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INTELLIGENT VIDEO INTERVIEW AGENT

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ABSTRACT - The process of selecting the right candidate for a job is a crucial task for any organization. To make this process efficient and effective, an intelligent interview system is proposed in which the interviewer sends a set of questions to the interviewee, who responds to them through a video recording. The video is then uploaded to an application thatuses sentiment analysis to determine the interviewee's confidence level and suitability for the job. This system aims to reduce bias and increase accuracy in the selection process.

Keywords – [Facial recognition, Affective computing, Big Five,Behavioral analysis, Deep learning, Lens model, Personality computing, AI-powered interview.]

1. INTRODUCTION

The traditional process of conducting job interviews involves face-to-face interactions between the interviewer and interviewee. However, this method can be time-consuming and costly, especially if the candidate is from a different location. To overcome these challenges, an intelligent interview system is proposed. This system enables the interviewer to send a set of questions to the interviewee, who can respond to them through a video recording. This recording is then analyzed using sentiment detection techniques to determine the interviewee's suitability for the job.

Personality qualities and interpersonal communication abilities have been highlighted as key success factors for work performance and organizational effectiveness. Members of the workforce with good communication skills are able to convey verbal and nonverbal messages to various stakeholders to trade information, share information, and provide feedback. While nonverbal cues like gestures, facial expressions, posture, and voice tones assist us grasp underlying emotions, attitudes, and moods, verbal cues are utilized to convey specific words. Personality traits are unique ways of thinking, feeling, and acting that can be used to determine if a person is a good fit for a particular organizational setting or employment context.

Face-to-face interviews are a typical technique of hiring, and they are a reliable tool for evaluating an applicant's interpersonal communication abilities in a structured manner. Additionally, interviewers may make hiring decisions based on their assessment of a candidate's personality attributes based on his or her nonverbal communication during the interview. However, it is not cost-effective to invite each applicant for a position to a face-to-face interview. The asynchronous video interview (AVI) is a substitute that asks job candidates to login to an interview platform and record their answers to predefined interview questions using a webcam and microphone on a computer or mobile device. The answers are then later reviewed by human raters. Candidates can record their responses to questions using AVI at any time or location. Additionally, AVI speeds up the hiring process because the interview video records can be sent and evaluated separately at the raters' convenience without scheduling an interview.
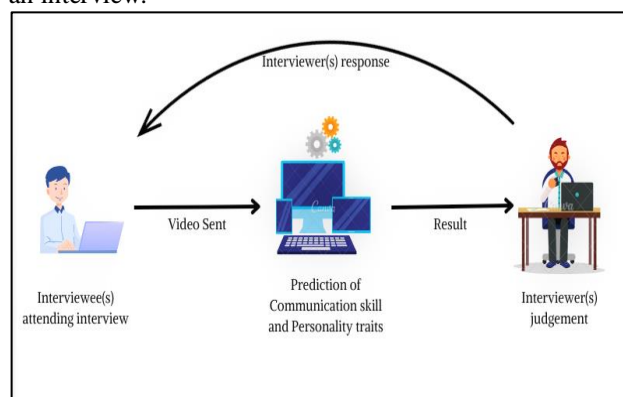
Figure 1: The process of the interviewer'sjudgement towards the interviewee's communication skills and personality traits

2. OBJECTIVES

- To develop software that predicts personality traits and interpersonal communication skills, as judged by human raters.
- Extract the interviewees' facial expressions in each frame.
- The goal is to create a convolutional neural network (CNN) using TensorFlow, which will serve as an intelligent video interview agent based on AVI and semi-supervised deep learning.
- Analyze both the accuracy and precision of our software in predicting interviewees' communication skills and personality traits.

3. LITERATURE SURVEY

Conrad, David and Robert D. Newberry. "24 Business Communication Skills: Attitudes of Human Resource Managers versus Business Educators." (2011).

The significance of 24 unique corporate communication skills was investigated from the perspectives of human resource managers and business school professors. Prior research revealed a strong consensus regarding the significance of employee and student communication

skills for successful job performance. However, the literature also made the case that various goals could evoke divergent views on particular competencies that make up effective communication. Conrad (2003) created three skill sets based on the widely acknowledged communication constructs of organizational, leadership, and interpersonal communication abilities in response to the demand for more specific communication skill characterization. The findings of this study demonstrate that company executives and business educators have a common understanding of the value of overall employee/student communication abilities, but their opinions on the significance of specific skills are very different.

Hough, Leaetta, and Stephan Dilchert. "Personality: Its measurement and validity for employee selection." In Handbook of employee selection, pp. 298-325. Routledge, 2017.
The authors discuss the arguments for and against using personality traits in hiring decisions, as well as the supporting data. They discuss the mega-trends that have influenced the personality traits that are chosen to be part of the selection processes, how they are assessed, and the outcomes they are anticipated to predict. The authors discuss concerns relating to taxonomic organization, measurement approaches, level of measurement, validity, and elements that both jeopardize and strengthen personality measurement validity. The social environment is also changing quickly, which has an impact on how personality traits are measured. Mega-data is a phenomenon that is altering how personality factors are studied, used to choose and place people in work contexts, and will be studied in the future.

