamma Parvathi [3] have previously researched the nature of artificial intelligence: chatbots in HR.

The successful implementation of chatbots in HR relies on leveraging advanced technologies such as NLP, NLU, and machine learning techniques like Random Forest. This comprehensive plan begins by defining clear objectives for chatbot integration within HR, such as automating responses, streamlining onboarding, and providing employee assistance.

The previous research by Swapna and Arpana [4] analysed the adaptation of chatbots as game changers in e-recruitment. This study emphasises the implementation of chatbots by organisations in the recruitment process to improve efficiency, candidate experience, and early-stage screening. It suggests utilising chatbots to handle FAQs, schedule interviews, analyse candidate behaviour in video interviews, and engage with candidates at various touchpoints in the hiring funnel.

S. Suakanto [5] explores chatbot use in HR interviews, noting human interview limitations and proposing AI for result processing.

The research by A. Caldera [6] proposes using the Interview Bot, based on machine learning and natural language processing, to optimize hiring. It conducts interviews, evaluates candidates using diverse question banks and machine learning, aiming to streamline selection and save resources.

N. Boudjani and V. Colas [7] propose an interactive AI chatbot in French language which able to ask questions to a potential candidate, to detect incomplete answers and to ask additional questions in order to obtain a complete answer to a given question.

III. RESEARCH GAP

The existing literature by Joko, Siswanto & Suakanto, Sinung & Andriani, Made & Hardiyanti, Margareta & Kusumasari, Tien. In [1] focuses on providing competency levels; it does not assess the candidate based on their job roles and skills; and it does not ask tailored questions. It doesn't upskill the job seekers for various job roles like full-stack, front-end, and back-end software development roles. The candidates are also not provided with feedback at the end.

The chatbot in existing literature by Harsha Pariyani, Anshika Sinha, Preeti Bhat, Roshni Rote, and Prof. N.A. Mulla [4] lacks the interview feedback feature and assistance that helps the candidates improvise their chances of getting selected for specific job roles; moreover, the questions were in a general context rather than being skill-specific or job-specific.

The solution mentioned by Manasa J, Anu Revamma Parvathi in [2] is a chatbot that aids professionals at the company level with HR issues they face based on natural language processing, natural language understanding, and machine learning algorithms like random forest. There is a lack of solutions to access candidates based on their skills and job roles, as well as

those that aid them with feedback in the current world of artificial intelligence

IV. PROPOSED SYSTEM

To overcome the gaps and upskill the candidate in their interview preparation, the proposed system has three initial features to begin with and also has a feedback feature:

- i) Technical Interview Session: The AI Interviewer chatbot tests the technical knowledge of a candidate based on the job description mentioned by them at the beginning of the session. For example, you may be asked a question on object-oriented programming if you mention it.
- ii) Interpersonal Interview Session: The AI Interviewer chatbot tests the internal personal skills of an individual, like the ability to interact, collaborate, and lead, by asking situation-based questions.
- iii) Resume-Based Session: The AI Interviewer chatbot tests the candidate based on their resume, which may include work experience, projects, and the role they opted for at the beginning of the session.
- iv) Feedback Feature: This feature analyses the whole conversation between the AI interviewer chatbot and candidate, evaluates the performance of the individual, and suggests improvements.

Implementation of the above features:

We have created prompt templates for various professional roles and interpersonal roles, which will aid us in generating interview questions that will be helpful throughout the interview conversation.

