

TalentVerify

Project Team

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Chapter 1

Introduction

1.1 Problem Statement

Conducting interviews for job positions can be time consuming and costly for any company looking to fill positions with quality candidates. This process has both an actual cost and an indirect cost that can be associated with it. Any company looking for the best possible candidate inevitably desires to interview as many good candidates as is feasible for them. The direct cost of conducting an interview is estimated to be anywhere from 70 to 200 dollars per candidate. The indirect cost may come in the form of lost time on understaffed projects and other such situations. This cost can build up to a very large amount, when any decent number of candidates is interviewed. Existing systems on the market that aim to tackle this problem do not account for soft skills of a candidate and are similar to a question answer analysis bot. Our goal is to create an AI agent to conduct interviews that can analyse behaviour, soft skills and provide a human face for the interviewee to interact with.

1.2 Motivation

The problem we picked presents various computing/AI challenges tied to the perception of confidence, objective analyses of soft skills and creating a lifelike intelligent agent. These are all incredibly interesting problems that provoke interesting thoughts on human behaviour and its perception by others, especially in an interview setting and are the reason why we picked this problem to work on for this project.

1.3 Problem Solution

Our software comes into the hiring process at the very start. It allows the employer to simply provide a job description and setup and interview. The employer can choose how many candidates to pass on, as well as the soft and hard score thresholds. The employer may invite candidates to participate in these interviews by linking them on the job posting. Our web app will then setup and conduct automated interviews of all the candidates and screen out the number specified by the employer based on how well they did on both their technical skills and their soft skills(confidence, nervousness, clarity etc). In the course of holding each interview, our automated agent will parse through each candidates resume, and generate personalized questions to assess each candidate as well as questions based on the job description provided by the employer. These candidates are then provided to the employer alongside data on how the interviewees in general performed on both their soft and technical skills. We want to gear our app to be able to:

1. Screen down to as few candidates as possible while guaranteeing their quality.
2. Provide helpful data to employers for them to be able to understand the qualities of the market in general.
3. Engineer our avatar to be as close to a human interviewer as possible.

1.4 Stake Holders

1. Employers
2. Hiring Managers
3. Employees
4. Jobs Industry

Chapter 2

Project Description

2.1 Scope

TalentVerify is a web based application for employers to streamline the interview process. It will help assess the job candidates more accurately and fairly.

TalentVerify will require minimum input from the hiring manager to be up and running and start the screening process. The hiring manager will only need to provide a job description and shortlisting criteria (eg. number of candidates). The application will handle everything else going forward, from scheduling interviews to assessing candidates skills. TalentVerify will tailor behavioral questions to every candidates resume, while keeping technical questions consistent for every user to provide a fair opportunity and remove any biases. Employers will also be provided with the comfort of integrity during the interview process, through its key focus on cheating detection strategies. While checking for any suspicious activity throughout the interview process, it will also be evaluating candidates soft skills through audio and video cues. Finally, a detailed report of every candidate will be created alongside AI informed short listing for the hiring manager.

2.2 Modules

The solution to TalentVerify is divided into independent modules that will help group members to work independently and parallel with each other. Continuous collaboration and mindfulness will help us integrate the microservices into a final product with fault tolerance capabilities.

2.2.1 Emotion Detection Pipelines

This module focuses on developing pipelines for our models to detect emotions from both facial expressions and audio cues. It involves developing and fine-tuning existing deep learning models to enhance their accuracy and performance. The goal is to achieve low-latency while ensuring accurate classifications. Using the 7 basic emotions we can have a clear way of **justifying** soft skill traits for every candidate. [4].