Spitzberg BH, Adams TW. "CSRS the Conversational Skills Rating Scale: An Instructional Assessment of Interpersonal Competence." Washington D.C: NCA National Communication Association; 2007.
In order to give a psychometrically sound tool for evaluating one's own or other interpersonal abilities in the context of the conversation, the Conversational Abilities Rating Scale (CSRS) was created. Its content mixes verbal and nonverbal behaviors, and it can be applied in a range of settings, including educational settings. The CSRS is composed of 25 behavioral items that are written at relatively microscopic levels and fall into four skill clusters: attentiveness, formerly known as alter centrism (i.e., a tendency to be concerned with, interested in, and attentive in a conversational partner), composure (i.e., avoidance of anxiety cues and an assertive or confident manner), expressiveness (i.e., gestural and facial animation, topical verbosity, etc.), and coordination, formerly known as interaction management, which includes topics like topic invention, coordinated entry and exit from discussions, and the smooth flow of conversational exchanges.

Mohammadi G. and Vinciarelli A. "Towards a technology of nonverbal communication: vocal behavior in social and affective phenomena." In: Gokcay, D. and Yildirim G. (eds.) Affective Computing and Interaction: Psychological, Cognitive and Neuroscientific Perspectives, 2012.

The primary means through which we gain access to other people's inner lives, including their emotions, feelings, moods, social attitudes, etc., is through nonverbal communication. Since nonverbal communication relies on signs like facial expressions, vocalizations, gestures, postures, etc. that we can experience with our senses and that can be (and frequently are) recognized, analyzed, and synthesizedin automatic ways, this piques the attention of the computing community. To put it another way, nonverbal communication has the potential to serve as a functional interface between computers and some of the most significant facets of human psychology, such as emotions and social attitudes. As a result, it appears that a new computing field called "technology of nonverbal communication" is emerging. This chapter describes some of the most significant features of such a potentially novel area as well as some of its most significant outlooks.

4. SYSTEM ARCHITECTURE
The proposed system consists of three main components: the interviewer's application, the interviewee's video recording, and the sentiment analysis engine. The interviewer's application is responsible for sending the questions to the interviewee and receiving the video recording. The interviewee's video recording is analyzed by the sentiment analysis engine, which determines the emotional tone of the interviewee's responses. The sentiment analysis engine uses natural language processing techniques and machine learning algorithms to analyze the video recording. The output of the sentiment analysis engine is a confidence score that indicates the interviewee's suitability for the job.

To develop software that could be used to predict personality traits and interpersonal communication abilities as judged by human raters, we created a three-stage model,
1) video data processing
2) classifier training
3) classifier validation

In the video data processing stage, to extract the candidate's facial expressions from each frame, we created an AVI. By tracking 86 face landmark points per frame, the facial traits have been identified using OpenCV and Dlib. The AVI records for each interviewee were used to extract each face characteristic from each frame within a 5 s time window. To eliminate unwanted noise in the feature extraction, such as
interference from hair and cosmetics, preprocessing was necessary.
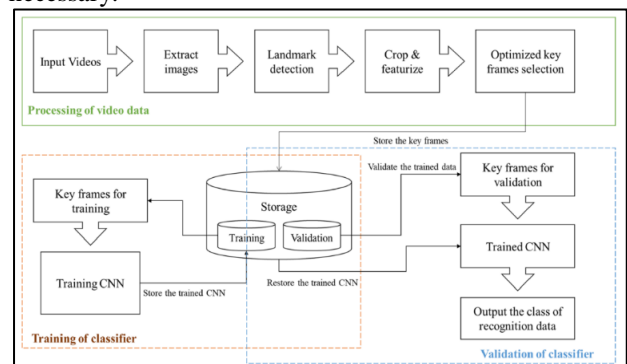
Figure 2: Video data processing, classifier training, and classifier validation

In order to train the classifier, we detected and cropped face images, demonstrating how we retrieve the original face image, identify facial landmarks, and do so. In order to lessen the impact of illumination and highlight the aspects that are associated with facial expression and movement, we transformed the cropped photos to a grayscale model after that.

In the classifier training stage, to train our prediction model for communication abilities and the Big Five personality traits, we integrated the extracted features from the 57 interviewees' extracted features with their labelled data. The model was a CNN model built with Tensor Flow.

In the classifier validation stage, through random sampling, the training set (50%) and validation set (50%) were obtained. Six distinct characteristics were collected from each interviewee: one communication skill score and five personality qualities.

CONCLUSIONS

The proposed intelligent interview system is an innovative approach to selecting the right candidate for a job. By using sentiment analysis, the system can provide valuable insights into the emotional tone of the interviewee's responses. This system aims to reduce bias and increase the accuracy of the selection process. However, further research is required to validate the effectiveness of this system in real-world scenarios.

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