

# Personality Prediction in Non synchronous Video Interview

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**Abstract** - With the growing influence of AI in our daily life and with a need to handle a large rush work pressure, there is a great need to automate one of the most necessary and time taking task, the interview. The traditional trend that's been carried is on effective but is more time consuming and is not accurate as it's conducted by human whose efficiency may fluctuate. Hence it can be considered an important area of research. With the recent progress in DL has given a way for high accurate method that can be followed. The main objective of this is to improve the automation of interview system in an asynchronous manner using the concepts of Deep Neural Network that helps in implementation of classification models and recognizing human verbal and nonverbal qualities and thus trying to improve the automation. Our work is about 80% efficient.

**Key Words:** Asynchronous, Automation, Deep Neural Network, interview, AI, DL, ML, CNN, classification model, verbal, nonverbal, efficiency, Artificial Intelligence, Deep learning, Machine Learning, HTML, CSS, JS, Python, resume classifier, tone analyzer, facial expression analyzer, Keras model, NLTK, Natural language processing, face\_landmark.xml.

## 1.INTRODUCTION

Industries believe that personality is the best means to evaluate whether a candidate is fit for the role or not. Some employers depend on info shared by the candidate but there can be a case where the candidate is lying to employer. So, some employers rely on behavior of the candidate during the process of interview. It sure is a time-consuming task for the employer to take interview to all the applied candidates and it is not possible for all job applicants to attend the live interview session in person. The asynchronous video interview stands as a solution to all these problems where in a fine number of interviews can be taken at the same time which saves a lot of time and the candidate can choose a slot that is in

comfort with him. Even it solves the problem of the varying efficiency of the selection process when handled manually.

The artificial intelligence may be more efficient option to be considered and can achieve more reliable and more predictable output. Applying AI to audio and visual data base in helping personality prediction in job selection is more reliable. Machine learning is a major approach for achieving AI, which gives computers the ability to learn without being explicit. Deep learning is a way of using ML works similar to the way in which the human brain works in processing image, text and sound.

The interview scenario being automated thus can be a great help to both company and the candidate in saving time, efforts on both sides.

## 2.BODY

### METHODOLOGY

The front end is designed using HTML, CSS and JS and is supported by Flask, a micro web framework of python. The front end gives a login window for already registered users and a registration link for new users, once registration is done by giving details and user preferred password it redirects to the login page again as in Fig -1. On logging in the home page consists of 3 main sections consisting the 3 models of our project namely resume classifier, tone analyzer, facial expression analyzer.

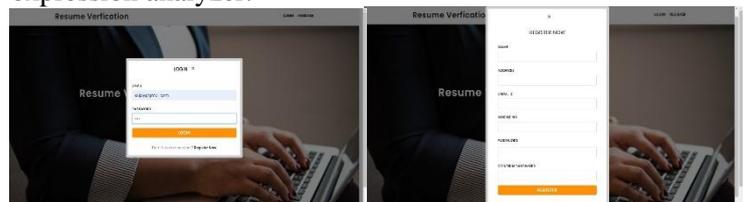


Fig -1: login and registration page.

The backend DL models are coded using python. The project is divided in to 3 models as mentioned earlier where in each stage helps in the hiring process. Models are

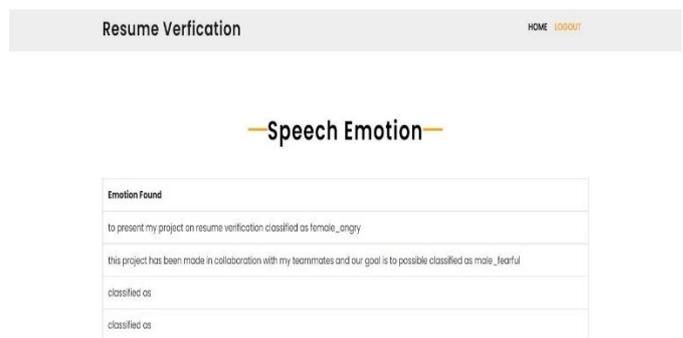
- 1.Resume Classifier
- 2.Tone Analyzer
- 3.Facial Expression Analyzer.



