

# CareerCraftML: Smarter Studying with AI-Powered Tools

Shweta Kambare

Dept. of Artificial Intelligence and  
Data Science

Vishwakarma Institute of Technology  
Pune, India  
shweta.kambare@vit.edu

Aditya Mhaske

Dept. of Artificial Intelligence and Data  
Science

Vishwakarma Institute of Technology  
Pune, India  
aditya.mhaske21@vit.edu

Aditya Nawale

Dept. of Artificial Intelligence and  
Data Science

Vishwakarma Institute of Technology  
Pune, India  
aditya.nawale21@vit.edu

Mokshit Oswal

Dept. of Artificial Intelligence and  
Data Science

Vishwakarma Institute of Technology  
Pune, India  
mokshit.oswal21@vit.edu

Sumit Mulhar

Dept. of Artificial Intelligence and Data  
Science

Vishwakarma Institute of Technology  
Pune, India  
sumit.mulhar21@vit.edu

**Abstract**—In today's competitive job market, leveraging advanced technology to enhance job application processes and interview preparedness is crucial. This research paper presents a comprehensive system integrating several innovative features using Flask and the Gemini LLM API. The system includes an Applicant Tracking System (ATS) Scanner, a YouTube Video Summarizer, a Resume Enhancement Tool, a Context-Based Mock Interview System, and an Interactive PDF Chat feature. The ATS Scanner evaluates resumes against job descriptions for compatibility with modern recruitment systems. The YouTube Video Summarizer generates concise notes from video content to facilitate efficient information consumption. The Resume Enhancement Tool offers real-time suggestions to improve resume quality, focusing on formatting and skill highlights. The Context-Based Mock Interview System allows users to practice interviews based on specific job descriptions, enhancing their readiness and confidence. Additionally, the Interactive PDF Chat feature enables users to upload notes in PDF format, allowing the system to train on the content and provide an interactive Q&A experience. This paper details the implementation and integration of these features, highlighting the effectiveness and potential impact on job seekers and professionals in the recruitment process.

**Keywords**—Accessibility, Convolutional Neural Network (CNN), Deaf Communication, Deep Learning, Image-to-Text-to-Audio.

## I. INTRODUCTION

In today's competitive job market, leveraging advanced technology to enhance job application processes and interview preparedness is crucial. This research paper presents a comprehensive system integrating several innovative features using Flask and the Gemini LLM API. The system includes an Applicant Tracking System (ATS) Scanner, a YouTube Video Summarizer, a Resume Enhancement Tool, a Context-Based Mock Interview System, and an Interactive PDF Chat feature. The ATS Scanner evaluates resumes against job descriptions for compatibility with modern recruitment systems, enhancing

efficiency and fairness in candidate selection. The YouTube Video Summarizer generates concise notes from video content to facilitate efficient information consumption. The Resume Enhancement Tool offers real-time suggestions to improve resume quality, focusing on formatting and skill highlights. The Context-Based Mock Interview System allows users to practice interviews based on specific job descriptions, enhancing their readiness and confidence. Additionally, the Interactive PDF Chat feature enables users to upload notes in PDF format, allowing the system to train on the content and provide an interactive Q&A experience. This paper details the implementation and integration of these features, highlighting the effectiveness and potential impact on job seekers and professionals in the recruitment process.

## II. LITERATURE SURVEY

Existing research on AI-driven mock interview systems emphasizes their potential to significantly improve interview preparation and evaluation accuracy. Paper 1 outlines an AI-driven mock interview system utilizing voice assistance, NLP, and speech recognition to simulate interview sessions and provide real-time feedback, which enhances interview efficiency and reduces biases. Similarly, Paper 2 discusses a platform that uses NLP and speech recognition to assess communication skills, body language, and content quality during mock interviews, offering personalized feedback to improve performance. Paper 3 introduces an AI-based evaluator that analyzes facial expressions, tone, and language patterns to assess candidates' emotions and confidence levels, providing nuanced feedback on non-verbal cues critical for professional interactions. Additionally, Paper 4 explores the use of deep learning, NLP, and speech recognition in smart interview systems to analyze personality traits and behavioral skills, contributing to more efficient and equitable candidate assessments.

