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AI INTERVIEW ASSISTANT: AUTOMATED CANDIDATE EVALUATION USING NLP

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Abstract - *The interview process is a critical stage in recruitment, where organizations assess the technical knowledge, communication skills, and overall suitability of candidates. However, traditional interview methods are highly dependent on human interviewers, making the process time-consuming, inconsistent, and prone to bias. Conducting interviews for a large number of candidates requires significant manpower and often leads to fatigue and subjective decision-making.*

To overcome these challenges, this paper presents an AI Interview Assistant that automates the interview process using Artificial Intelligence (AI) and Natural Language Processing (NLP). The system generates domain-specific technical and behavioural questions based on job requirements and difficulty levels. Candidates can respond to questions using either text-based chat or voice-based interaction. Voice responses are converted into text using speech-to-text technology for further analysis.

The system evaluates candidate responses by analysing technical correctness, language clarity, and confidence level. Sentiment analysis and keyword matching techniques are used to calculate performance scores. A summarized evaluation report is generated to assist recruiters in shortlisting candidates efficiently. The proposed system improves fairness, reduces recruiter workload, and enhances the efficiency of the recruitment process.

Key Words*: *AI Interview Assistant, Recruitment Automation, Natural Language Processing, Machine Learning, Speech Recognition, Candidate Evaluation

1. INTRODUCTION

In today's competitive job market, recruitment has become one of the most critical activities for organizations. Hiring the right candidate not only affects the productivity of a company but also influences its long-term growth and success. Among all recruitment stages, the interview process plays a vital role in evaluating a candidate's technical skills, communication ability, confidence, and overall suitability for a given role.

Traditionally, interviews are conducted by human interviewers in a face-to-face or online environment. The interviewer prepares questions, interacts with the candidate, and evaluates performance based on personal judgment and experience. Although this method has been used for many years, it presents several limitations, especially in modern large-scale recruitment scenarios such as campus placements, mass hiring, and remote recruitment.

One of the major challenges of traditional interview systems is the amount of time and effort required. Recruiters are required to schedule interviews, prepare different sets of questions, take notes, and compare candidates manually. When hundreds of candidates apply for a single position, conducting individual interviews becomes extremely time-consuming and exhausting. This often leads to interviewer fatigue, which can affect the quality and fairness of evaluation.

Another important issue is human bias. Even experienced interviewers may unintentionally introduce bias based on factors such as first impressions, communication style, personal preferences, or stress levels. Different interviewers may evaluate the same candidate differently, leading to inconsistent results. Such subjectivity can result in deserving candidates being overlooked while less suitable candidates may be selected. Maintaining uniform evaluation standards across multiple interviewers and sessions is difficult in manual interview processes.

With the rapid advancement of technology, Artificial Intelligence (AI) and Natural Language Processing (NLP) have emerged as powerful tools capable of understanding, analysing, and processing human language. These technologies have already been successfully applied in various domains such as customer support, education, healthcare, and finance. In recent years, AI has also gained significant attention in the field of recruitment and human resource management.

AI-based recruitment systems aim to automate repetitive tasks and assist recruiters in decision-making. Machine learning algorithms are commonly used for resume screening, skill matching, and candidate shortlisting. However, resume-based evaluation alone is not sufficient to assess a candidate's real capabilities. Interviews remain an

essential component of recruitment, as they allow evaluation of problem-solving skills, communication ability, and confidence.

The need for an intelligent and automated interview system has increased due to the rise of remote work and online hiring. Organizations now require systems that can conduct interviews without physical presence while still maintaining fairness and accuracy. Automated interview systems can help standardize the interview process by ensuring that all candidates are evaluated using the same criteria and question sets.

The **AI Interview Assistant** proposed in this paper is designed to address these challenges by automating the interview process using Artificial Intelligence and Natural Language Processing techniques. The system conducts interviews in a structured and interactive manner, reducing dependency on human interviewers while maintaining evaluation quality. It provides a consistent interview experience to all candidates, regardless of time and location. The proposed system allows recruiters to define interview parameters such as job domain and difficulty level. Based on these inputs, the system automatically generates technical and behavioural interview questions. Candidates can participate in interviews using either chat-based or voice-based interaction. This flexibility improves accessibility and user experience, especially for remote candidates.