designation	None
experience	<p>(Indian Institute of Science (IISc), Research Intern, Video Analytics Lab, Bangalore, India, Jul 2020 - Present, "Research on Deep Generative models for fine grained multimodal image-to-image translation for self-driving cars", Indian Institute of Technology, Bombay, Research Intern, CSRE Department, Mumbai, India (Remote), May 2020 - Aug 2020, "Computer Vision research of the ERSI team in collaboration with University of Tokyo and the MIT-JIT group", worked on predicting glare water levels from Spectroscopy data and Hyperspectral images from AVIRIS, "Google Summer of Code - TensorFlow (2020)", Student Developer - TensorFlow Hub Team, Google Brain, Mountain View, CA (Remote), July 2020 - Aug 2020, Training State-of-the-art Computer Vision models for Fine Grained Object Discovery and Generation and VQA, Built and train FaceAN, Expressivity of BN (Cosy) based, SRGAN and Detection Transformer from their papers, Indian Institute of Science (IISc) Bangalore, India, Oct 2019 - Dec 2019, Research Intern, Guidance Control and Decision Sciences Lab, IISc AutoAgriNet, Densely Matching search to obtain segmentation policies for semantic segmentation training, "Worked on Researcher Vector Quantized Generative Autoencoders to generate diverse high quality images", Google Summer of Code - TensorFlow (2019), Student Developer - TensorFlow Model Garden Team, Mountain View, CA (Remote), May 2019 - Aug 2019, TF 2.0 beta, worked with the TensorFlow team to create their official model implementations in TF 2.0, TF Models, Built StackGAN, Mass R-CNN, VAE and face aging with CycleGANs from their respective papers, ResNet50 and another custom networks to produce hyperparameters search with Keras-Tuner for TF 2.0, "IISc Technology, Deep Learning Intern, Computer Vision Team, Bangalore, India, Feb 2019 - Jun 2019, Trained CNN models with custom layers and post-training full integer quantization for edge device deployment, "Implemented Attention Guided Face Generation and Face Aging using Conditional CycleGAN on Google Cloud, "Workflows built efficient training pipelines with Shogun, Caffe, JCL, MC (Spatial and Attention-guided policies), Caffe-Central Eng Research Institute, Research Intern, Machine Learning Group, Bangalore, India, Mar 2018 - May 2018, Researched and developed cutting-edge CNN architectures (dnn4all) for structure-based face identity prediction, Abstraxion experiments on the Abstraxion architecture resulted in a 35% improvement in associated precision, "IISc</p>
company_names	[Microsoft]
no_of_pages	2

Fig 3b: Parsed and classified resume continued.

The second section is the interview section which include tone analyzer and facial expression detection where the candidate is asked to answer some questions and the answer is recorded and analyzed. In case of tone analyzer, the tone that is recorded is converted to text initially and then with the help of naïve bayes and random forest classification model predictions are made giving a prediction on the gender, emotions like confident, anxious, disgust, fear etc. And is displayed as in Fig 4. While in case of facial expression detection during the process of interview picture of the candidate’s face is captured, the land marks on the face is detected and marked using the face\_landmark.xml and saving them at each point. A CNN model is generated for implementation of the same thus it helps in the prediction of personality by keeping a count of the emotion set that is benign expressed by the candidate as shown in Fig 5.



Emotion Found
to present my project on resume verification classified as female_angry
this project has been made in collaboration with my teammates and our goal is to possible classified as male_fearful
classified as
classified as

Fig 4: Tone analyzed prediction.

By the combined results of both the section of the system can be a good assistant in the interview process.

We have used a pre collected data set in our work for training the models that are used in our work.

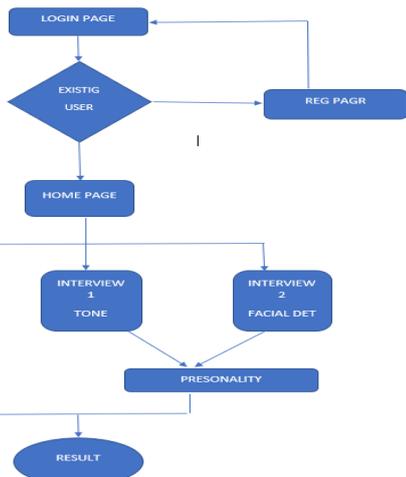
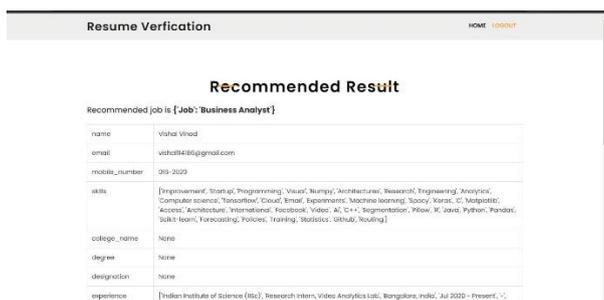