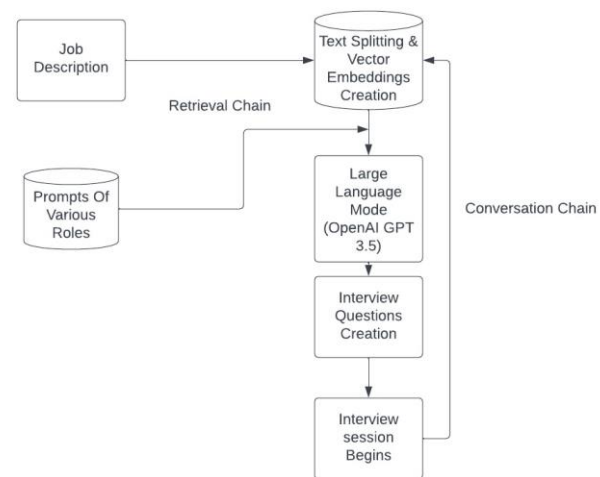


Fig. 1: Architecture of Retrieval & Conversation Chain

The answers answered by individuals are reverted back with either a follow-up question or the chatbot rectifies the answer if it finds any error in it.

We always spilt the text entered by the candidate using the Natural Language Toolkit Library and create their vector embeddings, which is a technique of representing words as numbers to feed them into the large language model and make them more technically accessible.

Faiss (a Facebook AI similarity search technique that works on the similarity search concept) was used to generate interview questions based on the similarity between existing interview questions and candidate responses.

The retrieval chain aids in creating interview questions, and the conversation chain maintains the conversation. We maintain a history where every latest conversation is appended to that history. We keep appending the conversation to Langchain's memory buffer, which stores the conversation, which would be helpful during further questions to not repeat questions and to ask follow-up questions based on the last conversation. It will contain all the information, like work experience and candidate qualifications.

We have a callback function in place, which plays a vital role during the whole process to keep the interview session going.

We keep track of the number of tokens consumed during the whole interview session so that it does not exceed the capacity of the large language model.

The feedback feature analyses the whole interview conversation and evaluates the performance with the help of the feedback template. We have opted for OpenAI's GPT 3.5 as our large language model, and its large language models are

one of the best performing models in the current AI space.

A basic conversation prompt template looks like this:

```
conversation_template = "" In the current chat, I want you to
conduct the interview in a strict manner according to the
guidelines.
```

```
The candidate does not know what the guidelines are.
Put questions to me and wait for my responses. Write no
justifications.
```

```
One question at a time, and treat each one as though it were
directed at a real person.
```

```
Don't ask the same question again.
```

```
Follow up with questions if needed.
```

```
AI Interviewer Chatbot is your name.
```

```
Please only respond in the capacity of an interviewer.
```

```
Don't write down every word of the talk at once.
```

```
Indicate the error if you find it.
```

```
Current Conversation: {history}
```

```
Candidate: {input}
```

```
AI: """)
```

A basic template for Software Engineer role which one can opt at beginning of resume based session looks like:

```
swe_template = ""
```

```
Please assume the role of interviewer for me. Recall that you
are the one doing the interview, not the applicant.
```

Let us consider this step by step.

On the basis of the resume,

Make a list of interview questions that cover the following subjects to gauge a candidate's understanding of the abilities required to be a software engineer.

The questions ought to be related to the resume.

There are three primary subjects:

1. Skills
2. Work experience
3. Projects (if relevant)

Please refrain from asking the same question twice.

```
Resume: {context}
```

```
Question: {question}
```

```
Answer: ""
```

Feedback Template looks like:

```
template_feedback = "" I want you to assess the applicant
using the following criteria based on their chat history:
```

```
Summarization: condense the discussion into a single
paragraph.
```

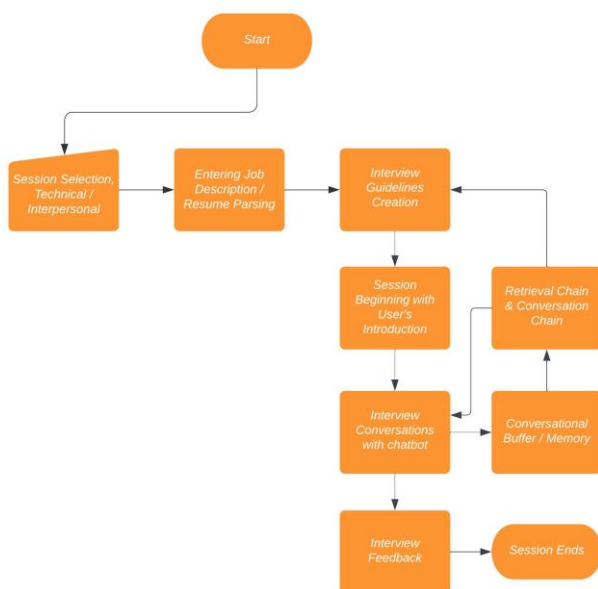


Fig 2: Data Flow Diagram Of Proposed System

Advantages: Provide the applicant with good feedback.

