Colloquium

A Career Guidance Support AI system
Web Project

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Under the guidance of Dr. Apash Roy

Please introduce your project

- In today's dynamic job market, individuals often face challenges in navigating career paths and making informed decisions regarding their professional development.
- The overwhelming amount of available information makes it difficult for users to find relevant and personalized advice, leading to suboptimal career choices and job dissatisfaction.
- To address these challenges, we propose an intelligent, AI-driven career guidance platform that offers personalized, data-driven insights and recommendations.

What are the objectives?

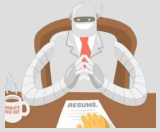
- **Personalization:**
Provide customized career guidance based on individual user profiles, preferences, and goals.

- **Interview Preparation:**
Use an AI-driven interview bot to conduct mock interviews tailored to the user's resume and career goals. Offer feedback and grading on interview performance, if feasible, to help users improve their skills.

- **Multimodal Support:**
Implement a chatbot for both text and image queries to provide comprehensive support and enhance user engagement.

- **Research Paper Recommendations:**
Utilize machine learning models to recommend relevant research papers based on user queries, supporting continuous learning and professional development.

- **Multilingual Chatbot**

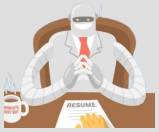


What are the limitations of the existing systems?

- **Jobscan:**
  Uses AI to optimize resumes for Applicant Tracking Systems (ATS).
  Provides insights on job descriptions and keywords.
  Tailors resumes for specific roles.

- **CareerBuilder:**
  Offers a career change program with personalized mentoring.
  Provides job placement assistance and career coaching.

- **Limitations of Existing Systems:**
  Jobscan: Focuses solely on resume tracking and related functionalities.
  CareerBuilder: Primarily offers mentoring and job placement assistance, with limited scope



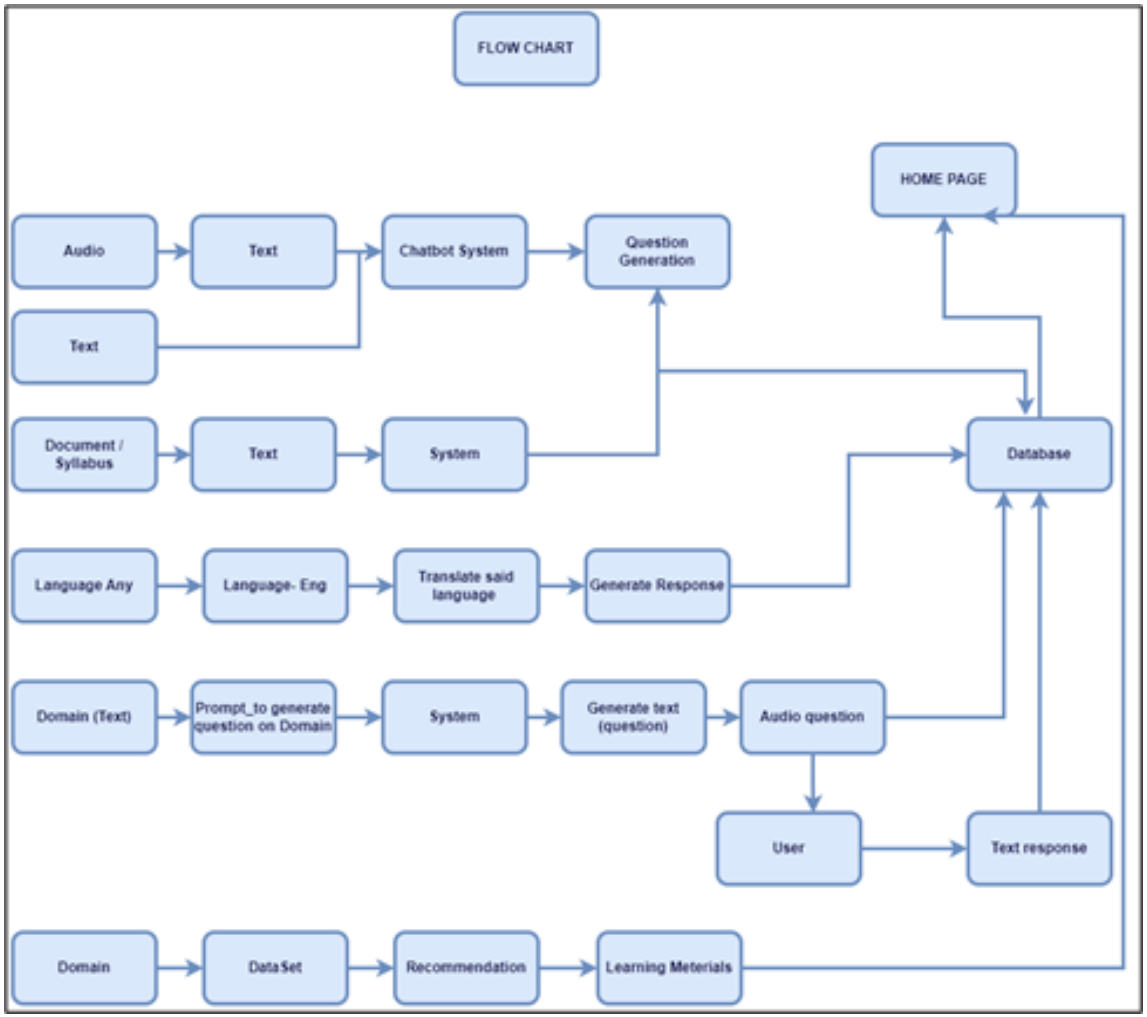
What are the limitations of the existing systems?