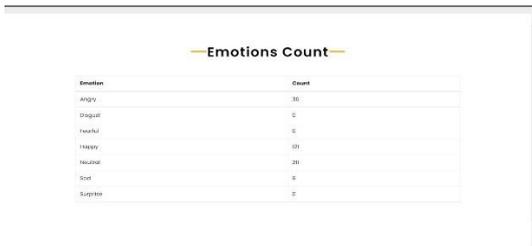
Fig -2: Block Diagram of system.

Fig -2 shows the outline view of the system that we are proposing. The first section is the resume classifier, as the name suggest it’s a model that parses, analyses, classifies and predict the job that is suitable for the candidate based on his resume. The candidate has to upload his resume as a soft copy in pdf format, the system the uses the python’s inbuilt model for parsing then the separated skill set is sent to the ML model where keras model is used in the prediction of the appropriate job for the skill set so provided. The predicted job and classified resume would look so like in Fig 3a and 3b.



Recommended Result	
Recommended job is {Job}: Business Analyst	
name	Vishal Vinod
email	vishu418@gmail.com
mobile_number	919-2029
skills	[Programming: Script, Programming, Visual, NumPy, Architectural, Research, Engineering, Analytics, Computer science, TensorFlow, C++, Email, Experiment, Machine Learning, Numpy, Numpy, C, JavaScript, Access, Architecture, International, Facebook, Video, AI, C++, Segmentation, Pillow, X, Java, Python, Pandas, Scikit-learn, Forecasting, Polaris, Training, Statistics, Github, Node.js]
college_name	None
degree	None
designation	None
experience	<p>(Indian Institute of Science (IISc), Research Intern, Video Analytics Lab, Bangalore, India, Jul 2020 - Present, "Research on Deep Generative models for fine grained multimodal image-to-image translation for self-driving cars", Indian Institute of Science (IISc), Research Intern, CSRE Department, Mumbai, India (Remote), May 2020 - Aug 2020, "Computer Vision research of the ERSI team in collaboration with University of Tokyo and the MIT-JIT group", worked on predicting glare water levels from Spectroscopy data and Hyperspectral images from AVIRIS, "Google Summer of Code - TensorFlow (2020)", Student Developer - TensorFlow Hub Team, Google Brain, Mountain View, CA (Remote), July 2020 - Aug 2020, Training State-of-the-art Computer Vision models for Fine Grained Object Discovery and Generation and VQA, Built and train FaceAN, Expressivity of BN (Cosy) based, SRGAN and Detection Transformer from their papers, Indian Institute of Science (IISc) Bangalore, India, Oct 2019 - Dec 2019, Research Intern, Guidance Control and Decision Sciences Lab, IISc AutoAgriNet, Densely Matching search to obtain segmentation policies for semantic segmentation training, "Worked on Researcher Vector Quantized Generative Autoencoders to generate diverse high quality images", Google Summer of Code - TensorFlow (2019), Student Developer - TensorFlow Model Garden Team, Mountain View, CA (Remote), May 2019 - Aug 2019, TF 2.0 beta, worked with the TensorFlow team to create their official model implementations in TF 2.0, TF Models, Built StackGAN, Mass R-CNN, VAE and face aging with CycleGANs from their respective papers, ResNet50 and another custom networks to produce hyperparameters search with Keras-Tuner for TF 2.0, "IISc Technology, Deep Learning Intern, Computer Vision Team, Bangalore, India, Feb 2019 - Jun 2019, Trained CNN models with custom layers and post-training full integer quantization for edge device deployment, "Implemented Attention Guided Face Generation and Face Aging using Conditional CycleGAN on Google Cloud, "Workflows built efficient training pipelines with Shogun, Caffe, JCL, MC (Spatial and Attention-guided policies), Caffe-Central Eng Research Institute, Research Intern, Machine Learning Group, Bangalore, India, Mar 2018 - May 2018, Researched and developed cutting-edge CNN architectures (dnn4all) for structure-based face identity prediction, Abstraxion experiments on the Abstraxion architecture resulted in a 35% improvement in associated precision, "IISc</p>

Fig -3a: Parsed and Classified resume.