1. Video Emotion Model
2. Audio Emotion Model

Traits	Anger		Fear		Joy		Sadness		Surprise		Disgust	
	SR	A	SR	A	SR	A	SR	A	SR	A	SR	A
Openness to Experience	0.01	-0.21	-0.04	0.05	0.20	0.29	0.11	-0.18	0.09	0.22	0.10	0.19
Openness	0.05	-0.06	-0.06	-0.03	0.17	0.28	0.10	-0.14	0.26	0.18	0.18	0.07
Intellect	-0.03	-0.28	0.00	0.11	0.16	0.20	0.08	-0.16	-0.12	0.18	-0.02	0.25
Conscientiousness	0.16	0.58	-0.06	0.01	0.01	0.09	0.30	-0.30	-0.11	-0.19	0.10	0.10
Industriousness	0.11	0.51	-0.15	0.04	-0.15	-0.16	0.19	-0.12	-0.19	-0.14	-0.01	-0.01
Orderliness	0.16	0.50	0.03	-0.01	0.14	0.28	0.33	-0.39	-0.02	-0.19	0.18	0.17
Extraversion	-0.13	0.15	-0.39	0.07	0.12	0.16	-0.09	-0.14	0.03	-0.12	-0.08	-0.18
Enthusiasm	-0.13	0.17	-0.35	0.08	0.12	0.18	-0.19	-0.18	0.04	-0.07	-0.04	-0.20
Assertiveness	-0.08	0.09	-0.29	0.04	0.08	0.09	0.03	-0.06	0.00	-0.13	-0.09	-0.10
Agreeableness	-0.13	0.20	-0.16	-0.15	-0.35	-0.08	0.07	-0.34	0.15	0.26	0.13	0.05
Compassion	-0.15	0.13	-0.29	-0.18	-0.32	0.04	0.01	-0.32	0.23	0.18	0.06	0.06
Politeness	-0.04	0.18	0.07	-0.04	-0.20	-0.16	0.10	-0.19	-0.02	0.21	0.13	0.01
Neuroticism	0.22	0.26	0.14	-0.42	0.40	0.14	0.41	0.08	0.21	0.05	0.25	0.28
Withdrawal	-0.01	0.04	0.24	-0.21	0.50	0.02	0.14	0.10	0.32	0.21	0.15	-0.03
Volatility	0.29	0.32	0.03	-0.42	0.20	0.18	0.45	0.04	0.07	-0.07	0.24	0.39

Figure 2.1: Emotion Soft Skill Mapping

2.2.2 Cheating Detection

The primary focus of the cheating detection module is to use strategies that maintain the integrity of the interview process. The 2 areas of focus are multiple entity detection and deepfake detection. These strategies will allow us to detect any external assistance that an interviewee may be getting throughout the interview [2].

1. DeepFake Detection
2. Multiple Entity Detection

2.2.3 Question Generation

The Question generation module is concerned with parsing the relevant documents for the hiring process. Our current solution is to use Large Language Models (LLMs) on

OCR scans of Resume and Job Description documents. Resume parsing will allow us to generate personalized non technical questions, whereas Job Description parsing will allow us to generate technical interview questions consistent for every interviewee.

1. Job Description Parsing
2. Resume Parsing

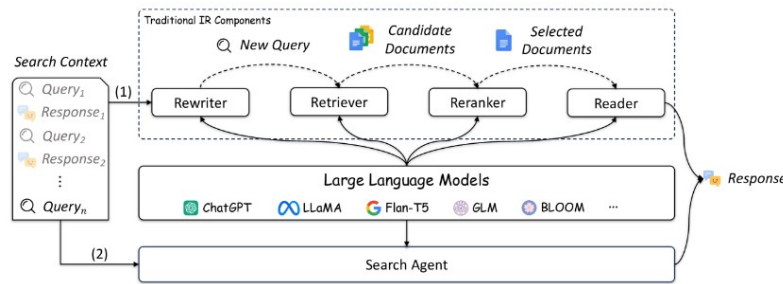


Figure 2.2: Document Parsing

2.2.4 Answer Evaluation

Answer evaluation is the backbone of our application that will allow us to evaluate every candidate's performance. Different criteria will be set for technical/factual and non technical answers provided by the interviewee.

1. Technical Evaluation
2. Non Technical Evaluation

2.2.5 Web Development

The Web Development module is the main development module concerned with the system that the end users will interact with. Our key focus of here will be a on UI/UX design, that does not overflow the user with excessive features. We will also focus on having a authentication system for every user so only authorized users are able to access specific features [1].

1. UI Design
2. User Authentication
3. Interview Scheduling

2.2.6 Avatar Generation

Avatar Generation module will focus on creating an AI assistant that interviewees can interact with during the interview process. It will allow us to add a personal touch and replicate the environment of an in person interview[3].

1. Video Generation of Avatar
2. Audio Generation of Avatar

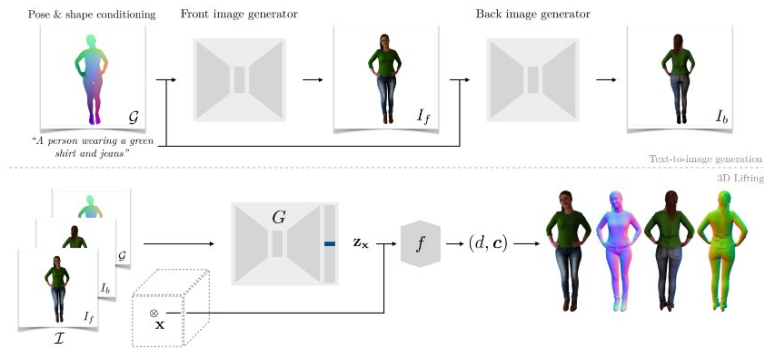


Figure 2.3: Human Avatar Generation

2.2.7 Dashboard

The Dashboard module will be the final module for our end to end application. It will be a detailed dashboard that provides the employer of every candidates performance and the shortlisted candidates for the next stage of the hiring process. The amount of shortlisted candidates will be preset by the employer when they set the preferences while providing the job description. A metric graph will also show areas where the specific candidates excelled at and areas where they need improvement. This graph will also be shared with the interviewee as a mean to provide extra transparency and help them improve on their skills.