During the interview, candidate responses are collected and analysed in real time. Text-based responses are directly processed using NLP techniques, while voice-based responses are converted into text using speech-to-text technology. The system evaluates candidate performance by analysing technical correctness, relevance of answers, communication clarity, and confidence level. Sentiment analysis techniques are used to identify hesitation and confidence patterns in candidate responses.

One of the key advantages of the AI Interview Assistant is its ability to provide objective and consistent evaluation. Unlike human interviewers, the system applies the same evaluation criteria to all candidates, thereby reducing bias and inconsistency. The system generates structured performance scores and summarized reports that help recruiters quickly compare candidates and make informed decisions.

The overall design of the AI Interview Assistant follows a modular and scalable architecture. The system consists of a frontend interface for recruiters and candidates, a backend server for managing interview logic, an AI processing layer for question generation and evaluation, and a database for secure data storage. This architecture ensures smooth interaction between different components and allows future enhancements without major system changes.

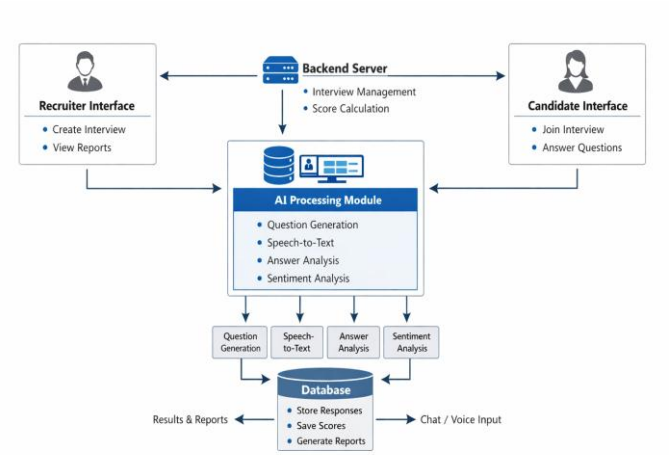

Fig. 1 System Architecture of AI Interview Assistant

II. LITERATURE SURVEY

In recent years, the recruitment and hiring process has undergone significant transformation due to advancements in Artificial Intelligence (AI) and Machine Learning (ML). Organizations are increasingly adopting automated systems to improve hiring efficiency, reduce human bias, and handle large volumes of applicants. The literature reveals that AI-based recruitment systems primarily focus on resume screening, candidate shortlisting, and preliminary skill assessment, while interview automation is still an evolving research area.

Early research in recruitment automation mainly concentrated on resume parsing and skill matching. Traditional keyword-based systems were used to extract relevant information from resumes and compare it with job descriptions. However, these systems often failed to capture contextual meaning and deeper candidate capabilities. To overcome these limitations, researchers introduced Natural Language Processing (NLP) techniques, which improved semantic understanding and contextual analysis of textual data.

Several studies have explored the use of NLP for analysing textual interview responses. Techniques such as tokenization, part-of-speech tagging, named entity recognition, and semantic similarity analysis have been applied to evaluate candidate answers. Research shows that NLP-based evaluation provides more consistent and objective results compared to manual assessment, especially in technical interviews where keyword relevance and conceptual accuracy are important.

With the rise of online interviews, speech processing technologies have gained importance in recruitment systems. Speech-to-text (STT) models such as Deep Neural Network (DNN) based systems have enabled accurate transcription of candidate responses. Studies indicate that converting spoken responses into text allows further

analysis using NLP models, making voice-based interviews suitable for automated evaluation. Researchers have also analysed speech features such as pauses, hesitation, and speaking rate to assess confidence and communication skills. Sentiment analysis has been widely studied for understanding emotional tone and attitude in human communication. In recruitment-related research, sentiment analysis has been used to identify candidate confidence, stress levels, and positivity during interviews. Machine learning classifiers and deep learning models have been applied to detect emotional patterns from textual and spoken responses. Literature suggests that sentiment-based evaluation can complement technical assessment by providing insights into soft skills.

