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Automated HR Interview System

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Abstract - *Every company conducts an HR interview round to judge the candidate's personality, strengths, weaknesses, capability to handle the role, to check his/her background, and to understand if he/she is the right fit for the job. These interviews consume a lot of time, money and resources as they are conducted physically. Also, different interviewers conduct the interviews at different places for the same position which may lead to interview bias. Now a days, online job interviews are becoming very popular in the screening of potential of employees. This has brought many benefits to both interviewers and interviewees, including the convenience of offline reviewing and decision making by Human Resources (HR) staff, which in turn enables them to assess multiple job applicants in a short time frame. Thus, a system is proposed that would take the candidate's answer to a question as a speech input and perform speech processing over it in order to judge the candidate based on the verbal cues like the tone of the speech, the appropriateness of the answer etc. The final output of the system would be a report that would be generated after the completion of the interview. This report would help to evaluate whether the candidate is suitable for the job or not. Thus, this system would help reduce the wastage of resources and also there would be no scope for bias.*

Key Words: **Interview bias, Human Resources, Speech Processing, Verbal cues.**

1.INTRODUCTION

HR interviews are conducted to judge a candidate based on their strengths, weaknesses, personality and some more factors. A lot can be found about the candidate's personality by asking them questions that determine whether they're team-oriented, interested in furthering their own and the company's goals, competitive, and so on. Questions about their lifestyle, hobbies, skills, social media presence can also be asked to find whether they can easily adapt to changes in technology.

Before meeting the candidates, the HR manager needs to figure out exactly what is required in the new candidate and ask questions accordingly. This can be done by compiling a list of required attributes for the position, determining the critical success factors of the job, ranking according to the job specifications the most important qualities, experiences, education and characteristics that a successful candidate would possess, selecting specific questions to determine whether an applicant possesses the critical success factors.

Another way used to judge a candidate's potential and their personality is by presenting a problem and asking them how they would solve it. Listening to their answer and seeing how they work through the problem can give an insight into their enthusiasm, skills, and thought processes, which can in turn allow one to gauge how they'll fit the job and company. From there, their communication skills, values, and attitude can also be evaluated.

A candidate can be judged by how honest he/she is towards their argument. For example, if the candidate claims that they're hardworking and determined, they can be asked what made them say that. The candidate should be ready to support the argument using examples. This is a test to ascertain if they know who they really are or if they're putting on an act. Candidate are put in different situations to know how they react. A great candidate would try to be spontaneous, and even try to surprise the interviewer. Interviewers also ask the same questions repeatedly in a twisted way to confuse the candidate and also use this to check their patience. If they provide different answers to an equivalent question that's been worded differently, it's a red flag.

Candidates are also welcomed to ask questions to the interviewer about the job and company. Based on these questions one can get a chance to see what's important for the candidate and therefore determine if they have the right personality for the job.

Usually an interview scorecard is created, with a score from 1-10, that each interviewer must use to assess every candidate. By looking for the same evidence and using a common standard to judge candidates, one can determine which one will be a good fit for the role and company. Overall, to hire the right person for a job besides the candidate's resume and cover letter the HR in-charge also tries to learn more about them as a person. While they are expected to have the skills and experience necessary to do the job, they also have to fit in with the company culture.

Automatic interview conduction, analysis and performance evaluation of interviewees is a largely unexplored and a bit

challenging problem. The motive is to create a software which will provide an adaptive HR interview. The system would display the question to the candidate and the candidate would then answer that question in the speech format. This speech will undergo speech processing in order to extract verbal cues from the speech. The speech will also be converted into text. The purpose of doing so is to check whether the answer given by the candidate is appropriate or inappropriate. To achieve this, text classification will be performed by using Naive-Bayes Classifier. By asking appropriate questions, the software will try to figure out if the candidate has the required qualities and if the candidate is fit for the job. At the end, a report will be generated which will summarize the performance of the candidate. This evaluation will be based on some pre-defined criteria given by the hiring company. This will reduce the workload on HR managers and will bring automation in the recruitment process to some extent and will also help the candidates to track what are the areas they are lacking and where they need to work upon.

2. LITERATURE SURVEY

This section includes the citation to all the relevant past literature that uses various techniques for the collection of data for the HR Interview automation system and for the evaluation of the interviews. Most of the researchers concentrate on the collection of data in the video form and then processing it.

"An Automated System for Assessment of Interview Performance through Audio and Emotion Cues [1]"
This proposed work deals with 3 major phases - the first phase is emotion recognition from face, the second phase is fluency of speech and the third one is performance analysis. First, the HOG features are extracted from face and the MFCC features are also extracted from
speech. Then both features are classified by using SVM.

"TensorFlow Based Automatic Personality Recognition System Used in Asynchronous Video Interviews [3]"
The paper implemented semi supervised DL methods, including CNN to develop an AI based interview agent that can automatically recognize applicant's personality by using dataset of applicant's facial expression. This approach achieved an accuracy of 90%.

