

AI-Interview Analyzer Using Natural Language Processing and Speech Recognition

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Abstract - Artificial Intelligence has changed modern recruitment by allowing automated evaluation of candidates. Traditional interview methods require a lot of manual work and can lead to inconsistent evaluations. This paper introduces an AI Interview Analyzer that combines Natural Language Processing (NLP) and Speech Recognition techniques to automate interview analysis. The system is mainly about evaluating what people write which's a big part of what it does about 70%. The other 30% is about talking to the system. It can understand what people say because it can turn speech into text. The system can look at what people write and what they say when they are being interviewed. When the system checks people's answers, it uses ways to see how good they are, like looking for important words seeing how similar the answers are checking the words people use and seeing how long the answers are. The system then gives people scores. Tells them what they do well and what they need to work on. The system is mainly for people who want to get better at interviews for jobs in the IT field. It covers things like Python, Database Management Systems, Object-Oriented Programming, Operating Systems and Machine Learning. The system is really good, for people who want to learn about these things and get better at talking about them in interviews.

Key Words: Artificial Intelligence, Natural Language Processing, Speech Recognition, Interview Analysis, Mock Interview System, TF-IDF, Cosine Similarity, Automated Feedback

1. INTRODUCTION

Interviews are a part of hiring and choosing the right candidate. Organizations check if candidates have the technical knowledge can communicate well are confident and can solve problems. Traditional interview methods mostly rely on people evaluating candidates, which can sometimes lead to unfairness and take a lot of time. Candidates also don't get feedback on how they did and what they need to improve on.

New advancements in Artificial Intelligence Machine Learning and Natural Language Processing have led to the development of systems that can automate interview evaluations. These AI systems can look at candidate answers assess how well they communicate and give scores and feedback automatically. Many recruitment platforms, mock interview apps and online assessment systems use these AI systems.

The AI Interview Analyzer is a system that uses NLP and speech recognition to automate interview evaluations. Most of its functions 70% focus on analyzing text. The rest, 30% supports speech interaction by converting speech to text. When

candidates give answers, they are converted to text and then analyzed using NLP. The system checks candidate performance based on things, like how relevant their answers are, if they use the right keywords their sentiment, vocabulary originality and how long their answers are. The AI Interview Analyzer evaluates candidates based on their answers. It checks if answers make sense and have the keywords. The system also looks at how candidates express themselves and use vocabulary. It assesses if answers are original and long enough. This helps organizations make decisions.

The system generates automated scores and feedback to help candidates enhance their interview performance and communication skills. It is designed for IT-related interviews covering topics such as Python, Database Management Systems (DBMS), Object-Oriented Programming (OOP), Operating Systems, and Machine Learning. The goal is to provide a structured platform for interview practice that improves preparation through objective and automated evaluations.

2. Literature Survey

Several researchers looked into using Artificial Intelligence, Natural Language Processing (NLP) and Speech Recognition for automated interview evaluation systems. These systems mainly focus on analyzing responses assessing communication detecting emotions and giving feedback.

Chavan and Jadhav [1] presented an interview system that uses AI to improve traditional preparation methods. The system processes resumes using NLP to extract background, technical skills and specialization. It then conducts interview rounds, including HR, technical and aptitude-based. Candidate responses are evaluated using semantic similarity analysis. The system generates a performance report that points out strengths, weaknesses and areas for practice. However, it does not analyze -verbal communication and faces challenges with poorly structured resumes.

Golande et al. [2] proposed a mock interview evaluation system that combines speech, text and visual analysis. This framework records audio and video during interviews. Processes them with speech recognition and facial expression analysis. The system assesses -verbal behavior, like facial movements and eye contact. It generates interview questions and provides detailed feedback reports. However, performance drops in conditions and highly specific responses are hard to evaluate accurately.

Tejaswini et al. [3] developed an interview platform that integrates NLP-based question generation with speech analysis. This system uses transformer-based models to generate HR and situational questions. Speech responses are transcribed using speech recognition APIs and analyzed for accuracy,

relevance, vocabulary and communication quality. The system generates reports with scores and performance summaries. However, video analysis demands computational resources and raises privacy concerns.