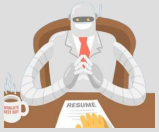
Year of Implementation	AI Name	Techniques/Algorithm	Gap or Drawback
2018	Pymetrics	Neuroscience-based Games, ML	Limited scope of assessment, potential biases in games
2019	HireVue	Video Interview Analysis, AI, ML	Potential bias in AI algorithms, privacy concerns
2020	MyInterview	AI Video Analysis, NLP, ML	Limited language support, privacy and data security issues
2021	Talview	Behavioral Insights, AI, ML	High dependency on video quality, potential bias issues
2022	InterviewStream	Video Interviewing, AI Analysis	Requires strong internet connection, potential bias in evaluations
2023	Vervoe	Skill Assessment, AI Scoring	May not cover all skill types accurately, potential biases
2018	JobPal	Chatbot, NLP, ML	Limited conversation complexity, potential language support issues
2023	Iris.ai	AI, NLP, Research Paper Recommendation	May struggle with niche topics, requires large data sets for accuracy

Then what is the uniqueness of your project?

- Our system offers a module for document scanning and answering related questions, but it also integrates other modules, providing a more comprehensive career support experience beyond just resumes.
- AI-generated mock interview practice.
- Multilingual for broader scope.
- Grading and feed back
- Research paper and material recommendations.

Explain the flow of your project.





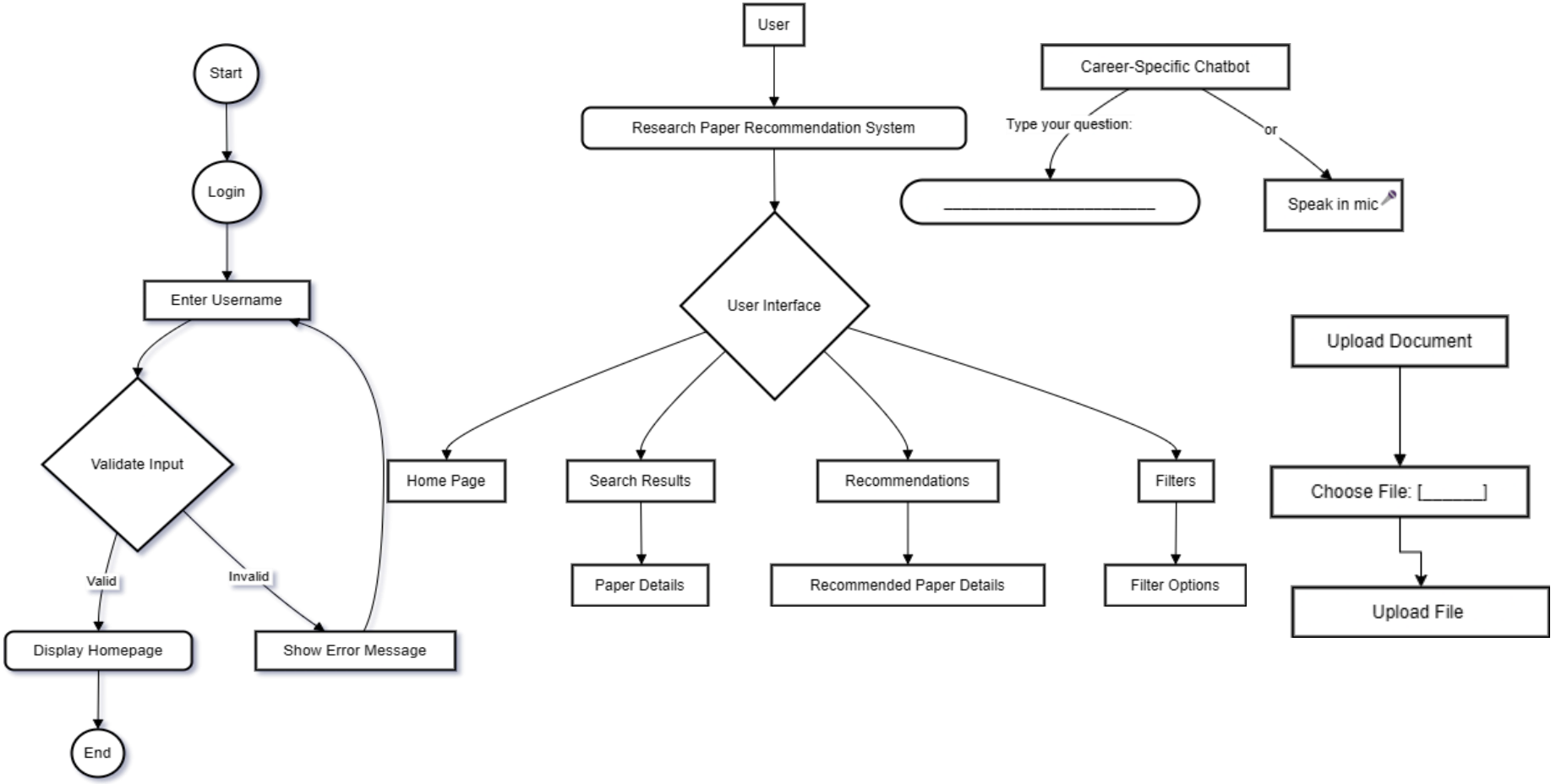
Elucidate on the software/hardware requirements