EZInterviewer, described in Paper 6, addresses the challenges of low-resource interview data by using a pre-trained knowledge selector and dialog generator, enabling realistic mock interview experiences that help job seekers



practice and improve their skills. In Paper 10, a virtual recruiter framework adapts to user behavior through automatic recognition of social cues, providing feedback on facial expressions and grammar to enhance interview preparation. Paper 13 reviews the use of ChatGPT in healthcare education, highlighting its potential for generating clinical vignettes and customized cases, which can be analogously applied to creating personalized mock interview scenarios.

The application of large language models (LLMs) in educational contexts is explored in Papers 7 and 8. These papers highlight the potential of LLMs to automate tasks such as question generation, feedback provision, and essay grading, while also noting challenges related to customization, bias, and ethical considerations. This research underscores the importance of integrating LLMs responsibly to harness their benefits in educational and professional settings.

The Gemini model, as detailed in Papers 9 and 16, uses a multimodal architecture optimized for scalable performance and capable of processing various data types. This enhances its ability to provide comprehensive and tailored feedback in educational contexts, which is crucial for developing effective mock interview systems. Paper 15 further emphasizes Gemini's versatility in generating content and analyzing text, positioning it as a powerful tool for personalized learning experiences.

Paper 5 discusses a system that uses deep learning for dialog state tracking and action selection, providing real-time, data-driven coaching to reduce interview anxiety and improve responses. This approach is particularly beneficial for preparing candidates for real-world interviews by enhancing their confidence and communication skills.

Generative AI tools like ChatGPT play a transformative role in human resource management by optimizing recruitment processes, enhancing employee engagement, and providing personalized training paths, as discussed in Paper 18. These tools automate initial screening, candidate interaction, and interview preparation, improving overall efficiency in HR functions.

The practical steps for integrating Google Bard in educational processes are outlined in Paper 19, demonstrating its functionality in summarizing and retrieving documents from Google Drive. This capability can enhance the efficiency of managing educational materials and aid in the research and preparation processes for job interviews.

Lastly, Paper 20 explores the pedagogical impact of the AI chatbot Gemini in mathematics education, highlighting its ability to provide customized learning pathways and immediate clarification, which can be analogously applied to the context of interview preparation.

These insights from the literature guide the development and implementation of the AI-driven mock interview system, emphasizing the importance of performance consistency, multimodal capabilities, personalized feedback, and reliability. By integrating these advanced technologies, the system aims to provide an effective and robust solution for job seekers to enhance their interview readiness and succeed in a competitive market.

### III. PROBLEM STATEMENT

In the context of enhancing accessibility for individuals with visual impairments, this research addresses the limitations in existing technologies related to image-to-audio conversion. The predominant issues lie in the lack of a unified and efficient system that seamlessly integrates Optical Character Recognition (OCR), Text-to-Speech (TTS) synthesis, and user-friendly functionalities, especially for blind users. While OCR and TTS technologies are fundamental, their fragmentation and the absence of an integrated, deep learning-driven solution hinder a comprehensive and intuitive user experience. This project specifically focuses on leveraging the VGG16 deep learning architecture to develop a unified image-to-audio conversion system. The proposed system aims to be user-friendly, incorporating a web application that facilitates image capture through device cameras. Additionally, the integration of speech commands enhances accessibility for blind users, allowing them to interact with the system more effectively. This research strives to overcome existing limitations and provide a robust, inclusive solution for individuals with visual impairments, fostering greater independence in their engagement with digital content.

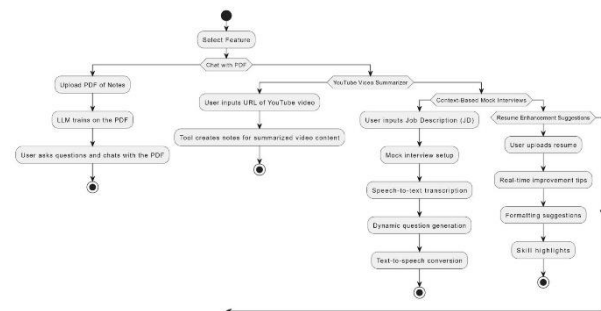


Fig. 1. Flowchart of the System

### IV. PROPOSED WORK

#### System architecture:

The AI-Driven Mock Interview System is designed to enhance the job application process and interview preparedness using a combination of advanced technologies including Flask, Gemini LLM API, Python, and NLP. The architecture is modular, allowing for the integration of various features such as ATS scanning, YouTube video summarization, resume enhancement, context-based mock interviews, and interactive PDF chat. Below is a detailed architecture overview.

