Project Report
Project 3

INTERVIEWPRO

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A **Hero GROUP** INITIATIVE

Department of Computer Science and Engineering
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Candidate's Declaration

We hereby certify that the work on the project entitled, "**Project Name - InterviewPro**", in partial fulfillment of requirements for the award of Degree of **Bachelor of Technology** in School of Engineering and Technology at BML Munjal University, having University Roll No. 210471, 210285, 210451, 210221, 210200, is an authentic record of our own work carried out during a period from February 2024 to May 2024 under the supervision of Dr. Nishtha Phutela and Dr. Atul Mishra.

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Supervisor's Declaration

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Faculty Supervisor Name: Dr. Nishtha Phutela

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Abstract

InterviewPro depicts an effective turning point in technical recruitment, offering a breakthrough solution whereby an AI-powered and machine learning (ML) based platform is used to automate the process and boost efficiency. This can be attributed to the fact it was meant to solve the major challenges which hinder technical hiring such as extensive time requirement, shortage of resources and lack of experienced engineers that can conduct interview. InterviewPro enables automation on the critical areas of interview by leveraging the cutting-edge NLP as well as DL technologies that include real-time coding analysis, speech-to-text conversions, sentiment analysis, and non-verbal cue analysis to mention a few. On this platform, therefore, the entire logistic side of recruitment is simplified, in addition to enriching the quality of evaluations, thereby improving the comprehensive and fair assessment process. The coming test runs have been a source of hopefulness, as there has been a clear sign of improvement in efficiency, candidate experience, and interviewer workload. With future view InterviewPro is going to spread its technological range and plans to extend its geographic reach, with the goal of remodeling the global recruitment standards and creating a more unified and user-friendly hiring space.

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1. Introduction

The software industry keeps revolutionizing at a high speed which has resulted in many difficulties in finding technical talents. Long software interviews ditract the delivery, in an attempt to find the skilled ones, most of which are occupied by hiring experts. The inefficiency is also aggravated by the small size of the number of those who can conduct these interviews which is due to the fact that these people are exposed to their role in the operations of the organization and are overwhelmed with responsibilities. Taking these issues into account, we are calling for the creation of InterviewPro—an incredible platform, which is based on the use of AI and ML technologies to change the technical interview process to the extent that it can be fully automated.

The main goal of InterviewPro is to enable quick and smooth, fully remote technical interviews. As a result, we are able to drastically reduce the time and resources used for the evaluation process, among other things. The platform has an inbuilt NLP (Natural Language Processing) and DL(Deep Learning) algorithms and therefore can offer swift coding assessments, speech-to-text conversion of interview responses and insight extraction from answers. This traditional method relied on questionnaires and essays, and today, psychometric tests have evolved, eliminating errors through sentiment analysis, cheat detection, and the analysis of nonverbal cues, which in turn helps recruiters create more comprehensive and quality candidate assessment.

Driven by the urgent need to rise to the severity of technical hiring within the software sector, especially during a time characterized by the high demand for technical skills, is where InterviewPro focuses its efforts. Organizations need to make a balance between quickly finding and choosing appropriate applicants and providing a safe and merit-based evaluation course. InterviewPro boosts a company's capability of executing technical interviews better and makes the hiring decisions more judicious with all the testings and observations done by the engineers from the wide pool of the organization.

InterviewPro will change how tech recruitment can be done for the better by taking away the mundane work while boosting the quality of the hiring process. With this invention the burden of engineers will be deleted, the evaluation of the candidates will be instant and objective and a remote, accessible and universal interview process for worldwide candidates will be created. Such a mechanism maintains a high level of integrity and equity in the measuring and assessment process which is to the advantage of the employers by simplifying job hiring process and is in line with the overall goals of growing the tech industry by efficiently getting the best suited skills in place at the right time.