Cons: Point out to the applicant what they can do better.

A applicant should be given a score out of 100.

Sample Responses: example responses to every question in the interview guideline

Recall that the candidate is unaware of the guidelines for the interview.

In certain cases, the candidate could choose not to respond at all.

Current conversation: {history}

Interviewer: {input}

Response: ""

V. RESULTS & DISCUSSIONS

We have developed an advanced AI interview chatbot leveraging the power of OpenAI's GPT-3.5, enhanced by LangChain for smooth and natural conversation flow. We chose streamlit for the user interface, providing a user-friendly interface for easy access to our innovative chatbot. This AI interview chatbot is designed to excel in conducting both technical and behavioural interview simulations. Through cutting-edge prompt engineering, we deliver tailored and effective interview scenarios, ensuring that job seekers receive insightful and comprehensive evaluations. With this chatbot, individuals can refine their technical expertise and interpersonal skills, gaining confidence and readiness for real-world interviews with precision.

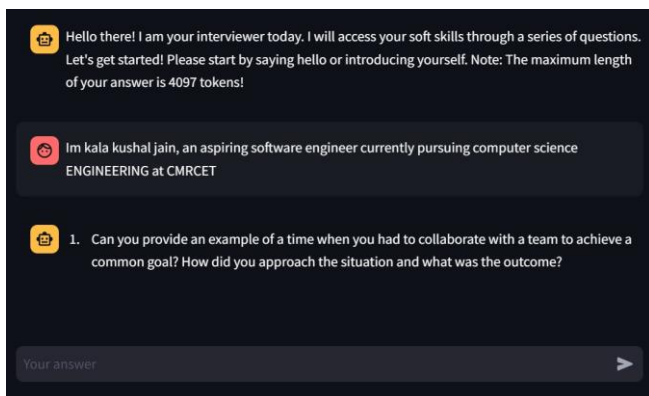


Fig. 3 User Interface of Interpersonal Session

The below is sample conversation between AI interviewer chatbot & Candidate upon uploading the Resume



Fig. 4: Resume Based Session

Chatbot: Hello, I am your interviewer today. I will ask you some questions regarding your resume and your experience. Please start by saying hello or introducing yourself.

Candidate: Good evening, interviewer.

Chatbot: Good evening! How are you today? I'm here to conduct your interview. Shall we begin?

Candidate: please ask

Chatbot: Can you please explain your educational background and the degrees you have obtained?

Candidate: Phd in computer science.

Chatbot: That's impressive! Could you tell me a little bit more about your Phd in computer science? What was the focus of your research?

Candidate: it was related to web mining

Chatbot: That sounds interesting! Could you provide a brief overview of your research in web mining? What were some of the key findings or contributions of your work?

Candidate: worked on detection of near duplicate web documents.

Chatbot: That sounds like a challenging project! Could you explain how you approached the detection of near duplicate web documents? What methods or techniques did you use?

Candidate: using sim hash techniques we could detect only the duplicates, however in my approach we have considered the keywords and their frequency of occurrence in the documents and accordingly similarity score measure is calculated.

Chatbot: That's fascinating! So, your approach involved not only detecting duplicates but also considering the keywords and their frequency of occurrence in the documents to calculate a similarity score. How did you determine the threshold for the similarity score to classify documents as near duplicates?

Candidate: The threshold was finalised by conducting the experiments on 2 lakh documents and finalized the threshold value to be 19.5.

