

# Emotional Analysis of Candidate and Keeness to Join an Organization

Riya Dharamsi<sup>1</sup>, Himani Gwalani<sup>2</sup>, Shaunak Padhye<sup>3</sup>, Rushikesh Yadwade<sup>4</sup>  
SCTR's Pune Institute of Computer Technology, Pune, Maharashtra, India

**Abstract:-** The prediction of an individual's communication skills is a critical issue not only in psychology but also in the industrial sector. Every company wants to poach only the righteous and skilful candidates those who align with their interests. This hiring process is quite hectic,time consuming for the recruiters and candidates also tend to back out at the last moment as a result of which automation of this process has become a dire need for these organizations to save time as well as money. Our objective is to tackle this problem and hire only the eligible and keen candidates for the organization. This paper proposes an approach for the emotional analysis and keeness detection of a candidate to join an organization using modern and sophisticated algorithms like CNN, Viola-Jones, Natural Language processing,etc.

**Keywords:-** Sentiment analysis , Keeness detection, Convolutional Neural Network(CNN), Computer Vision(CV), NLP.

## I. INTRODUCTION

Over the years there have been major advancements in technology,organizations have integrated necessary technology with daily operations to ease the work hassles. We believe that companies are known by their people and we wish to get the right people at the right place based on their talent and skills which will boost the company's growth as well as their own.

The most common challenge companies face while hiring a candidate is the candidate backing out at the moment of joining.The recruitment process is a crucial part of any organization where substantial resources are spent and all the work goes in vain when the candidate backs off after accepting the offer. According to Jobvite 2017 Recruiting Funnel Benchmark Report, average time-to-hire a new employee was 39 days in 2016, down from 43 days in 2015. According to SHRM Human Capital Benchmarking Report 2016, Average cost per hire for companies is \$4,129. This problem can be reduced to some extent if the candidate's behaviour is quantified. This paper proposes a solution to tackle this problem by analysing the facial cues and expressions of a candidate during the hiring process with the help of machine learning techniques like CNN,NLP,etc. The candidate will be asked to login to an interview platform and we will record their overall

interaction and behaviour through the webcam to predefined interview questions. Because of our solution the interview process will be streamlined and the final report can be shared and assessed independently at the recruiter's convenience without scheduling the interview.

## II. LITERATURE SURVEY

Hung-Yeu Suen, Kuo--En Hung and Chen Chien-Liang Lin [1] proposed an intelligent video interview agent to predict the communication skill and perceived traits in a candidate. The paper mentions extraction of the facial expressions of the candidate by the CNN and manual rating by three human raters .So basically internal personal communication skills,openness,agreeableness,etc as perceived by the human raters were learned and predicted successfully by the network.

P. P. Dahake, K. Shaw and P. Malathi, "Speaker dependent speech emotion recognition using MFCC and Support Vector Machine", 2016 [2] provides a method to identify emotions using audio. The audio is converted to MFCC signals and comparison between different SVM kernel functions like linear, polynomial, quadratic and RBF is provided.

M. S. Likitha, S. R. R. Gupta, K. Hasitha and A. U. Raju, "Speech based human emotion recognition using MFCC", 2017,[3] it recognizes speaker emotions using the data extracted from the speaker's voice signal. This paper achieved an accuracy of 80% in identifying three emotions: happy, sad and angry.

Yingruo Fan, Jacqueline C.K Lam,Victor O.K Li ,,"Video-based Emotion Recognition Using Deeply-Supervised Neural Networks 20th ACM International Conference on Multimodal Interaction",2018 [4] uses Viola Jones Object detection algorithm. The video based emotional recognition is carried out in two parts, the first is the face detection in which the viola jones algorithm is used. This is a pre-trained algorithm provided by opencv which uses different techniques like haar feature selection,creating an integral image,adaboost training and finally a cascading classifier to to select only the true positives.The second part is the emotional analysis from the detected faces which is done by the convolutional neural network(CNN) to classify the facial cues into one of the seven classes of anger, fear, disgust, happy, sad, neutral, surprise.