Recent studies have focused on large language models (LLMs) such as GPT and T5 for question generation and answer evaluation. These models are capable of generating domain-specific interview questions with varying difficulty levels. Research demonstrates that LLM-generated questions maintain contextual relevance and improve interview standardization. Automated question generation reduces interviewer dependency and ensures uniform assessment criteria across candidates.

Several researchers have proposed AI-driven interview platforms that integrate multiple technologies such as NLP, speech recognition, and machine learning-based scoring systems. However, most existing systems are limited in scope, focusing either on technical evaluation or communication assessment. Few systems provide a complete end-to-end solution that includes question generation, live interview interaction, response evaluation, scoring, and reporting.

Studies also highlight ethical concerns and challenges associated with AI-based interviews. Issues such as data privacy, transparency, and algorithmic bias have been discussed extensively. Researchers emphasize the importance of secure data storage, encrypted communication, and explainable AI models to ensure trust and fairness in recruitment systems.

From the literature review, it is evident that AI has strong potential to enhance the interview process by improving efficiency, consistency, and scalability. However, there remains a gap in implementing a unified system that combines automated question generation, real-time interaction, speech analysis, sentiment detection, and structured performance reporting. The proposed AI Interview Assistant aims to bridge this gap by providing a comprehensive and practical solution for automated candidate evaluation.

III. PROPOSED METHODS FOR PRODUCT ANTI COUNTERFEITING USING BLOCKCHAIN

Counterfeiting of products has become a serious problem in global supply chains, causing financial losses to manufacturers and reducing consumer trust. Traditional anti-counterfeiting methods such as barcodes, holograms, and serial numbers are often vulnerable to duplication and manipulation. To overcome these limitations, blockchain technology offers a secure, transparent, and tamper-proof solution for product authentication and traceability.

The proposed method uses **blockchain technology combined with digital verification mechanisms** to prevent product counterfeiting. The system ensures that every product is uniquely identified, securely registered, and transparently tracked throughout the supply chain. The overall flow of the proposed system is illustrated in **Fig. 2**, which explains how data moves from product registration to final consumer verification.

Initially, during the **product registration phase**, each genuine product is assigned a unique digital identity such as a QR code or hash value. This identity is generated by the manufacturer and stored on the blockchain network. Once stored, the information becomes immutable, meaning it cannot be altered or deleted by unauthorized parties. This ensures the originality of the product data from the manufacturing stage itself.

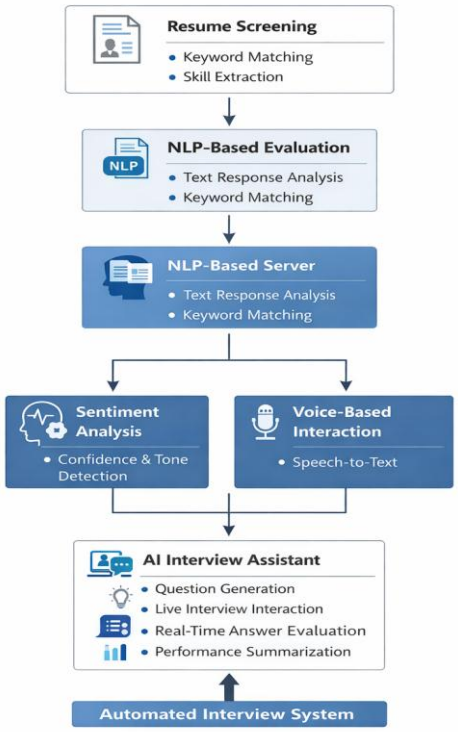

Fig. 2 Flow of AI Evolution in Recruitment

In the next phase, the registered product data is processed through a **blockchain-based verification layer**. Similar to the evaluation stage shown in the flow diagram, the system validates product details using cryptographic techniques. Each transaction related to the product—such as manufacturing, shipping, and distribution—is recorded as a new block in the blockchain. This creates a transparent and traceable history of the product.