#### Overview of System Components

##### 1. Frontend Interface

- User Interface (UI): Built using HTML, CSS, and JavaScript, providing a user-friendly interface for interacting with the system.
- User Input Forms: For uploading resumes, inputting YouTube URLs, job descriptions, and PDF files.

## 2. Backend Framework

- Flask: A lightweight WSGI web application framework for handling HTTP requests and responses, routing, and session management.
- Gemini LLM API: For advanced natural language processing, resume enhancement, mock interview generation, and interactive Q&A.
- Python: The main programming language used for implementing backend logic, NLP processing, and integrating various APIs.

## 3. APIs and Services

- Gemini LLM API: For language understanding, resume enhancement, mock interview generation, and Q&A functionalities.
- YouTube Data API: To fetch video transcripts and metadata.
- NLP Models and Libraries: For text analysis, summarization, and sentiment analysis.

## 2. Detailed Component Descriptions

### 1. ATS Scanner

- Functionality: Automatically scans and scores resumes against job descriptions to ensure compatibility with Applicant Tracking Systems.
- Components Involved:
  - Frontend: Resume upload form.
  - Backend:
    - Flask: Handles file upload and routing.
    - NLP Module: Analyzes resume content and matches it against job descriptions.
    - Gemini LLM API: Scores the resume based on keywords, skills, and formatting.
- Database: Stores resumes and job descriptions for comparison and scoring.

### 2. YouTube Video Summarizer

- Functionality: Users input a YouTube video URL to receive summarized notes of the video content.
- Components Involved:
  - Frontend: URL input form.
  - Backend:
    - Flask: Handles URL submission and processes the request.
    - YouTube Data API: Fetches video transcript.
    - NLP Module: Summarizes the transcript using text summarization algorithms.
    - Gemini LLM API: Enhances the summary for coherence and readability.
- Database: Stores the video summaries for user retrieval.

### 3. Resume Enhancement Suggestions Using LLM

- Functionality: Provides real-time resume improvement tips, including formatting and skill highlights.
- Components Involved:

- Frontend: Resume upload and display area for suggestions.
- Backend:
  - Flask: Handles resume upload and routes enhancement requests.
  - Gemini LLM API: Analyzes the resume and provides enhancement suggestions.
  - NLP Module: Extracts key information and highlights areas for improvement.
- Database: Stores enhanced resumes and suggestions history.

### 4. Context-Based Mock Interviews

- Functionality: Users input job descriptions to practice mock interviews and enhance their skills.
- Components Involved:
  - Frontend: Job description input form and mock interview interface.
  - Backend:
    - Flask: Manages job description inputs and routes to mock interview generation.
    - Gemini LLM API: Generates interview questions and evaluates responses.
    - NLP Module: Analyzes user responses for feedback.
- Database: Stores job descriptions, generated questions, and user performance metrics.

### 5. Chat with PDF

- Functionality: Users upload a PDF of notes to train the LLM, enabling interactive conversations and Q&A with the document.
- Components Involved:
  - Frontend: PDF upload form and chat interface.
  - Backend:
    - Flask: Manages PDF upload and initiates LLM training.
    - Gemini LLM API: Processes the PDF content for interactive Q&A.
    - NLP Module: Extracts and indexes key information from the PDF.
- Database: Stores PDF content and conversation logs for future reference.

## 3. Data Flow and Integration

### 1. User Interaction:

- Users interact with the system via the web interface, submitting resumes, YouTube URLs, job descriptions, and PDFs.
- Flask routes these requests to the appropriate backend services.

### 2. Processing and Analysis:

- The Flask backend coordinates with the Gemini LLM API and various NLP modules to process and analyze user inputs.

- The results are stored in the database and presented back to the user through the web interface.

### 3. Real-Time Feedback and Enhancement:

- The Gemini LLM API provides real-time suggestions and feedback for resumes, interview responses, and PDF-based interactions.
- The system ensures continuous improvement by learning from user interactions and updating models accordingly.

## V. IMPLEMENTATION

### Implementation of AI-Driven Mock Interview System

The implementation of our AI-driven mock interview system involves a comprehensive integration of frontend and backend technologies, leveraging the power of Flask, Gemini LLM API, Python, NLP, and various other APIs to provide a seamless and effective user experience.