As opposed to traditional platforms which focus only on challenges in coding, InterviewPro does an overall assessment of candidates by the real-time speech-to-text conversion and analysis of interviews, information extraction, and sentiment analysis to understand the technical skills as well as soft skills. Outside of this, deep learning-based cheat detection and optional non-verbal feature analysis will allow for a more detailed assessment of the suitability and the fidelity of the participants. The platform also uses standardized rubrics for in-depth candidate assessment, advanced features for detecting cheating, and offers 24/7 availability, which facilitates the hiring process or business engineers around the world who follow different time zones. The smart engine's holistic approach to technical recruiting stands out among the other existing solutions, as it facilitates greater depth and efficiency level.

2. Introduction to Project

InterviewPro is envisioned as a transformative tool in the recruitment industry, designed to streamline the hiring process by interfacing organizations, interviewers, and candidates through a centralized platform. This system not only facilitates the outsourcing of interviews by companies but also offers professional interviewers a channel to utilize their skills for monetary benefits. Simultaneously, it simplifies the interview process for candidates, ensuring a smooth progression through each step.

2.1 Overview

In addition to saving time and streamlining the process of surfacing the best candidates as possible, InterviewPro will also create an opportunity for evaluating the capability of recruiting individuals. The main the strength of Interviewpro is the possibility for organizations to create filters which then work through submitted resumes retrieve only the most suitable candidates. This targeted approach sets the set for the fair and complete evaluation of applicants, thus extending the quality of the hiring process. This individualized technique also demonstrates that there is no miss in evaluating the candidates, making the decision making process robust.

Apart from that, the platform serves as the source of profit for interviewers who can use their industry knowledge to conduct the interviews and get a passive income. Herewith, InterviewPro is a platform for experienced professionals who are looking for ways to put their knowledge and interview skills into play outside their regular work.

Candidates would get a unique benefit from this groundbreaking technology. InterviewPro provides a simple and straightforward UI that lets applicants easily navigate their applications and interview periods. This systematic way eliminates the stress and insecurity that normally occurs during the job search process, since it provides a more structured way of moving through the recruitment process.

2.2 Existing System

Karat

The Karat platform has the reputation of an advanced technical interviewing system which enables companies to substantially improve the level, throughput and diversity of their technical hiring pipeline. The platform offers an array of intelligent products and services, including 24/7 interviews, bubble-free environment, and reliable interviews with highly knowledgeable professionals. Karat's method emphasises human specialists joining with technology to intelligently place into the hiring process and present proven results wherever the recruitment goes . Company places great emphasis on

developing assessment tools, which are predictive, fair, and engaging, thus distinguishing it from other solutions and ensuring a consistent and systematic experience for candidates and employers alike. The fact that Karat is driven by the desire to develop an improved hiring process is revealed by its construction of job competency models for structured and validated jobs while linking questions for job interviews to expectations and competencies of workplace roles. The Karat candidates get the chance to interact with live professional interviewers who will adapt their algorithm to candidates' needs and preferences. This way, the Karat Interview Engineers offer a fair and predictive interview experience and all the candidates walk away happy, and their organization will hire the right talent efficiently. Generally, Karat is deserving of being recognized for the innovation it has brought to the job market by making the technical interviews more accurate and fair, and enjoyable making a high rating in the tech hiring industry.

Intervue.io

Intervue.io, a company with the achievement of digital transformation, has been exceptional in the modernization of technical hiring. The site underscores its 1-stop solution that unites recruiters with technology talent on-the-fly. By dint of the fact that Intervue.io is tasked with changing the traditional face-to-face-interview and aims to the one and only way the interviews are conducted globally. The company delivers a technical assessment program, which act as a test tool through technical questions and provide with team rooms to promote collaboration during the interview. Furthermore, Intervue.io has highlighted the use of shared IDEs and whiteboards to enable brainstorming in different languages. This puts forward the concept of improving the feedback cycle between developers and HR managers, and eventually respond to this feedback by making superior hiring decisions that are based on data. Furthermore, the platform provides organizations the chance for them to work with top engineers from the ages to solve the evaluation of candidate and this consequently enables the speeding up of talent acquisition process. Overall, Intervue.io has received an appreciation for its unique idea in tech hiring and its effort in improving the recruiting experience for all the parties involved.