The system then performs **data validation and integrity checks**, ensuring that the product information remains consistent across the supply chain. Any attempt to modify product details or introduce counterfeit items can be easily detected, as blockchain records are distributed and verified across multiple nodes. This stage ensures trust and reliability in the system.

Further, the proposed method supports **consumer-level verification**, where end users can scan the QR code using a mobile or web application. The scanned data is compared with blockchain records in real time. If the product information matches the original blockchain entry, the product is verified as genuine. Otherwise, the system flags it as counterfeit.

Finally, the system generates **verification results and reports**, similar to the final output stage in the flow diagram. Manufacturers and regulatory authorities can monitor product movement, identify counterfeit sources, and take corrective action. This automated and decentralized approach significantly improves supply chain transparency and reduces dependency on centralized authorities.

Overall, the proposed blockchain-based anti-counterfeiting method ensures product authenticity, improves consumer trust, and enhances supply chain security. By leveraging blockchain's immutability and transparency, the system provides an effective and scalable solution to combat product counterfeiting.

- **Resume Screening / Product Registration**

  Each genuine product is registered by the manufacturer and assigned a unique digital identifier such as a QR code or hash value.

- **Data Evaluation Layer**

  Product details are verified and validated before being stored on the block chain.

- **Block chain-Based Server**

  The blockchain network securely stores product information and transaction history in an immutable manner.

- **Integrity and Sentiment Analysis Layer**

  System checks data consistency and detects any unauthorized modification attempts.

- **Consumer Interaction / Verification**

  End users scan the product code to verify authenticity using a web or mobile application.

- **Final Authentication System**

  The system confirms whether the product is genuine or counterfeit and provides verification results.

3. CONCLUSIONS

The AI Interview Assistant project presents a comprehensive and intelligent system designed to modernize and streamline the recruitment and evaluation process. By integrating advanced Natural Language Processing (NLP) and machine learning techniques with web technologies, the system automates multiple stages of interviews, from question generation to candidate performance evaluation, ensuring efficiency, objectivity, and scalability. The project leverages state-of-the-art AI models, including GPT for question generation, Whisper for speech-to-text transcription, and BART/Pegasus for summary creation, allowing recruiters to conduct technical and behavioural interviews in both text and voice modes.

The system successfully addresses several challenges inherent in traditional recruitment methods, such as subjectivity, time consumption, and inconsistent evaluation standards. The AI-driven scoring mechanism evaluates technical accuracy, communication skills, and confidence levels, providing a holistic and quantitative assessment of candidates. Real-time analysis, supported by WebSocket connections, ensures instant feedback, while sentiment and entity recognition enable deeper insights into candidate responses. Additionally, the integration of a visualization and analytics dashboard, powered by Plotly.js and Grafana, provides recruiters with clear metrics and trends, enhancing data-driven decision-making.

Security and reliability have been given due consideration throughout the system's design. Features such as JWT-based authentication, encrypted storage of audio recordings, and robust error handling for model calls and network disruptions ensure that sensitive candidate data is protected, maintaining the integrity and trustworthiness of the platform. Furthermore, the modular architecture using React.js for the front-end and Node.js/Fast API for the back-end allows for future scalability and seamless integration of additional features, such as advanced interview domains or AI-driven predictive analytics.

In practical terms, this AI Interview Assistant reduces human workload, minimizes bias, and standardizes candidate assessment across different interviewers and sessions. The platform provides recruiters with ranked candidate lists, detailed summaries, and domain-specific insights, enabling faster and more informed hiring decisions. For candidates, the system offers an interactive and adaptive experience, with clear feedback that can help improve their skills over time.

Overall, the successful implementation of this project demonstrates the potential of AI-assisted interviewing as a transformative tool in human resource management. By combining cutting-edge AI models, real-time processing, and user-friendly interfaces, the system exemplifies how technology can enhance traditional recruitment practices, making the hiring process more objective, efficient, and transparent. The AI Interview Assistant thus represents a significant step toward intelligent, data-driven recruitment, with potential applications across corporate, academic, and technical hiring contexts.

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