Rao et al. [4] introduced a role- interview prep platform using large language models for dynamic question generation and automated response evaluation. The platform provides dashboards for users to track their performance and skill development. AI-generated evaluations aligned closely with assessments. However interpreting responses and integrating non-verbal analysis remained challenging.

Ahlawat, Aggarwal and Gupta [5] reviewed deep learning techniques used in Automatic Speech Recognition systems. The study looked at the progression of speech recognition models from methods to advanced techniques. Their findings showed that Transformer and Conformer models achieved transcription accuracy. However, challenges like variation, multilingual speech handling and low-resource language support remained.

Tang and Tung [6] proposed an Automatic Speech Recognition framework that improves transcription quality with generative Large Language Models. The system combines candidate hypotheses with information to create improved transcriptions. Experimental results showed reductions in Word Error Rate. However, this system needed computational resources and relied heavily on quality contextual information.

Rai et al. [7] developed an AI-based interview evaluation platform that combines speech analysis and facial expression recognition. The platform assesses candidates. Emotional behavior during interviews. The overall evaluation combines technical response analysis with assessment. However, limitations like dependence on labeled datasets and limited contextual understanding remained.

Wuttke et al. [8] proposed an interviewing framework that uses Large Language Models (LLMs) as interviewers. The system aims to improve survey methods by generating relevant follow-up questions. The experimental results showed that the AI interviews produced response quality to human interviewers. However, maintaining a conversational flow posed a challenge.

Pang et al. [9] introduced a human-like embodied AI interviewer using the Android robot ERICA. The system combined AI, automatic speech recognition and dialogue management. Evaluation was carried out with real-world interview sessions, where users reported experiences. However high computational demands and occasional unnatural responses remained a challenge.

Venkanna et al. [10] developed an AI Interview Simulator to assist with automated interview preparation and intelligent hiring support. The system utilized Natural Language Processing, Whisper-based speech recognition and Large Language Models. Experimental analysis indicated that the system improved interview practice through interactions and automated assessments. However, challenges with interpreting responses and reliance on speech recognition accuracy remained.

Reddy et al. [11] created AIVA, an AI-powered Interview Verbal Analysis system developed using tuned machine learning and Natural Language Processing models. The system focused on analyzing interview responses by merging speech recognition and NLP assessment techniques. Experimental

evaluations showed that the system increased the efficiency of automated assessments. However, challenges with speech clarity, background noise and the need for datasets remained.

Khan et al. [12] introduced an AI-powered Interview Preparation Web Application to aid interview practice through automated analysis and feedback. The system combined Natural Language Processing and speech analysis techniques to evaluate candidate responses. Experimental findings suggested that the system boosted interview preparation efficiency and user engagement. However, challenges with responses and reliance, on external APIs remained.

3. Observations and Insights from the Literature

The study of interview analysis systems shows that they are using Artificial Intelligence and Natural Language Processing a lot more these days. They do this to automatically evaluate interviews and assess people who are being interviewed. Most systems today look at how people answer questions how they talk and how well they communicate. They also give feedback to help people get better at interviews and learn skills.

A lot of research is being done on how to make systems that can understand what people are saying and give them scores. These systems use things like speech recognition and Natural Language Processing to do this. They can even convert spoken words into text. Then analyze it. New systems that use things like Transformer and Conformer architectures are getting better at understanding what people are saying even if they speak languages.

The study also found that many interview platforms are using something called analysis. This means they look at things like what people saying, their facial expressions and how they behave. They also use something called AI to make interviews feel more real. Big Language Models are being used to create questions ask follow-up questions and analyze how well people are doing. Some systems can even look at how people behaving in real-time and figure out how confident they are.

Even with all these advancements there are still some problems with interview evaluation systems. For example, speech recognition systems can get confused if there is background noise or if people speak with an accent. They can also struggle to understand people who speak languages or use technical terms. These problems can make it hard to get scores.

Another thing the study found is that using video to analyze people behavior can be complicated and raise privacy concerns. This is because it involves watching and storing what people are doing. Some interview systems are like boxes, where it is not clear how they are scoring people. This can make it hard to trust the system.