### III. PROPOSED METHODOLOGY

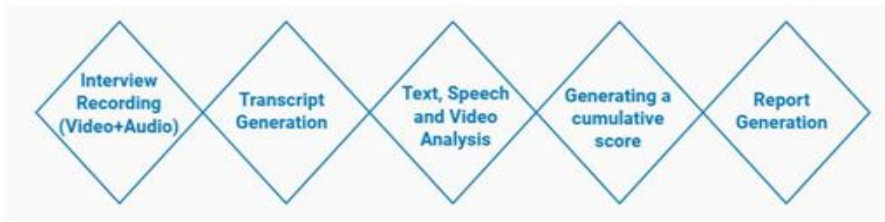


Fig 1:- Methodology

The project can be divided into the following modules:

➤ *Interview Module:*

In this module, the videos from the interviewing candidates will be captured. The user (candidate) will login to the system. Then, a series of HR questions will be displayed. The questions will be selected by the company for which the candidate is interviewing. For each question, the candidate will have to record a video response. These responses will be stored and analysed later.

➤ *Analysis Model:*

The video responses stored from the previous module will be analysed in this module. Firstly, the videos will be converted into three forms: video, audio and transcript. The video will be analysed by using computer vision. The audio

will be converted to mfcc signals and analysed. Natural Language Processing techniques will be used to analyse the transcript. These techniques will be used to perform emotional analysis on the data. This preliminary analysis will generate some data which will be further analysed to infer the candidate’s interest in the organization taking the interview. The emotional analysis data will also be used to infer whether a candidate is a fit for the company based on parameters other than keenness.

➤ *Report Module:*

The report module is where the result of the analysis will be displayed. Interactive charts and graphs will be used to best convey the result and make it easy for the company to make a decision on whether the candidate is right for the company.

### IV. ARCHITECTURE DIAGRAM

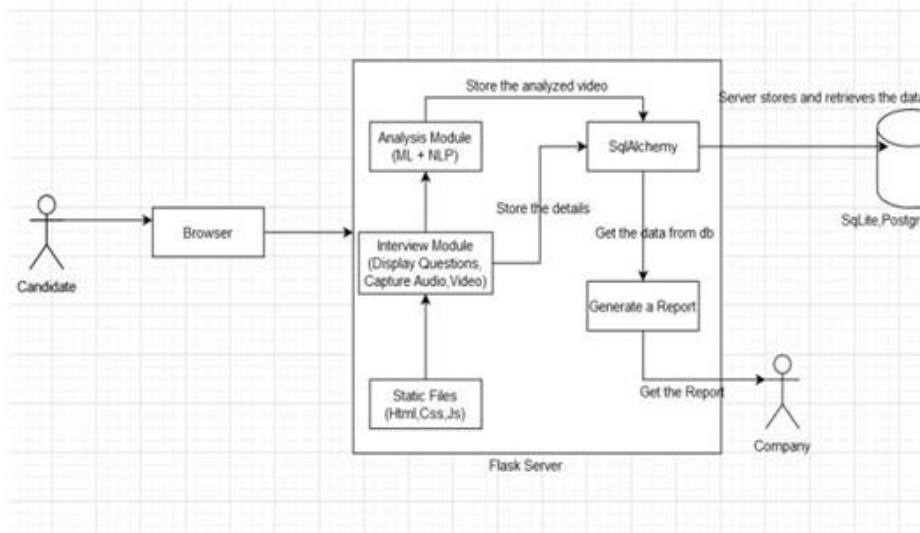


Fig 2:- Architecture Diagram

We have considered the flask REST to handle the request and response from the client. The server stores and retrieves the data from the sqlite/postgresql database through sqlalchemy. SQLAlchemy provides a nice ORM(Object Relational Mapping) to interact with our database with the help of python. The flask api provides sophisticated libraries to develop the application. The analysis module is the crux of our architecture. It contains ML and NLP modules to quantify the candidate behaviour. In ML part we have used different libraries like OpenCV for video processing captured through the webcam in the interview module,

keras/sklearn for identifying the sentiment of the candidate. In NLP part, transcript is generated of the candidate audio and further processed to capture the sentiments through their audio as well. All this analysed data is stored in the database and retrieved later to generate the report which will help the company to make a final decision on whether to hire the candidate or not.

**V. DATA FLOW DIAGRAM**

Two external entities interact with the system: the candidate and the Company. The database can be logically divided into 4 parts as shown in the diagram. Two databases will store the Candidates’ information and the companies’ information respectively. All the data pertinent to the Interview will be stored in the Interview Datastore.