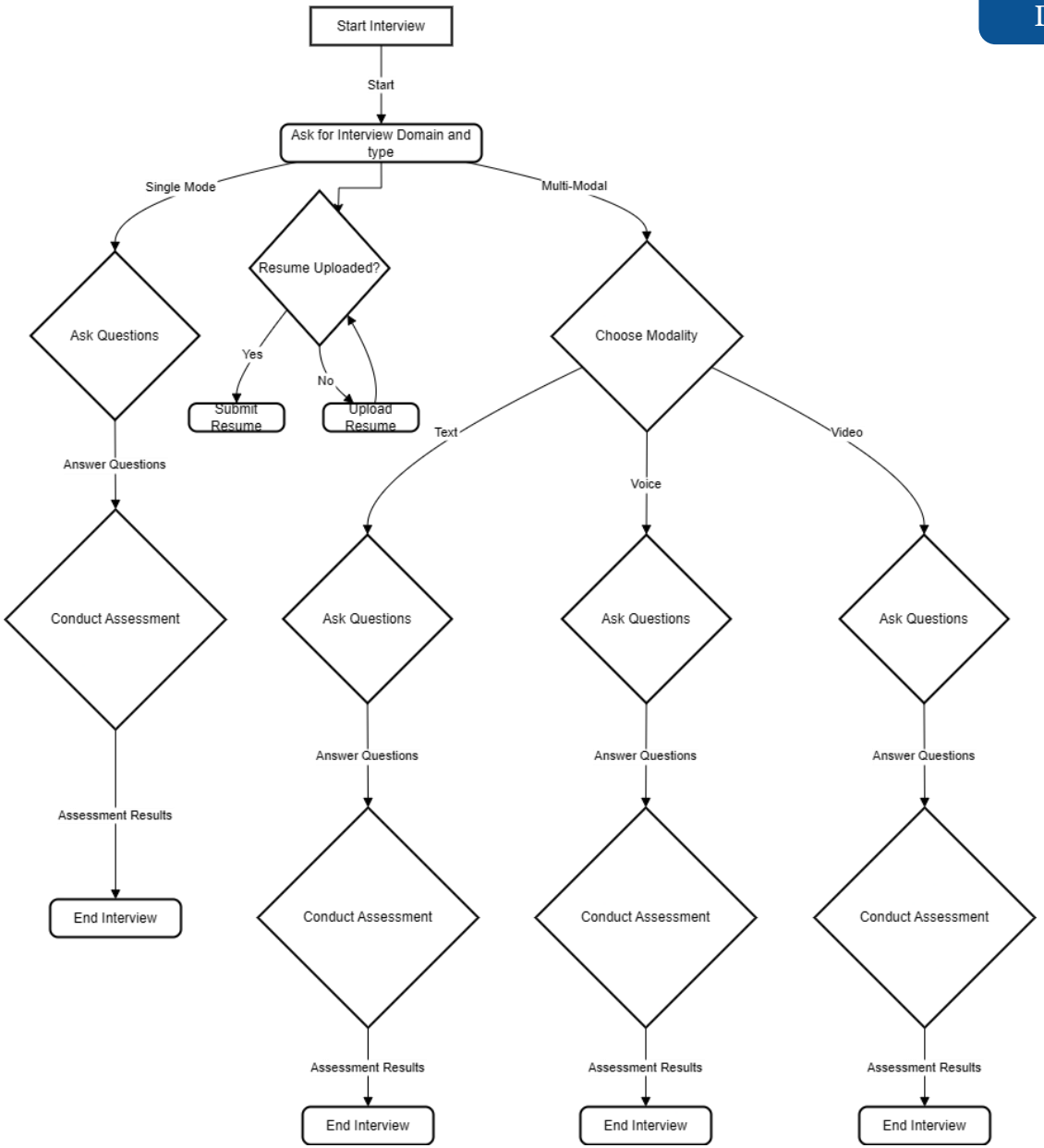
Requirement	Characteristics
Software	GPU cloud based notebook running environments- Google Colab, Kaggle, Gradio, Streamlit, Huggingface Interface Support. HTML, CSS, JS , backend PHP support savings in txt/csv formats, Python Flask
Hardware	Cloud systems required not supported in hardware. For end users: atleast 2 GB RAM, internet connectivity.

Functional requirements

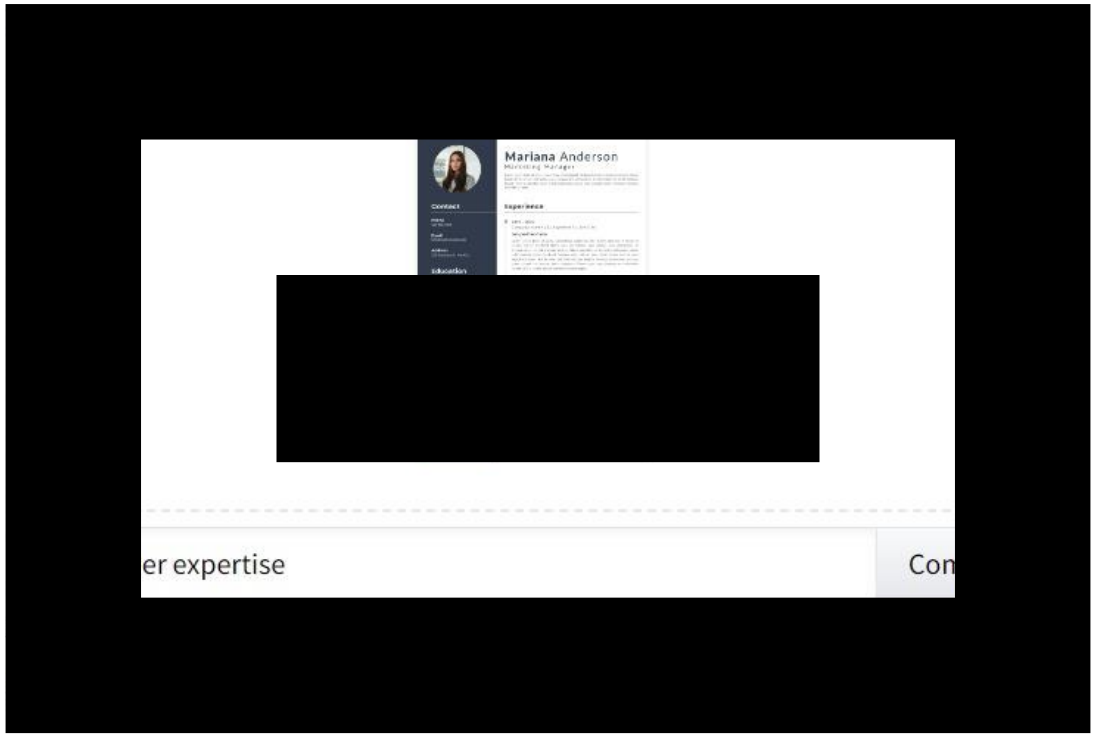
Requirement ID	Requirement
M1_FR1	Document Summarization
M1_FR2	Carrier Specific Chabot
M1_FR3	Language Learning Support
M1_FR4	Interview Bot
M2_FR5	Material Recommender