**Fig 5:** Emotion count by facial expression detection.

## LITRATURE SURVEY

(James Wright, Dr David Atkinson [1]) in their paper discussed about the introduction of AI in the field of interview. They have mentioned regarding the drawbacks of the traditional tend that is being followed and have also specified about the study made by US Department of Labor station that this traditional process was only 16% efficient giving a solid stance to their paper and attempt way made to introduce the Ai in this field for this candidate’s survey and observation of trial implementation was carried out. A semi structured interview was conducted, online survey with 132 responds were given and Overview of a round table event was given. However, it was in for of a trial-and-error format showing an attempt to combine AI and interview.

(Xiang Guo Sun, Bo Liu, Jiu Xin Cao, Junzhou Luo [2]) in their paper they have worked on prediction of personality on the basis of text. They has shown that structure of the text is also a feature that can be considered to predict the personality of the person who has framed it. The used the Latent sentence group to model the text content and level them and then use CNN to analyze the model. They had used a combine CNN and RNN neural network model to achieve their project. This approach was better than the existing systems in those days.

(Suhas Tangadle Gopalakrishna and Vijayaraghavan Varadharajan [3]) in this paper they have tried implementing a system that is indeed helpful to the human resource team in any company. As it would be the duty of the HR team to undertake the process of assigning of projects to the candidates who are been hire based on their skill sets mention by them in their resume. The HR team had to do this task manually, but in this paper, they have automated this process with the help of AI. This involved the use of Natural Language

processing on the resumes of candidates and converting it to a machine-readable form and then use of 5 different classifiers voting in analyzing and assigning the project to candidate.

(Pradeep Kumar Roy, Sarabjeet Singh Chowdhary, Rocky Bhatia [4]) in their paper they have focused on the automation of the job search for aspirin g candidates based on their resume, this process involved in searching the appropriate job for the candidate and also on the company side could be used to predict weather the candidate is apt for the job description. Their approach was to prepare the candidates data in a machine-readable format and used the concept of NLTK tokenized in the process and the use of classification models for further predictions.

(Hung-Yue Suen, Kuo-En Hung, Chien-Liang Lin [5]) presents in this paper that the critical factor of job selections are communication skills and personality, gesture, facial expression and tone are factors to predict emotion attitude of candidate. They have used semi supervised DL and CNN based on tensor flow which predict the candidate personality and provide the interview with the details of the candidate by facial expression detection.

In facial picture or video processing state the use a frame of their own dataset in FFmpeg. The facial feature is predicted based on 86 facial landmark points per frame within 5 sec intervals. This helped in interviewer’s judgement towards candidates.

(Clemens Stachl, Florian Pargent, Sven Hilbert, Gabriella M. Harari, Ramona Schoedel, Sumer Vaid, Samuel D. Gosling and Markus Buhner [6]) in their paper they have highlighted new methods for collecting data in personality science. Machine learning models are well suited to these kinds of data and allowing researchers to model highly complex relationships. They have presented the issues faced in building and validating the models and highlights some issues by use of latent variables. And conclude by referencing the future role of ML in personality prediction.

## RESULT:

The first model, resume classifier predicts the most relevant role for the candidate, its accuracy is about for

77%. The second, tone analyzer is about 75% and for the third model, the facial expression detector is about 85%.

### 3. CONCLUSIONS

The recent finding has proved that DL based architecture can be used to analyze personality based on the previously collected data. Most all use APP for this where the DL model can be used as substitute for interviewer's and make decisions on personality of the candidate.

This paper focuses on asynchronous video interview which uses DL models to automate the interview process and recognize the candidate's personality. Our system has an accuracy of 80%. This system can be used to replace the self-reported detail and can be more efficient.

Although our AVI can be used in job selection it is important to note that some job might require skills that cannot be directly described in resume and job specific personality than the usual personality.

This model may further be improved by focusing on the specific job and as this require professional to be involved which may limit the generalizability of rest. Future research should include a more diverse participant population.

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