The report generated after analysing the videos will be stored in the Report database.

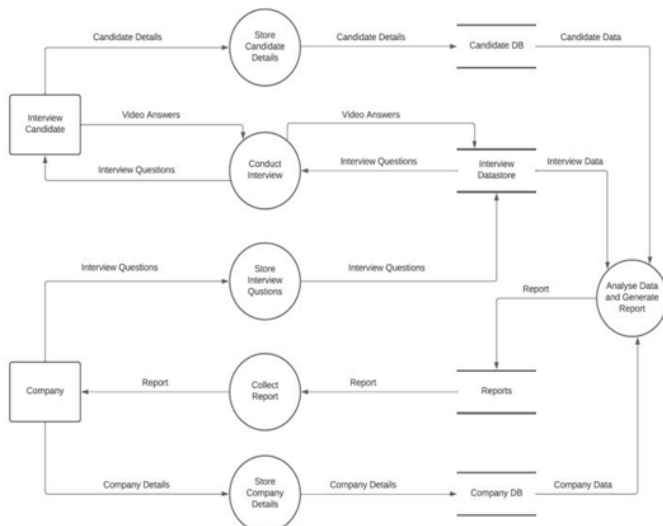


Fig 3:- Data Flow Diagram

The Data flow diagram illustrates the movement of data that takes place in the system and between the system and the external entities. The processes shown in the circles will facilitate the flow of data.

**VI. CONCLUSION**

In the presented system, the system first captures video answers to HR questions framed by the companies. The data is converted to three different forms and Emotional Analysis is performed on each form. This Emotional Analysis is used to predict the candidates keenness in joining the particular company. This will help companies select the right candidates for their companies and save the companies a large amount of money, which is otherwise lost when a candidate chooses to reject a job offer.

**REFERENCES**

[1]. Hung-Yue Suen, Kuo-En Hung and Chien-Liang Lin, "Intelligent video interview agent used to predict communication skill and perceived personality traits", 2020.  
 [2]. P. P. Dahake, K. Shaw and P. Malathi, "Speaker dependent speech emotion recognition using MFCC and Support Vector Machine", 2016.  
 [3]. M. S. Likitha, S. R. R. Gupta, K. Hasitha and A. U. Raju, "Speech based human emotion recognition using MFCC", 2017.

[4]. Yingruo Fan, Jacqueline C.K Lam, Victor O.K Li, "Video-based Emotion Recognition Using Deeply-Supervised Neural Networks 20th ACM International Conference on Multimodal Interaction", 2018.  
 [5]. Iftexhar Naim, Md. Iftexhar Tanveer, Daniel Gildea, Ehsan Hoque, "Automated Prediction and Analysis of Job Interview: The Role of what you say and how you say it", Conference: IEEE International Conference on Automatic Face and Gesture Recognition (FG), 2015.  
 [6]. Manojkumar Parmar, Bhanurekha Maturi, Jhuma Malik Dutt, Hrushikesh Phate, "Sentiment Analysis on Interview Transcripts: An application of NLP for Quantitative Analysis", June 2018.  
 [7]. Kevin Tomba, Joel Dumoulin, Elena Mugellini, Omar Abou Khaled, "Stress Detection Through Speech Analysis", International Conference on Signal Processing and Multimedia Applications, January 2018.  
 [8]. Erina Kasano, Shun Muramatsu, Akihiro Matsufuji, Eri Shimokawara, "Estimation of speaker's confidence in conversation using speech information and head motion", 16th International Conference on Ubiquitous Robots (UR), June 2019.  
 [9]. Lei Chan, Ru Zhao, Chee Wee Leong, Blair Lehman, "Automated video interview judgment on a large-sized corpus collected online", Seventh International Conference on Affective Computing and Intelligent Interaction (ACII), October 2017.  
 [10]. <https://www.mygreatlearning.com/blog/humanoird-for-hr-sentiment-analysis-of-the-interview-candidate-using-aws-ai-ml-services/>  
 [11]. <https://medium.com/an-idea-for-you/how-i-figure-out-if-a-job-candidate-is-right-for-the-job-b51a202b1eb5>  
 [12]. <https://www.resourcefulmanager.com/hiring-interview-phrases/>