Explain the human machine interface

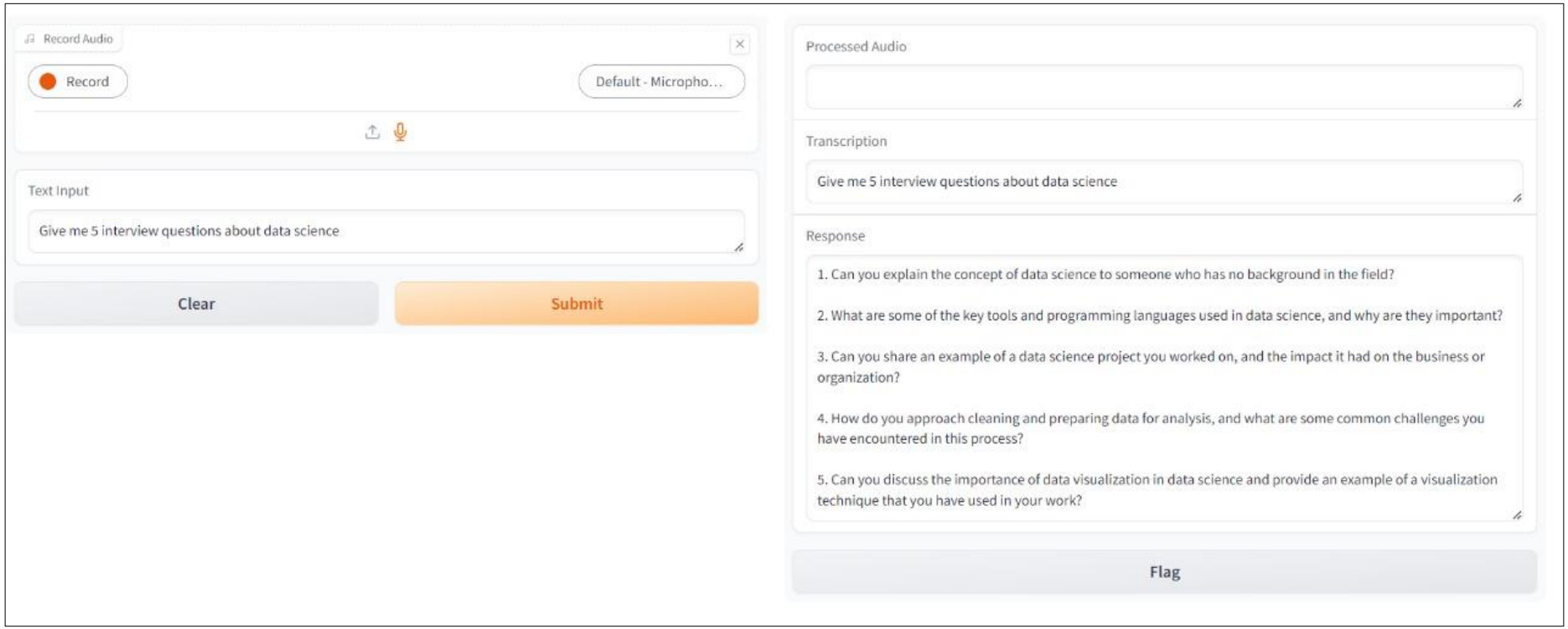



Start Interview
Start
Ask for Interview Domain and type
Single Mode
Multi-Modal
Resume Uploaded?
Ask Questions
Choose Modality
Yes
No
Submit Resume
Upload Resume
Answer Questions
Text
Voice
Video
Conduct Assessment
Ask Questions
Ask Questions
Ask Questions
Assessment Results
Answer Questions
Answer Questions
Answer Questions
End Interview
Conduct Assessment
Conduct Assessment
Conduct Assessment
Assessment Results
Assessment Results
Assessment Results
End Interview
End Interview
End Interview