Kariyer.net

Whereas a long time ago Kariyer.net was merely a place where employers listed jobs, today it is a multipurpose workplace that provides services such as employer branding, virtual recruitment events, and training for tech talent. Kariyer.net, the flagship online employment service in Turkey, is known for the unique job listings offered and adding some more features to come up with a key output. The company applies AI-driven job matching which is essential in perfecting job seekers with the relevant areas of job placement. This is made possible by the power of artificial intelligence in generating a logical and accurate solution. Through the use of this site, Kariyer.net is able to identify trends in job

descriptions, candidates profiles, and historical hiring data. This, in return, helps to deliver the best job recommendations possible. Additionally, the website carries out the activities such as employer branding and online job fairs. They make it possible for businesses to display their conduct and vacant positions and promote communication between employers and those job-seekers who live far from work location. Responding to the rise for technical ability, the platform through their technical job board for tech roles.

2.3 User Characteristics

InterviewPro is engineered to serve three primary user groups: The professionals of HR specialties and technical recruiters, personnel with relevant engineering expertise, and applicants. Each group interacts with the platform with specific needs and expectations.

Technical Recruiters and HR Professionals

Profile: These users typically manage the logistical aspects of the hiring process within organizations.

Needs:

- **Automation Tools**: They necessitate the use of automation to carry the core procedures uninterruptedly with time like scheduling candidates, tracking them and preliminary assessments.
- **Integration**: The system based on integration needs to interfere well with other HR processing systems to provide an effective flow of work.
- **Reporting Features**: Sophisticated reporting tools on your interview schedule feed becomes essential for any successful decision making process.

Behavior: These are power users who engage with the platform regularly. It is, henceforth, a requirement of a platform to work with agility and ease to be able to handle multiple tasks at a time.

Figure 1 Example persona for an HR professional

Experienced Engineers

Profile: Experts available for technical assessment of candidates who showcase their talents in the facilitation of the recruitment process.

Needs:

- **User-Friendly Interface:** A simple but user-friendly interface that guide them to focus entirely on the job of analyzing their candidates without the fear that they will either get off track or be overwhelmed by the technical complexities of the platform.
- **Efficient Communication Tools:** Tools that will be using to communicate with candidates and ensure that communication is clear and the interviewees are briefed.
- **Customizable Evaluation Metrics:** Among activities and feedback, it can personalize it for different technical roles by modifying evaluation metrics and feedback forms to meet the required ones.

Behavior: It is the norm for them to use the platform on an intermittent basis while mostly focusing on the days they are on schedule to do their interviews. They work fast and prepare all the data on task.

Figure 2 Example persona for an Experienced Interviewer

Job Candidates

Profile: The job seekers benefit from this platform to apply for jobs, attend job interviews and get feedback.

Needs:

- **Accessibility:** The platform has to be available on different devices that candidates can access wherever they are and use it.
- **Responsive Support:** Fast customer support with an intention to assist in overcoming any challenges during the registration, application, or interview stage.

Behavior: The engagement of the platform by them is very unpredictable but it can be pretty high while they are at the job searching stage. Simplicity and dependability are two major factors that must be considered if one wishes to present a healthy environment for the users.

Figure 3 Example persona for a candidate

2.4 Feasibility Study

The feasibility study assesses the technical, economic, and operational sides of the business and establishes whether InterviewPro actually addresses a need in our job market scenario or it is just an idea that needs more work.

Technical Feasibility

Robust Platform Requirements: The scope includes the development of a strong, easily scalable web platform that integrates cutting-edge functions users within all the stakeholders groups and supports large traffic and data accuracy.

Integration Capabilities: Installing tools that facilitate the swift integration of new platform components with existing HR systems and databases to maintain uninterrupted operations.

Security Measures: Designing and using of high-level security methods to save users confidential data and preserve their privacy.

