

# Virtual Interviewer Using Deep Learning

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**Abstract**— One of the important stages in the life of a student is his or her first job. Naturally, a candidate will be quite nervous during an interview as it is a completely new experience. Due to such nervousness, a candidate might not be able to project his/her emotions correctly. This can have a negative impact on the result of the interview. To avoid this, prior practice is required. In order to make the candidate become more confident, we propose a system in which a candidate can practice some commonly asked interview questions and receive concrete feedback based on the response submitted. This will help a candidate become a best fit for the company.

The system will put some common interview questions to the user. The system will use machine learning and deep learning models to detect the emotions in the input. The analysis of each question will be shown to the user. Apart from this, a report of all the questions answered by the user will be generated at the end. This report contains the most common emotion displayed by the user throughout the interview. This comparison will help the user his/her shortcomings and thus, help him/her prepare better for the interview process.

**Keywords**— Emotions, Feedback, Report, Speech recognition, Voice recognition, Text-to-speech.

## I. INTRODUCTION

A Virtual Interviewer for students to practice and improvise their skills by understanding where do they lack. Candidates are unable to get a job because of communication and other such factors need an interface where they can get an opportunity to practice and gain the confidence of cracking an automated interview. The proposed approach will be able to assess the video submitted by the candidate and display most common emotion viewed by the candidate throughout the interview. This comparison will help the user his/her shortcomings and thus, help him/her prepare better for the interview process. The primary goal of virtual interviewer systems is to streamline the recruiting process, reduce the workload of recruiters, and provide a more engaging and personalized experience for candidates. These systems can conduct initial

screening interviews, ask questions in a conversational manner, and provide feedback to candidates based on their responses. Overall, virtual interviewer systems using deep learning are transforming the recruiting process, providing more efficient and effective ways to identify the best candidates for a wide range of positions.

## LITERATURE SURVEY

This study proposes an approach to dialog state tracking and action selection supported deep learning methods. First, the interview corpus during this study is collected from 12 participants, and is annotated with dialog states and actions. Next, a long-short term memory and a man-made neural network are employed to predict dialog states and therefore the Deep RL is adopted to find out the relation between dialog states and actions. Finally, the chosen action is employed to get the interview question for interview practice. To gauge the proposed method in action selection, an interview coaching system is made. Experimental results show the effectiveness of the proposed method for dialog state tracking and action selection. In this study, an interview coaching system is proposed and constructed for dialog state tracking and action selection. LSTM and ANN are employed to predict dialog states and the deep RL is used to learn the relation between dialog states and actions. Advances in computer vision and pattern recognition based on deep learning (DL) techniques have led to the establishment of convolutional neural network (CNN) models that can successfully recognize human nonverbal cues and attribute their personality traits with the utilization of a camera. During this study, an end-to-end AI interviewing system was developed using asynchronous video interview therefore the true personality scores from the facial expressions and self-reported questionnaires of 120 real job applicants.

Y. Adepu and V. R. Boga "Interviewee Performance Analyzer Using Facial Emotion Recognition and Speech Fluency Recognition" The proposed system consists of two main components: facial emotion recognition and speech fluency recognition. The facial emotion recognition component uses a deep learning-based model to recognize the emotions of the interviewees based on their facial expressions. The speech fluency recognition component uses a speech recognition model to evaluate the fluency of the interviewee's speech.

G. Sandbach, S. Zafeiriou, M. Pantic, and L. Yin "Static and dynamic 3d facial expression recognition: A comprehensive survey" The study aimed to provide a comprehensive review of the state-of-the-art in 3D facial expression recognition, both static and dynamic. The authors believed that 3D facial expression recognition had significant potential for applications in areas such as human-computer interaction, emotion recognition, and biometrics. The results of the study indicated that 3D facial expression recognition had made significant progress in recent years, particularly in dynamic approaches that capture and analyze temporal changes in facial expressions.

I. Naim, M. I. Tanveer, D. Gildea, and M. E. Hoque "Automated prediction and analysis of job interview performance: The role of what you say and how you say it" The study aimed to investigate the role of verbal and nonverbal communication in job interview performance and to develop an automated system for predicting and analyzing interview performance. The authors believed that understanding the relationship between communication and job interview performance could help job seekers improve their interviewing skills and increase their chances of success.

T. W. Dougherty et al "Confirming first impressions in the employment interview: A field study of interviewer behavior" The study aimed to investigate the impact of first impressions on the employment interview process. They measured the interviewers' behavior, including their verbal and nonverbal communication, and the interview outcomes, such as the interviewees' ratings, job offers, and acceptance rates.

B. Froba and A. Ernst "Face detection with the modified census transform" The census transform is a technique that is widely used in computer vision for various tasks such as stereo matching, optical flow, and texture analysis. The MCT is an extension of the traditional census transform, which is used for detecting faces in images. The MCT works by comparing the intensity values of a pixel with its neighboring pixels in a circular pattern. The pattern is defined by a radius and a number of sampling points. The resulting binary string is then used as a feature vector to detect faces in the image.

Simon L. Dolan, Zhaoli Song, and Philip J. Corr "Virtual job interview coaching" The virtual coaching group received coaching via a virtual coaching platform, which included simulated job interview questions, personalized feedback, and coaching tips. The face-to-face coaching group received coaching in person, and the control group did not receive any coaching. The results of the study

showed that both the virtual coaching group and the face-to-face coaching group reported significant improvements in their interview performance compared to the control group. However, there was no significant difference between the two coaching methods in terms of their effectiveness.