"Natural Language Processing based Jaro - The Interviewing Chatbot [4]"
JARO accelerates the interview process towards an unbiased decision-making process by proposing a chatbot that would conduct interviews based on candidate's CV based on which, it then prepares a set of questions to be asked. The software would ask questions based on previous responses of candidate based on NLP.

"Automated Video Interview Judgement on a Large Sized Corpus Collected Online [6]"
The paper deals with the collection of data in form of audio-video and storing it in a text file. For conversion of audio to text, ASR was used. An application called Open Face was used to track the head position and gaze. The experiments done by the author says that the prediction of the personality traits can be done by a property called F-measure.

"Virtual Simulation of Technical Interviews [7]"
The paper provides a method to simulate interview process for the practice purpose. The Resume mining and the Emotion detection model are fairly accurate. The future scope of the project involves recommending to the interviewees about what they should prepare and from where they should prepare.

3. PROPOSED METHODOLOGY

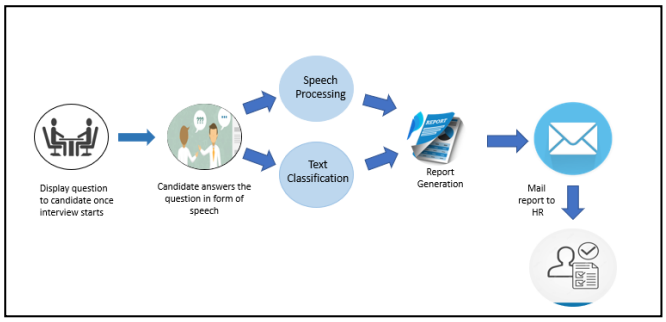

Fig -1: Proposed Automated HR Interview System

The Automated HR interview system will be a web application where the candidate's will be able to login to the system to start with the interview.

Thus, the entire methodology is divided into three main phases –

- Speech Processing
- Text Classification
- Report Generation

3.1 Speech Processing

After starting with the interview, a question will be displayed whose answer will be given by the candidate in the form of speech. The speech will be recognized by using the Python Speech Recognition module and Google Speech API. The listen (source, timeout) will listen to the voice coming from the source till the timeout period. Then after timeout, The Google Speech Recognizer will recognize the speech and convert it to text.

The purpose of speech processing is to know if the candidate is confident, calm or in disgust. In order to achieve this, the

HR interview system also has the Speech Emotion Recognition (SER). Speech Emotion Recognition is the act of attempting to acknowledge human emotion and affective states from speech. The purpose of performing SER over here is to analyze the tone in which the candidate is speaking. It uses the Librosa library in python for analyzing audio and music. In this, a function is declared to extract MFCC, Chroma and MEL features. MFCC gives a power spectrum of sound. Chroma has 12 pitches and MEL is a scale of pitches. Then, a model is built by using a Multi – Layer Perceptron Classifier (MLP classifier). Unlike SVM or Naïve Bayes, the MLP Classifier has an internal neural network for the purpose of classification. This is a feedforward ANN model. Using the MLP classifier the emotions like neutral, calm, fearful and disgust are extracted from the speech. Based on this, it will be judged whether the candidate is confident while giving the answers or the candidate is nervous or whether the candidate is neutral.

3.2 Text Classification

This text answer will be classified as appropriate or inappropriate by using the Naïve Bayes Classifier. It is a probabilistic classifier, which means it predicts on the basis of the probability of an object. For training the model, a dataset was used which had the set of most commonly asked HR interview questions and also the appropriate and inappropriate answers to them, as the answers to these questions cannot be classified as right or wrong because they may vary from person to person.

3.3 Report Generation

Speech processing would predict the tone of the speech of the candidate and text classification would classify whether the given answer is appropriate or inappropriate.

This information would be further used for report generation. The report would contain the summary of the answers given by the candidate and a score will be given to the candidate on the scale of 1-10. This report will then be mailed to the HR who would then decide whether the candidate should be hired or not.

4. FUTURE SCOPE

The future scope of the HR interview automation system involves resume parsing in which, the candidate's resume will be first analyzed and then a set of questions would be made depending on the skills, hobbies etc. mentioned in the resume.

Also, it can include implementation of face tracking system in order to judge the candidate based on certain non-verbal cues like gaze, proper posture, facial expressions.

Adding these features would definitely make the system more accurate and reduce the chances of system cheating.

5. CONCLUSION

Good academic records and sound technical knowledge alone are not enough to guarantee a Job. The thought process, personality and the potential of the candidate needs to be considered. Thus, HR interview is conducted by every company to decide how much a candidate is mentally prepared, devoted and how good are his/her work ethics. Other skills such as soft skills, interpersonal skills, communication skills, emotional intelligence, social intelligence and social skills of the candidate are judged. Conducting a physical HR interview consumes a lot of resources, money and time. With the advancement in technology, an automated HR interview system can help in evaluating a candidate's overall personality. It can evaluate candidate's body language, facial expression and voice tonality during the interview. Thus, an efficient automated HR interview system can help in deciding the perfect candidate for the job.

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