1. Interviewees performance dashboard
2. Automated Shortlisting feedback

2.3 Tools and Technologies

The following technologies are utilized in TalentVerify:

1. Frontend:

- (a) **Frontend Framework:** React JS
- (b) **UI Component Library:** Material UI
- (c) **CSS Framework:** Tailwind CSS

2. Backend:

- (a) **API:** FastAPI
- (b) **Deep Learning Libraries:** TensorFlow, PyTorch, Transformers
- (c) **Open-Source LLM Frameworks:** Llama 3.1

3. Database: MongoDB**4. DevOps:** Docker

2.4 System Diagram

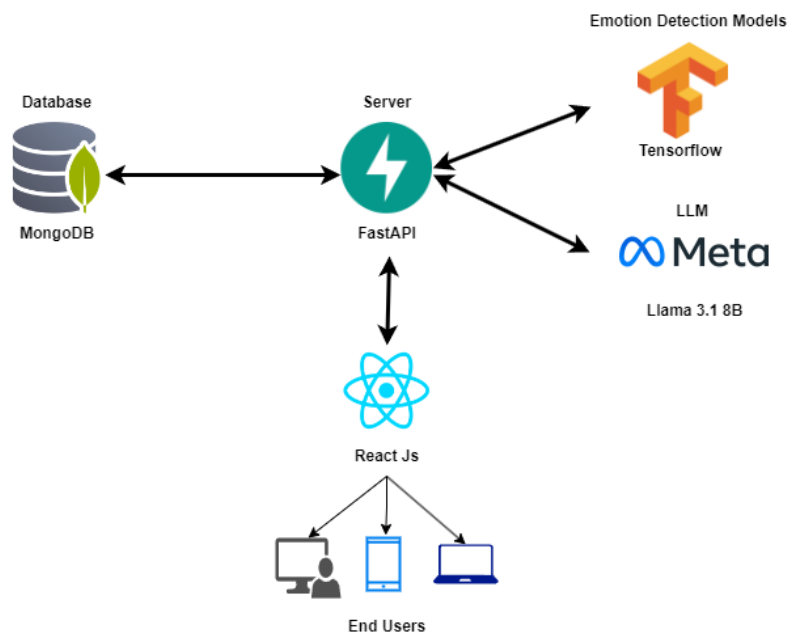


Figure 2.4: TalentVerify System Diagram

2.5 Work Division

Table 2.1: Work Division

Name	Registration	Responsibility
Mr. Muhammad Mobeen	21i-0444	Audio Emotion, Resume parsing, Avatar Audio Generation, Non Technical Answer evaluation
Mr. Huzaifah Bin Saeed	21i-0432	Video Emotion, Job Description parsing, Avatar Video Generation, Technical Answer evaluation
Mr. Ahmad Raza	19i-0710	User authentication and Verification, Performance Dashboard, Interview Scheduling, UI Design

2.6 TimeLine

Table 2.2: Timeline

Iteration#	Time frame	Tasks
01	Sept-Oct	Emotion Model Pipelines, Multiple Entity Detection, User Authentication
02	Nov-Dec	Resume and Job Description parsing, Answer Evaluation, Deepfake detection
03	Feb-Mar	Avatar audio and video generation, UI Design, Interview Scheduling
04	Apr-May	Performance Dashboard, Shortlisting feedback

Bibliography

- [1] Abdulazeez Abdulazeez Adeshina. Securing fastapi with jwt token-based authentication. *TechDriven*, 2024.
- [2] Davide Cozzolino Andreas Rossler and Christian Riess. Faceforensics++: Learning to detect manipulated facial images. *Arvix*, 2019.
- [3] hiemo Alldieck Nikos Kolotouros and Enric Corona. Instant 3d human avatar generation using image diffusion models. *Arvix*, 2024.
- [4] Ruairi O'Reilly Ryan Donovan and Aoife Johnson. Differentiation in personality-emotion mappings self-reported and automatically extracted emotions. *ResearchGate*, 2020.