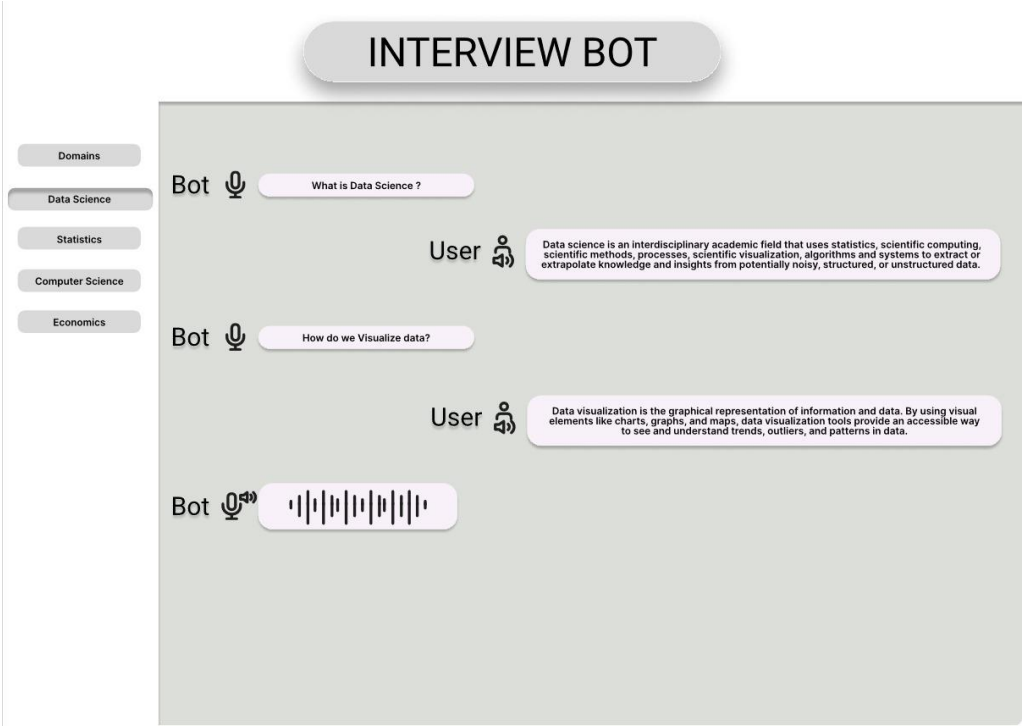
DEMO Interface

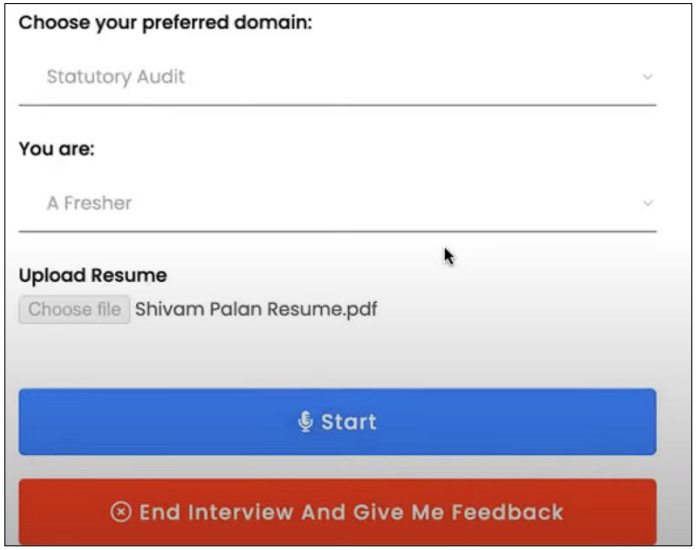


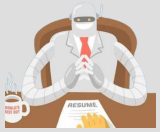
DEMO Interface



DEMO Interface







What about the expected outcomes?

1. Document Summary Report:

Key Points: Summary points extracted from the document.
Questions & Answers: User queries and corresponding answers.

2. Chatbot Response Screen:

User's Question: The query entered by the user.
Chatbot's Answer: The response generated by the chatbot.

3. Language Translation Screen:

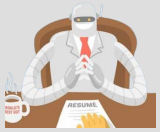
Native Text: Text input by the user in their native language.
Translated answer : The native text of the answer

4. Interview Practice Report:

Domain: The selected domain for the interview practice.
Questions & Answers: List of questions asked and user's responses.
Feedback: Automated feedback on user's performance.

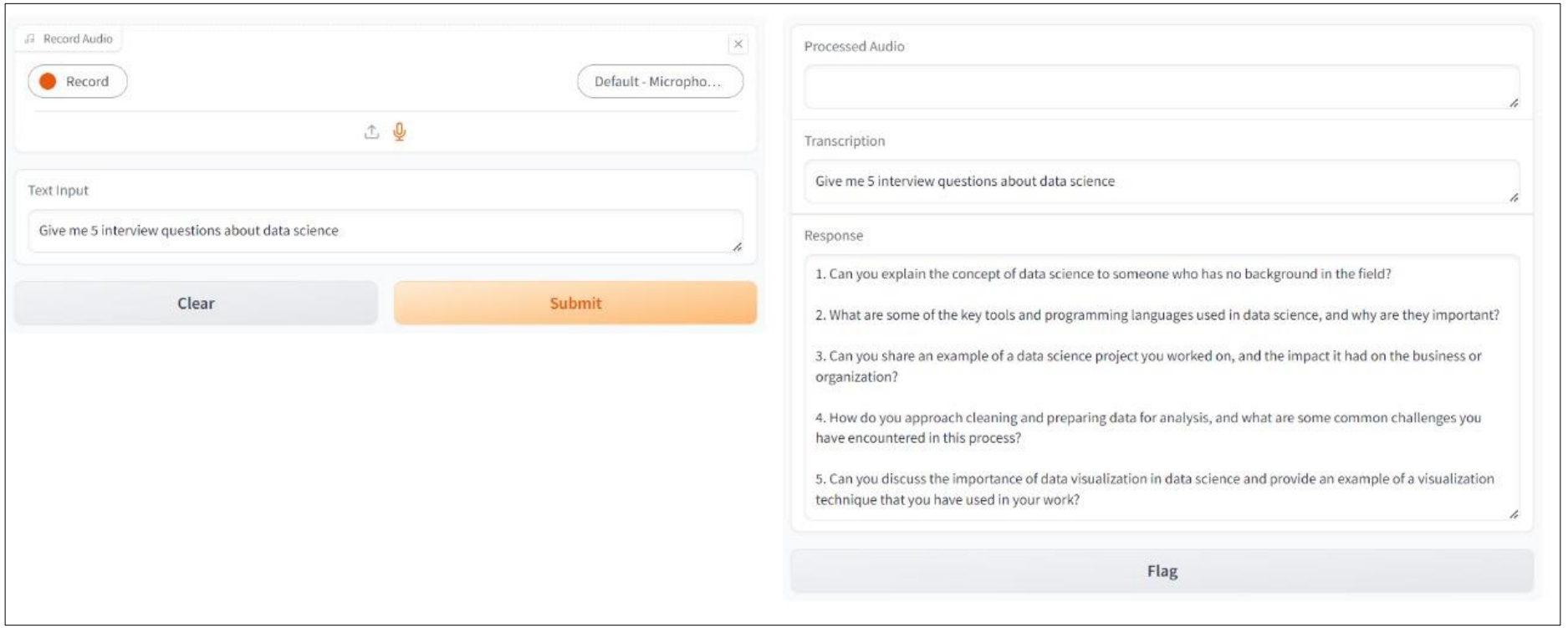
5. Material Recommendations Report:

Domain: The domain for which materials are recommended.
Recommended Resources: List of suggested resources.