Economic Feasibility

Cost-Benefit Analysis: A financial plan showing the startup and running expenses for the facility spent as compared to forecasted profits, which would help to appraise the economic proportions of the project.

Market Analysis: Measuring the demand of the indicated platform among the vast industries; and the

competition world.

Revenue Models: Many possible sources of revenue are being sought e.g. services fees to organizations, subscription fees for premium features and other commission-based models which pay to interviewers.

Operational Feasibility

User Adoption Strategy: Efficient marketing strategies which segment the target audience to improve the highest level of adoption amongst them.

Customer Support and Maintenance: Construct of a coverage and well-organized support system which will provide assistance to users, address their concerns fast, increase satisfaction level among the users and upgrade the reliability of the platform.

Long-Term Sustainability

Scalability Plans: Plans for scaling the platform taking into account the user numbers growth and massive data volume.

Continuous Improvement: Frequent process of feedback collection and review from users and streamlining processes with technology.

Finally, by developing the long-awaited solution in the recruitment industry, InterviewPro will fill the voids which exist now in the hereto inexistent regimes of efficiency, transparency and user responsiveness. This platform is created to tackle the emerging demands of the job market and help organizations accomplish their missions successfully together with candidates and interviewers. Proceeding cautiously with quality based planning, list of tasks, and execution strategies, InterviewPro is here to transform the area of recruitment practices to worthy standards.

3. Literature Review

With technology representation across many fields, the area of online education via virtual recruitment has experienced an influx of the use of complex technologies fabricated to improve the operations of this field. Consequently, it becomes essential to look into digital technologies that are currently implemented when sitting online tests and taking part in virtual recruitment procedures and outline how such modernizations afford both security measures and interpersonal evaluations through facial and vocal analyses. The exploration encompasses a range of studies highlighting the application of 360-degree security cameras, artificial intelligence in pre-interview screening, as well as the fact that facial and vocal recognition technologies have to be used carefully to reach a comprehensive understanding of what the candidate is capable of and the emotional state of the candidate.

The usage of automated video interviews (AVIs) for weeding out job candidates is on the rise. On the other hand, there is a glaring absence of research that focus on exploring the reliability, validity and the generalization of the assessments made during this process. Moving forward with the deficiency of valuation of divergent personality characteristics, Hickman and the team have determined AVIs which get to analyze verbal, paraverbal, and nonverbal behaviors from video interviews to check the Big Five personality traits. The results indicate that AVIs trained on interviewer reports displayed inconsistent results, they showed convergent and discriminant validity, used conceptually relevant predictors, and handled academic achievement prediction, which in turn was well done. Another debatable issue for doing self-report avis is that these are bias on the part of the interviewee and thus may have weak reliability and validity. Displaying an example of an unguided conversation which was very helpful [1].

In addition, the use of AI technology for screening processes is one of the topics that the research studies such as "Job Pre-Interview System with Artificial Intelligence" and " AI-based Behavioural Analyser for Interviews/Viva." The first one explains an AI system which does pre-interviewing by using semantic analysis and natural language processing to determine the applicant suitability. The latter research explores the potential of AI in decoding candidate's non-verbals, which are considered the best indicators for attributes such as personality trait and state of mind during the interview. In this respect, the ability of AI powered by deep learning to imitate human behaviour indicates that this AI would be much more effective in the assessment of interpersonal skills in the virtual interviews; thus, it would give the possibility of a deeper evaluation process [2][3].

The human tendency to misread facial expressions and body language is amplified in the virtual environment. With online education and the process of virtual recruitment on its rise, the requirement of effective candidate monitoring and evaluation approaches has become indispensable. The research presented in " Students Online Exam Proctoring: A Case Study Using 360-Degree Security Cameras"

emphases on having the ability of 360-degree security cameras to be used in online examination settings. Based of this technology, the monitoring scope will be significantly increased which may result in higher security and chance to disable opportunities of cheating. Consequently, it is created to facilitate in reducing the amounts of stress and performance anxiety as they are the usual areas where students don't do well whilst using the surveillance methods. This examination scenario creates a relaxed and less invasive exam atmosphere for students participating in it [4].