#### A. Frontend Implementation

The frontend of the system is designed to be highly interactive and user-friendly, ensuring that users can easily navigate through various functionalities such as uploading resumes, entering YouTube URLs, inputting job descriptions, and uploading PDFs for interactive Q&A sessions. The frontend is developed using a combination of HTML, CSS, and JavaScript.

##### Key Components:

- **User Interface (UI) Design:** The UI is structured using HTML to create different web pages corresponding to each feature of the system. CSS is used to style these pages, ensuring they are visually appealing and easy to navigate. JavaScript adds interactivity, enabling dynamic content updates and form validation.

- **Forms and Input Fields:** Different forms are created for specific user actions. For example, a form for uploading resumes allows users to submit their resumes, while another form lets users input YouTube URLs to receive summarized notes. Similarly, job description input forms enable users to practice mock interviews, and PDF upload forms facilitate interactive Q&A sessions with uploaded documents.

- **Interactive Elements:** The frontend includes dynamic elements that provide real-time feedback and updates. For instance, users receive immediate resume enhancement suggestions and interview feedback. Summarized notes from YouTube videos are displayed in a concise manner, and the mock interview interface allows users to engage in simulated interview sessions, enhancing their skills through practice and feedback.

#### B. Backend Implementation

The backend handles the core logic and data processing, ensuring smooth interaction between the frontend and various AI and NLP services. The backend is implemented using Flask and Python, integrating multiple APIs such as the Gemini LLM API and YouTube Data API to deliver the system's functionalities.

##### Key Components:

- **Flask Application:** Flask is used to define routes and endpoints that handle different user requests, such as uploading resumes, summarizing YouTube videos, generating mock interview questions, and enabling interactive Q&A with PDFs. Flask's request handling capabilities ensure that user inputs are processed efficiently and responses are sent back to the frontend in a timely manner.

- **Gemini LLM API Integration:** The Gemini LLM API is leveraged for several key functionalities. It analyzes resumes to provide enhancement suggestions, generates interview questions based on job descriptions, and evaluates user responses during mock interviews. Additionally, it facilitates interactive conversations with uploaded PDFs, allowing users to engage in detailed Q&A sessions.

- **YouTube Data API Integration:** The system uses the YouTube Data API to retrieve transcripts of videos based on user-inputted URLs. These transcripts are then processed using NLP models and the Gemini LLM API to generate concise summaries that help users quickly grasp the key points of the videos.

- **NLP Modules:** NLP is crucial for text analysis tasks within the system. It is used to scan and score resumes against job descriptions for ATS compatibility, analyze user responses during mock interviews for sentiment and confidence, and summarize large texts like YouTube transcripts. These NLP capabilities ensure that the system provides accurate and meaningful feedback to users.