The study also found that most interview systems are designed for companies but there are not as many systems for students or people who want to practice their interview skills. Existing systems can also have trouble understanding answers that're not clear or are very technical. If they rely on the internet to work, they can be slow and expensive to use.

So, the proposed AI Interview Analyzer is designed to be simple and easy to use. It focuses on analyzing text-based interviews. It also allows people to speak their answers. The system uses things like speech-, to-text conversion, keyword

matching and automated feedback generation to help people prepare for interviews. It is designed to be efficient, scalable and easy to use while also minimizing privacy concerns. The system concentrates on the important parts of interview evaluation and tries to keep things simple.

4. PROPOSED SYSTEM AND PRELIMINARY METHODOLOGY

The AI Interview Analyzer is made in steps that work together to see how well a candidate does. First, we make a list of questions to ask the candidate. Then we get the answers from the candidate they can. Talk their answer. If they talk their answer, we use a tool to turn what they say into text. We do some work on this text to get it ready. Then we use something called Natural Language Processing to look at it. We want to know if the answers are good and make sense so we use some ways to check them. We look for words we use something called TF-IDF to make a list of important words and we use cosine similarity to see how similar the answers are, to what we are looking for. The AI Interview Analyzer uses all these steps to evaluate the candidate. The AI Interview Analyzer looks at the answers to see how good they are. If they are what we want. The AI Interview Analyzer is a tool that helps us pick the candidate. Based on this analysis, the system generates scores and provides automated feedback along with performance reports. The complete architecture of the proposed system is illustrated in Fig. 1.

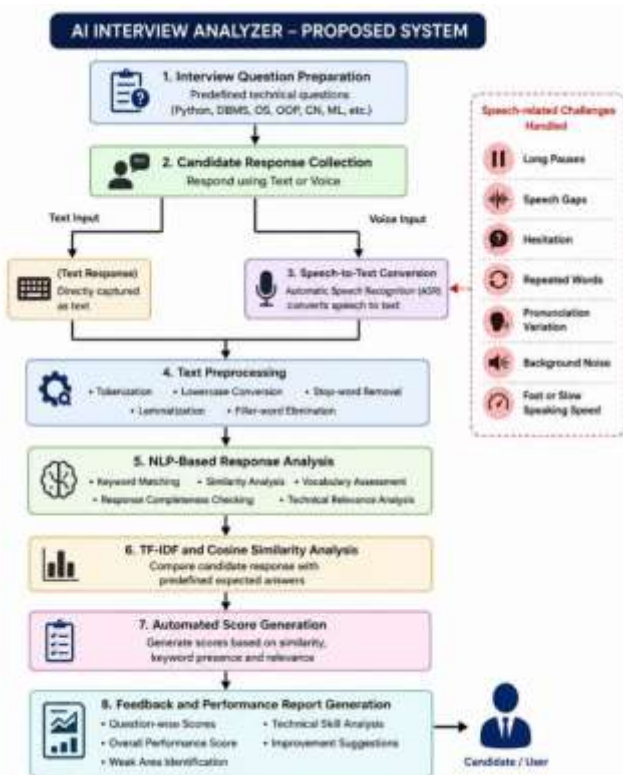


Fig 1: Proposed System Architecture of AI Interview Analyzer

The AI Interview Analyzer is made to make interview evaluation easier using Natural Language Processing and Speech Recognition. This system is mainly for people who are getting ready for interviews. It looks at what the person who is being interviewed says and writes. It does this in a smart way.

Most other systems look at videos. Need a lot of power to work but this one is different. It is easy to use and does not need a lot of power because it mostly uses Natural Language

Processing to evaluate people and it also uses Speech Recognition. 70% of the AI Interview Analyzer looks at what people write when they answer interview questions. The other 30% is for when people talk and answer questions loudly. People who are being interviewed can answer questions by typing or, by speaking. If they speak the AI Interview Analyzer turns what they say into writing using Automatic Speech Recognition before it looks at what they said and decides what it means. The AI Interview Analyzer uses Natural Language Processing and Speech Recognition to evaluate people.