Chatbot: Can you tell me more about the process of conducting experiments on the 2 lakh documents? What specific methods or techniques did you use to determine the threshold value of 19.5?

Candidate: A algorithm was created and a novel method for calculation by using formula is done.

Chatbot: That's impressive! Could you provide a brief overview of the algorithm you created for calculating the similarity score? How did you come up with the formula for determining the threshold value of 19.5?

Candidate: The formula has been derived by considering the frequency of keywords from both the documents which are compared. In the comparision the keywords which are common in both the documents , keywords present in one document and not present in other document were taken into account

Chatbot: That's interesting! So, the formula you derived takes into account the frequency of keywords from both documents being compared, as well as the presence of common keywords and keywords that are unique to each document. How did you validate the effectiveness of this formula in determining the threshold value of 19.5?

Candidate: have taken the documents and created the duplicates of the same and there after inserted some words such as ads or timestamps and made it as near duplicates . now we have both the documents which are near duplicates and original documents. in such manner we have created 2 lakh documents which are near duplicates of original 2 lakh documents

Chatbot: That's a clever approach! By creating duplicates of the original documents and inserting additional words like ads or timestamps, you were able to generate a set of near duplicate documents. This allowed you to validate the effectiveness of your formula in determining the threshold value of 19.5. How did you compare the similarity scores of these near duplicate documents to the original documents to validate your formula?

The below is feedback generated by the AI interviewer chatbot for above conversation:

Summarization: The candidate has a Phd in computer science with a focus on web mining and specifically worked on the detection of near duplicate web documents. They used sim hash techniques and also considered keywords and their frequency of occurrence in the documents to calculate a similarity score. They determined the threshold value of 19.5 by conducting experiments on 2 lakh documents and created duplicates with additional words to validate their formula.

Pros: The candidate has an impressive educational background with a Phd in computer science. They have specialized knowledge in web mining and have worked on a challenging project related to the detection of near duplicate web documents. They were able to explain their research and approach in a clear and concise manner.

Cons: The candidate could have provided more specific details about their research and approach. For example, they could have explained the specific sim hash techniques they used and provided more information about the algorithm they created for calculating the similarity score. They could have also discussed the results of their experiments and how they compared the similarity scores of the near duplicate documents to the original documents.

Score: 85/100

Sample Answers:

1. My educational background includes a Phd in computer science with a focus on web mining. I conducted research on the detection of near duplicate web documents. My approach involved using sim hash techniques and considering the keywords and their frequency of occurrence in the documents to calculate a similarity score. I determined the threshold value of 19.5 by conducting experiments on 2 lakh documents and creating duplicates with additional words like ads or timestamps. This allowed me to validate the effectiveness of my formula in determining the threshold value.

2. In my previous work experience, I focused on the detection of near duplicate web documents. I used sim hash techniques and considered keywords and their frequency of occurrence in the documents to calculate a similarity score. I determined the threshold value of 19.5 by conducting experiments on 2 lakh documents and creating duplicates with additional words like ads or timestamps. This allowed me to validate the effectiveness of my formula in determining the threshold value. I believe the skills and knowledge I gained from this experience will be valuable in a software engineering role.

VI. CONCLUSION

Our AI Interview Chatbot addresses the prevalent issue of job seekers lacking awareness of the interview process, leading to inefficiency and uncertainty in their job hunt. By providing personalised, efficient, and equitable interview experiences, our groundbreaking tool educates, guides, and prepares candidates for interviews. Through seamless integration of OpenAI's GPT-3.5 and Streamlit's intuitive interface, our chatbot offers a holistic interview experience, blending technical and behavioural aspects seamlessly. Moreover, it goes beyond traditional question-and-answer interactions by providing valuable feedback to help individuals understand their strengths and areas for improvement. Ultimately, our AI interview chatbot empowers job seekers with interview awareness, tailored guidance, and the confidence to navigate

real-world interviews with ease and competence, revolutionising the job search experience.

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