Edwin N Torres, Amy Gregory "Hiring manager's evaluations of asynchronous video interviews" Asynchronous video interviews (AVI) occur when an employment candidate records responses to pre-selected interview questions and an employer reviews them afterwards. This study examined the influence of the review process, the effect of aesthetics, and hard and soft skills on hiring managers' reviews of AVIs. The results from 517 observations reveal that the order of the interview (i.e., interview first versus resume first) had an impact on the hiring managers' decisions.

Jelena Gorbova, Iiris Lusi "Automated screening of job candidate based on multimodal video processing" The selection of adequate job candidates is very long and challenging process for each employer. The system presented in this paper is aiming to decrease the time for candidate selection on the pre-employment stage using automatic personality screening based on visual, audio and lexical cues from short video-clips. The system is build to predict candidate scores of 5 Big Personality Traits and to estimate a final decision, to which degree the person from video-clip has to be invited to the job interview.

Jin-Young Kim, WanGyu Heo "Artificial intelligence video interviewing for employment" In 2018, an artificial intelligence (AI) interview platform was introduced and adopted by companies in Korea. This study aims to explore the perspectives of applicants who have experienced an AI-based interview through this platform and examines the opinions of companies. The participants, who had recent experience of AI interviews, were recruited offline and online.

Archit Aggarwal, Akash Kumar, Ankesh Patel "Multimodal Sentiment Analysis Model using Machine Learning" The architecture consists of three separate modules to perform sentiment analysis in three mediums - audio, video, text. The data is captured and processed using NLP and OpenCV to detect the user's performance concerning other users and also assess the sentiments exhibited by the user. The machine learning algorithm used will be for video and audio, and textual analysis. The Algorithms used will be chosen in such a way as to avoid overfitting and give accurate results to the users.

V. Soman and A. Madan "Social signaling: Predicting the outcome of job interviews from vocal tone and prosody" The paper discusses the use of vocal tone and prosody to predict the

outcome of job interviews. The authors conducted a study in which they recorded job interviews and analyzed the vocal tone and prosody of both the interviewer and the interviewee. The authors found that certain vocal features such as pitch range, speaking rate, and pauses were strong predictors of the outcome of the interview. They used machine learning algorithms to analyze the data and predict the outcome of the interviews based on these vocal features.

### III. METHODOLOGY

#### A. Natural Language Processing (NLP):

NLP is a critical module that is responsible for understanding the user's responses to interview questions. This module may involve tasks such as text pre-processing, word tokenization, part-of-speech tagging, and named entity recognition. Common deep learning models used for NLP include Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs), and Transformer-based models like BERT.

#### B. User Interface:

The user interface is a key module that provides the interface for the user to interact with the virtual interviewer. This module includes designing and implementing the front-end interface using a framework such as javascript.

#### C.Database:

The database module is responsible for storing the interview questions, responses, and other relevant information related to the virtual interviewer. This module may involve integrating a database management system such as MySQL or MarineDB.

#### D.Emotion recognition:

This module detects the candidate's emotional state based on their speech patterns and facial expressions. Deep learning models such as CNNs or RNNs can be used for emotion recognition.

#### E.Feedback generation:

This module generates feedback for the candidate based on their performance in the interview. This may involve providing suggestions for improvement or highlighting areas of strength. Deep learning models such as Generative Adversarial Networks (GANs) can be used for feedback generation.

### IV. ARCHITECTURE

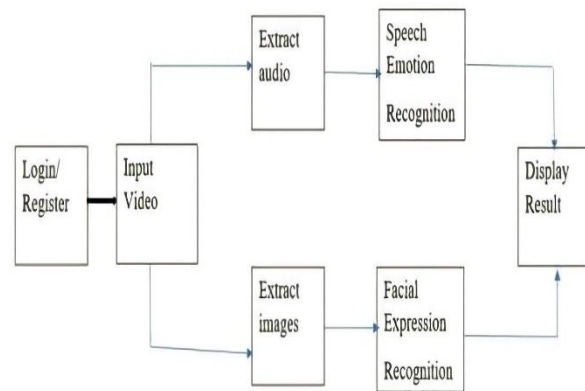


Fig 4.1: System Architecture

### V. APPLICATIONS

#### 1. Recruitment:

Virtual interviewers can help companies streamline their recruitment process by conducting initial interviews with job candidates. This can save time and resources, and also help reduce unconscious bias in the hiring process.

#### 2. Education:

Virtual interviewers can be used in educational settings to help students practice and improve their interview skills. This can be especially helpful for students preparing for college or job interviews.

#### 3. Customer service:

Virtual interviewers can be used by companies to provide customer support or to conduct customer satisfaction surveys. Customers can interact with the virtual interviewer to provide feedback or ask for assistance, and the interviewer can provide relevant information or escalate the issue to a human representative if necessary.

### VI. CONCLUSION

Using OpenCV, video can be captured and by using Haar cascade algorithm we can successfully detect faces. Using Xception model, we can successfully detect emotions throughout the video by Pointwise convolutions followed by depthwise convolutions. Using Time Distributed Convolutional Neural Network, we can detect the emotions in the voice.

## VII. FUTURE SCOPE

One potential use case for virtual interviewers using deep learning is in the initial screening of job candidates. A virtual interviewer could use natural language processing techniques to analyze the candidate's responses and determine whether they meet the minimum qualifications for the job. Virtual interviewers could also be used to personalize the interview experience for each candidate. By using deep learning algorithms to analyze a candidate's background, education, and work experience, a virtual interviewer could ask targeted questions that are relevant to their unique qualifications and interests. Overall, the future of virtual interviewers using deep learning is bright. As the technology continues to improve, it has the potential to revolutionize the way we conduct interviews and select candidates, making the process more efficient, effective, and personalized.

## VIII. REFERENCES

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