4.1 Major Functional Modules

The proposed system includes the following modules:

- Interview Question Preparation
- Candidate Response Collection
- Speech-to-Text Conversion
- Text Preprocessing
- NLP-Based Response Analysis
- Keyword Matching
- TF-IDF and Cosine Similarity Analysis
- Automated Score Generation
- Feedback and Performance Report Generation

4.2 Working of the Proposed System

Initially, predefined interview questions related to technical subjects like Python, DBMS, Operating Systems, Object-Oriented Programming, Computer Networks, and Machine Learning are stored in the system. Candidates respond to these questions through text or speech.

For speech-based interviews, the system captures candidate audio responses through a microphone and converts them into text using speech recognition libraries. During this stage, several speech-related challenges are addressed, including:

- Long pauses
- Speech gaps
- Hesitation
- Repeated words
- Pronunciation variation
- Background noise
- Fast or slow speaking speed

These factors may impact transcription quality and interview evaluation accuracy. To minimize these issues, the system performs preprocessing operations such as tokenization, stop-word removal, lowercase conversion, lemmatization, and filler-word elimination before response analysis.

4.3 NLP-Based Evaluation

After preprocessing, the system evaluates responses using multiple Natural Language Processing techniques:

- Keyword Matching
- Similarity Analysis
- Vocabulary Assessment
- Response Completeness Checking
- Technical Relevance Analysis

TF-IDF vectorization and cosine similarity methods are used to compare candidate responses with predefined expected answers. Based on the similarity score and keyword presence, the system generates automated performance scores and structured feedback.

4.4 Automated Feedback Generation

The generated feedback report contains:

- Question-wise scores
- Overall performance score
- Weak area identification
- Technical skill analysis
- Improvement suggestions

The proposed methodology aims to provide an efficient and scalable interview preparation platform while reducing computational complexity and privacy concerns associated with video-based behavioral analysis systems.

5. DATA AVAILABILITY

The AI Interview Analyzer uses a lot of things to work. It uses things that're available to the public and things that people made just for this. The AI Interview Analyzer looks at interview questions what the right answers should be, what people say and how they say it. All of this was collected when people practiced interviewing.

When the AI Interview Analyzer looks at interviews that're just text it uses questions about things like Python, Database Management Systems, Object-Oriented Programming, Operating Systems, Computer Networks and Machine Learning. The AI Interview Analyzer knows what the right answers are and what words are important. This helps the AI Interview Analyzer see how similar the answers are and score them.

When the AI Interview Analyzer looks at interviews that are just talking it changes what people say into text. The AI Interview Analyzer uses tools to do this. The AI Interview Analyzer also uses things that are available to the public to make sure it gets everything right. The AI Interview Analyzer looked at things like LibriSpeech to see how people talk differently. This helps the AI Interview Analyzer understand when people talk differently pause or say things wrong.

The AI Interview Analyzer only used all of this for school. To learn more about interviews. The AI Interview Analyzer did not use any information about people. The AI Interview Analyzer was very careful with all of the information it used. The AI Interview Analyzer and the interview data were used for the AI Interview Analyzer and interview analysis. The AI Interview Analyzer and the interview data helped with the AI Interview Analyzer.

6. CONCLUSIONS

The proposed AI Interview Analyzer provides an efficient approach for automated interview evaluation using Natural Language Processing and Speech Recognition techniques. The system mainly focuses on text-based interview analysis while also supporting speech-based interaction through speech-to-text conversion. By using keyword matching, TF-IDF

vectorization, cosine similarity analysis, and automated feedback generation, the system helps candidates improve technical knowledge, communication skills, and interview performance.

The study observed that many existing interview systems face challenges related to computational complexity, speech recognition errors, and privacy concerns. To address these issues, the proposed framework emphasizes lightweight NLP-based evaluation and scalable speech processing techniques. The system is mainly designed for IT-related interview domains and aims to provide an easy-to-use and effective interview preparation platform.

In future work, the system can be extended by incorporating multilingual interview support, adaptive AI-based question generation, emotion analysis, and advanced speech processing methods to further improve interview evaluation accuracy and user experience.

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