Share interfaces and its working for each module

The interface shown here helps the user to record audio or give prompt as text and generate responses.



Share interfaces and its working for each module

- **This module used two types of input prompts wav file audio or text prompt.**
- **The text prompt is directly processes through the generative pretrained model.**
- **The audio prompt is first converted to text prompt using face book transcription model and then processed through the generative model.**

Models Used for the Chatbot

- For audio transcription facebook/wav2vec2-large-960h-lv60-self
- The large model pretrained and fine-tuned on 960 hours of Libri-Light and Librispeech on 16kHz sampled speech audio. Model was trained with Self-Training objective.
- When using the model make sure that your speech input is also sampled at 16Khz.

Models Used for the Chatbot

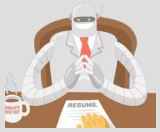
- **For text generation microsoft/Phi-3-mini-4k-instruct**
- **The Phi-3-Mini-4K-Instruct is a 3.8B parameters, lightweight, state-of-the-art open model trained with the Phi-3 datasets that includes both synthetic data and the filtered publicly available websites data with a focus on high-quality and reasoning dense properties.**
- **The model belongs to the Phi-3 family with the Mini version in two variants 4K and 128K which is the context length (in tokens) that it can support.**

How was the interface made?

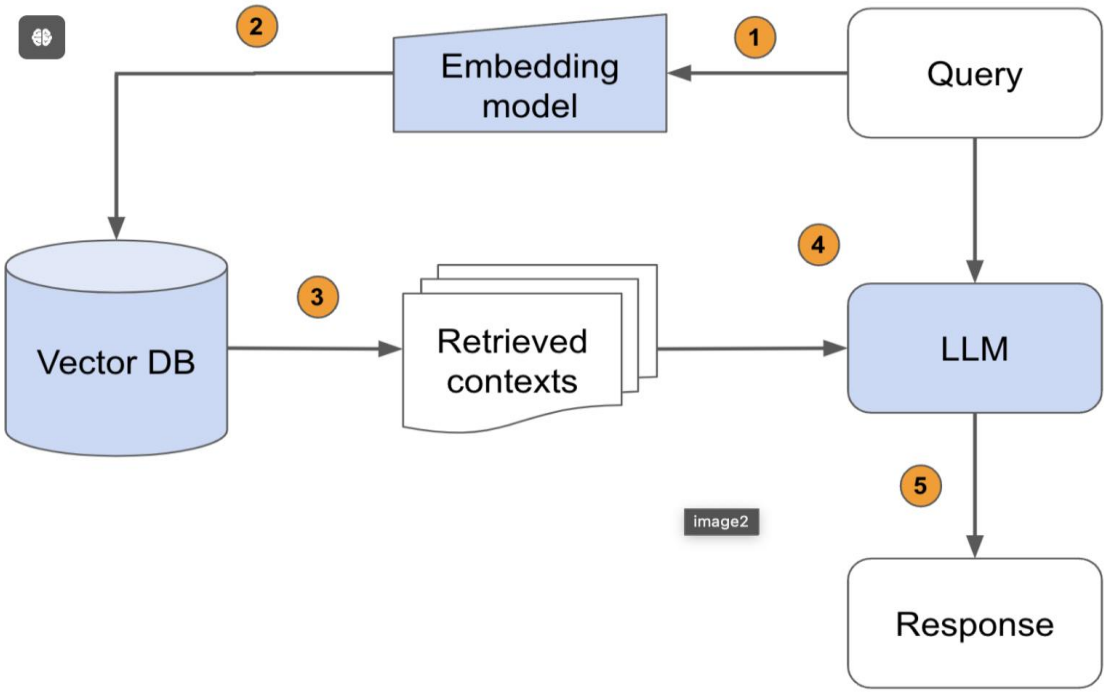
- The interface was build in **gradio** which is **huggingface** tool to build interfaces using large language models.
- The code uses live link for interface later we can upload the interface in huggingface spaces to host it.
- Here is the interface launch snippet.

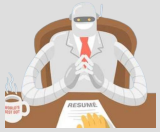
```
# Create Gradio interface
iface = gr.Interface(
    fn=process_input,
    inputs=[
        gr.Audio(label="Record Audio", type="filepath"),
        gr.Textbox(label="Text Input")
    ],
    outputs=[
        gr.Textbox(label="Processed Audio"),
        gr.Textbox(label="Transcription"),
        gr.Textbox(label="Response")
    ],
    live=False
)

if __name__ == "__main__":
    iface.launch(share=True)
```