## VI. RESULT

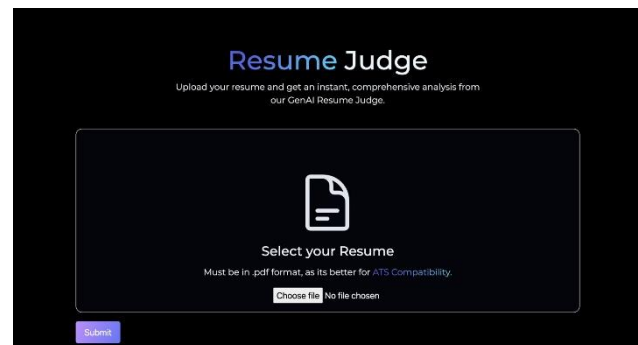


Fig. 2. ATS Checker

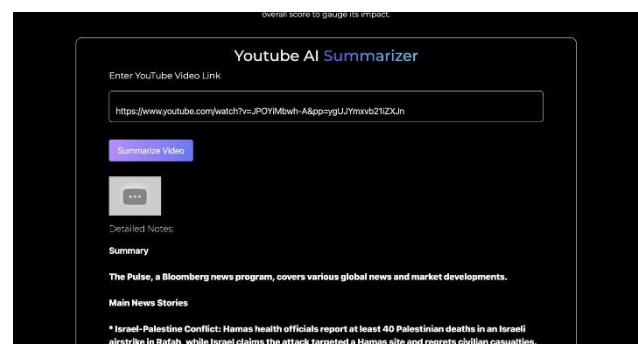


Fig. 3. YouTube Summarizer

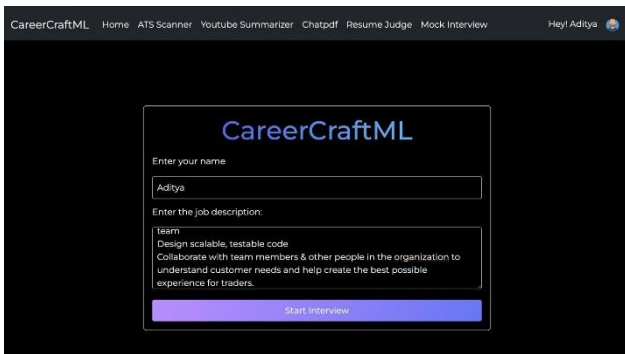


Fig. 4. JD Match with Resume

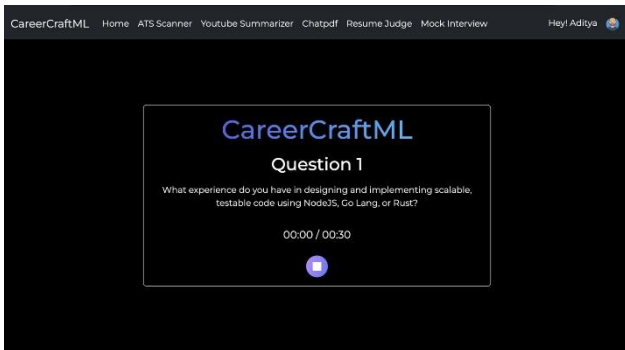


Fig. 5. Mock Interview System

## VII. CONCLUSION

The AI-driven mock interview system we have developed is a comprehensive solution designed to enhance job seekers' preparation and improve their chances of success in the competitive job market. By integrating advanced technologies such as the Gemini LLM API, NLP, and Python within a Flask framework, the system provides a suite of powerful features. These include an ATS Scanner for resume compatibility checks, a YouTube Video Summarizer for efficient content digestion, real-time Resume Enhancement Suggestions, Context-Based Mock Interviews, and an interactive Chat with PDF functionality.

Our system addresses various challenges faced by job seekers, from resume optimization and interview preparation to efficient learning and skill enhancement. The AI-driven feedback and interactive capabilities offer users personalized insights and practice opportunities, thereby boosting their confidence and readiness for real-world job interviews. Overall, the project demonstrates the potential of leveraging AI and NLP to transform the job application process, making it more efficient and equitable.

## VIII. FUTURE SCOPE

While the current implementation of the AI-driven mock interview system is robust, there are several avenues for future enhancement and expansion:

1. **Enhanced AI and NLP Models:** Continuously updating the AI and NLP models with more diverse and extensive datasets will improve the accuracy and relevance of feedback provided to users. Incorporating state-of-the-art models and techniques will ensure that the system remains at the forefront of technological advancements.
2. **Multilingual Support:** Expanding the system's capabilities to support multiple languages will make

it accessible to a broader audience, catering to non-English speakers and enhancing its global reach.

3. **Integration with Job Portals:** Integrating the system with popular job portals could streamline the job application process further, allowing users to directly apply for jobs through the platform after receiving optimized resume feedback and interview practice.
4. **Advanced Analytics and Reporting:** Developing advanced analytics features that track users' progress over time, provide detailed performance reports, and offer insights into areas needing improvement will add significant value to the users' preparation journey.
5. **Mobile Application Development:** Creating a mobile app version of the system will enhance accessibility and convenience, allowing users to practice and receive feedback on the go.
6. **Virtual Reality (VR) Integration:** Incorporating VR technology for mock interviews can provide users with an even more immersive and realistic interview practice experience, simulating real-world environments and interactions.
7. **Peer Review and Collaboration Features:** Adding features that enable users to share their resumes and interview responses with peers for review and feedback can foster a collaborative learning environment and provide diverse perspectives for improvement.
8. **Personalized Learning Pathways:** Developing personalized learning and practice pathways based on users' performance and feedback can ensure that each user receives tailored guidance and resources to address their unique needs and goals.

By exploring these future directions, the AI-driven mock interview system can continue to evolve, offering increasingly sophisticated and effective tools for job seekers to achieve their career objectives. The ongoing integration of emerging technologies and user-centric enhancements will ensure that the system remains a valuable resource in the ever-changing job market landscape.

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