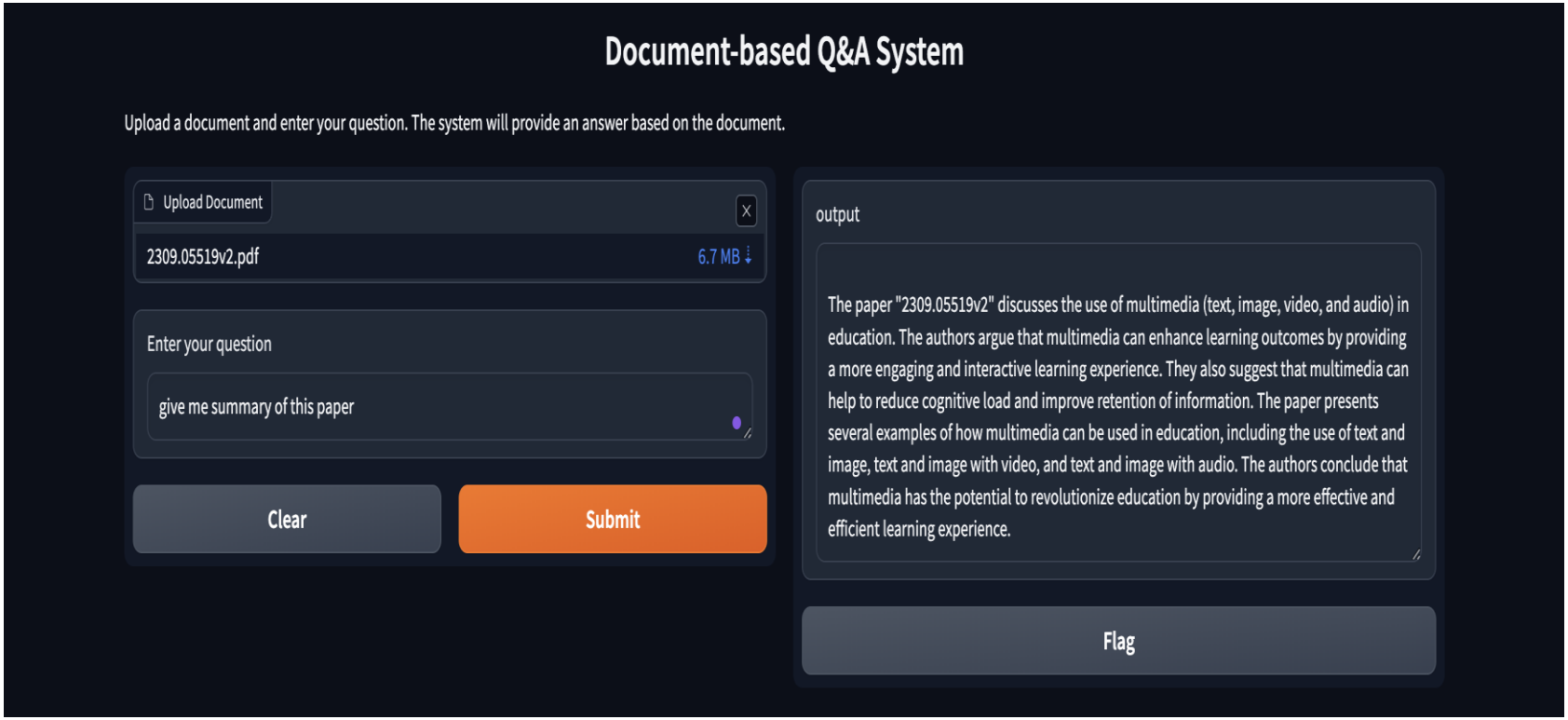


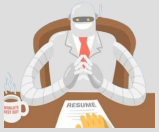
How the workflow happens?





How does your paper reader looks like?





Models Used for the Chatbot

Model Name: meta-llama/Llama-2-7b-chat-hf

- The LLaMA-2-7B-Chat is a conversational AI model from Meta, featuring 7 billion parameters. It's optimized for generating human-like dialogue, making it ideal for chatbots, virtual assistants, and other interactive applications.

Embedding Model Name: sentence-transformers/all-mpnet-base-v2

- The all-mpnet-base-v2 is a high-performance embedding model from the Sentence-Transformers library. It produces dense, semantically rich embeddings suitable for tasks like semantic search, clustering, and text similarity.

How was the interface made?

- The interface was build in **gradio** which is **huggingface** tool to build interfaces using large language models.
- The code uses live link for interface later we can upload the interface in huggingface spaces to host it.
- Here is the interface launch snippet.

```
def create_gradio_interface():
    iface = gr.Interface(
        fn=process_input,
        inputs=[
            gr.File(label="Upload Document", type="filepath"),
            gr.Textbox(label="Enter your question")
        ],
        outputs="text",
        title="Document-based Q&A System",
        description="Upload a document and enter your question. The system will
        provide an answer based on the document."
    )
    return iface

if __name__ == "__main__":
    iface = create_gradio_interface()
    iface.launch(share=True, debug=True)
```

What about the research paper recommendation?

```
# Print the recommendations
for i in range(1, 6):
    print(f"Recommendation {i}:\n{df['title'][indices[i]]}\n")
print("===============\n")
```

```
Enter a sentence:  speech recognition and modelling
Sample:
speech recognition and modelling

Recommendation 1:
Automatic Speech Recognition in Sanskrit: A New Speech Corpus and
  Modelling Insights

Recommendation 2:
A Transfer Learning Method for Speech Emotion Recognition from Automatic
  Speech Recognition

Recommendation 3:
Modelling word learning and recognition using visually grounded speech

Recommendation 4:
Speech frame implementation for speech analysis and recognition

Recommendation 5:
Speech-enhanced and Noise-aware Networks for Robust Speech Recognition

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```

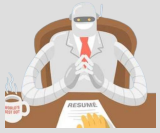

What is the output of your multilingual bot like?

```
Enter your prompt:  ভারতে ডেটা সায়েন্সের ভবিষ্যত কী?
Detected language: bn
Translated to English: What is the future of data science in India?
Loading checkpoint shards: 100%|██████████| 2/2 [00:03<00:00,  1.58s/it]
Special tokens have been added in the vocabulary, make sure the associated word embeddings are fine-tuned or trained.
Your input_length: 474 is bigger than 0.9 * max_length: 500. You might consider increasing your max_length manually, e.g. translator('...', max_length=400)
Response in English: <|user|>
What is the future of data science in India?<|end|>
<|assistant|>
 The future of data science in India looks promising and poised for significant growth. India has a large population, a growing middle class, and a strong focus on edu
cation and technology, making it an ideal environment for data science and analytics to thrive. Here are some key factors that contribute to the positive outlook for d
ata science in India:

1. Demand for Data Science professionals: As businesses increasingly rely on data-driven decision-making, the demand for data scientists and analysts is growing. Accor
ding to the World Economic Forum, India is expected to have the highest demand for data science professionals by 2025.
```

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•
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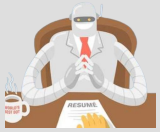
Response in bn: ভারতে ডেটা বিজ্ঞান ভবিষ্যত কী? ভারতে ডেটা বিজ্ঞান ভবিষ্যত কী? ভারতে ডেটা বিজ্ঞান পেশাদারদের চাহিদাঃ ব্যবসায়গুলি ডেটা-চালিত সিদ্ধান্ত গ্রহণের উপর আরও বেশি নির্ভর করে, ডেটা বিজ্ঞান ও বিশ্লেষকদের জন্য ভবিষ্যতটি প্রতিশ্রুতিবদ্ধ এবং উল্লেখযোগ্য বৃদ্ধির জন্য প্রস্তুত। ভারতে একটি বড় জনসংখ্যা, ক্রমবর্ধমান মধ্যবিত্ত শ্রেণী এবং শিক্ষা এবং প্রযুক্তির উপর জোরালো মনোনিবেশ রয়েছে। এটি ডেটা বিজ্ঞান এবং বিশ্লেষণের জন্য একটি আদর্শ পরিবেশ তৈরি করে। এখানে কিছু মূল কারণ রয়েছে যা ভারতে ডেটা বিজ্ঞানকে ইতিবাচকভাবে দেখায়ঃ 1. ডেটা বিজ্ঞান পেশাদারদের চাহিদাঃ ব্যবসায়গুলি ডেটা-চালিত সিদ্ধান্ত গ্রহণের উপর আরও বেশি নির্ভর করে, ডেটা বিজ্ঞান এবং বিশ্লেষকদের জন্য চাহিদা বাড়ছে। বিশ্ব অর্থনৈতিক ফোরামের মতে, ভারতে ডেটা বিজ্ঞান, একটি ক্রমবর্ধমান মধ্যবিত্ত শ্রেণী এবং শিক্ষার উপর জোরালো মনোনিবেশ রয়েছে। 2. সরকারি উদ্যোগঃ ভারত সরকার ডেটা বিজ্ঞান এবং বিশ্লেষণের জন্য একটি আদর্শ পরিবেশ চালু করেছে। ডিজিটাল ইন্ডিয়া পেশাদাররা উদাহরণ স্বরূপ, ডিজিটাল ডেটা বিজ্ঞান এবং ডেটা অ্যাক্সেসকে উত্সের জন্য ইতিবাচক দৃষ্টি আকর্ষণ করে। ডেটা বিজ্ঞান এবং তথ্য প্রযুক্তির জন্য ডেটা বিশ্লেষকদের জন্য ডেটা প্রযুক্তির প্রয়োগের চাহিদা বাড়তে জাতীয় নীতিটি আরও বেশি বেশি। ভারত সরকারিদা বৃদ্ধি করেছে, ডেটা বিজ্ঞান এবং প্রযুক্তির জন্য একটি বড় বিনিয়োগের জন্য একটি বড় সুযোগ তৈরি করে। ভারত সরকারি বিনিয়োগের জন্য ডেটা বিজ্ঞান এবং প্রযুক্তির বিকাশের জন্য একটি বড় বিনিয়োগের সুযোগ তৈরি করে। ভারত, ডেটা বিজ্ঞান এবং প্রযুক্তির বিকাশের জন্য একটি বড় বিনিয়োগের জন্য একটি বড় বিনিয়োগের লক্ষ্য তৈরি করে।



Describe your project roles

Soham Chatterjee

- Oversee project progress, coordinate team, handle material recommendation.
- Full Stack Developer: Develop front-end and back-end, ensure system security and performance, integrate material recommendation, collaborate on interview bot.

Ritwika Dasgupta

- Develop and maintain chatbot, integrate modules, conduct code reviews, collaborate on interview bot.
- Develop AI algorithms for chatbot, ensure responsiveness, train and validate models, collaborate on interview bot.

Sayantan Ray

- Develop document summarizer, ensure accuracy and efficiency, integrate summarizer, collaborate on interview bot.
- Develop AI algorithms for summarizer, ensure data processing accuracy, conduct data analysis, collaborate on interview bot.

CONCLUSION

- The design document outlines a detailed architectural framework and blueprint for the COLLOQUIUM AI-driven career guidance platform.
- It covers comprehensive system specifications, including hardware and software requirements.
- Intricate internal communications and human-machine interfaces are detailed for seamless platform operation.
- Design constraints and system integrity are addressed to ensure a secure, scalable, and efficient platform.
- The platform's ability to adapt to future advancements and challenges is emphasized.

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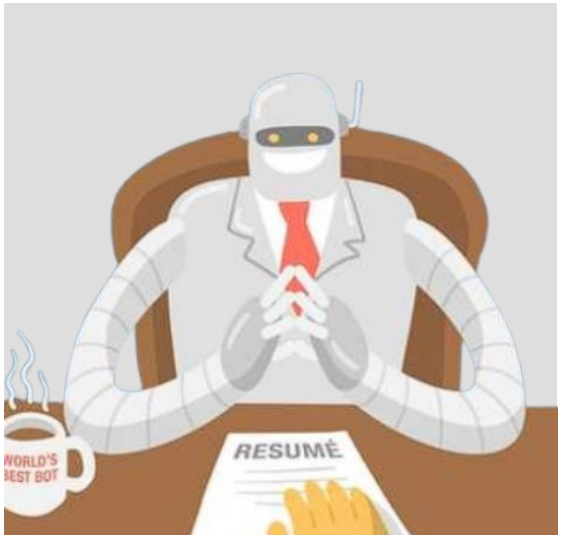

Colloquium **:** Thank you. If you have any questions, feel free to ask.