Visual analytics not just ensure that we build a graphical interface but also include an element of human-machine collaboration. Not only voice is being utilized, but also visuals are used to pick up on someone's emotions and ideas. Shuai Peng et al. concentrated on the improvement of Inception-ResNet architecture in their research which incorporated such augmentation in transferring face recognition models and hence achieved the stage of better trainability, stability, and higher performance level by utilizing trainable parameters and replacement of the activation functions. They are using it on multiple datasets and spotlighting its superiority as it outperforms in various parts [5]. Also in this vein, Jia Xiang and Gengming Zhu relies on the utilization of Multi-task Cascaded Convolutional Networks (MTCNN) that performs concurrently in the task of joint face detection and facial expression recognition so as to capitalize on their complementarity to advance the comprehension of people nonverbal communication through visual clues. Their approach main objective to recognize facial micro-expressions as well as facial detection that allows non-verbal communication cues be captured and used for the purpose of making human-computer interaction process more responsive and intelligent [6]. And, lastly in the paper by Na Li and colleagues they conduct eye and attention tracking research on the visual behaviors of people that provides perceptual and attentional characteristics related to architectural heritage, uncovering how they differ in various kinds of structural environments [7].

These studies collectively depicts the broad world applications of visual analytics for better understanding and to improve inter-human and computer interactions. Recent developments in deep learning architectures by Peng illustrate that no matter even the smallest adjustments, deep learning could most probably be trained more responsive to human emotions comparison to traditional AI. Through this example, the article makes it clear how facial recognition functions in practice to guarantee safety and content personalization. Moreover, the researce done by Li et at point up particular how the movement of the eyes can be tracked and studied .

Furthermore, candidate's vocal analysis becomes another key element in the interview process. Through the changing of the accent, tone, volume and intonation, the vocal cues become unnoticeable and the responses given by the candidate towards the questions and the comfort he or she has when talking about certain topics are easily revealed. This improves the interviewer's capability of judging the fit of the candidate to his position. While discussing about speech emotion

recognition (SER) technology, Akçay and Öğuz highlight the progress of classifiers like convolutional networks and recurrent neural networks and dire difficulties like dataset production and feature extraction [8]. While, Wani deals with the figure of Speech Emotion Recognition (SER) in human-computer interactions which is developed through the SER system designs. Also, improved emotional models and robust classifiers are suggested in order to accommodate diverse datasets, and reflect the quality of interview interfaces. Additionally giving us an indepth review of existing SER systems [9].

So it can be deducted that visual and vocal artificial intelligence can serve educators and recruiters with excellence in their security and credibility needs, but also lead them towards a virtuous circle of understanding candidate features and emotional states. These advancements are also indicative of the direction in which online assessments are moving and are aimed at improvement and increased fairness of the said tests, that helps with more informed decision-making in educational and professional environments. It is certain that as the technologies support interviewed techniques advance, their incorporation into common activities will transform the traditional standards of candidate management and the assessment procedures. On a larger scale this will lead to new standards for evaluation and monitoring of candidates in different settings.

3.1 Comparison

This section gives a complex analysis of the key features, advantages, and disadvantages of similar products, thus helping us to understand our competitive stand and gather a further knowledge on possibilities for creating of new and innovative product or improvement.

Aspect	InterviewPro	Karat	Kariyer.net	Intervue.io
Innovation in Assessment	✓	✓		✓
Technology Utilization	✓			✓
FAANG Hiring Managers	✓	✓		✓
Support for Non-Traditional Backgrounds	✓	✓		
Efficiency in Hiring	✓	✓	✓	✓
Cheat Detection	✓			
Availability in India	✓	✓	✓	✓

Table 1 Critical analysis of existing products

3.2 Objectives of Project

For InterviewPro to successfully combat the difficulties inherent in hiring technical talent within this industry during this period of rapid software industry evolution, specific objectives have been set ranging from the improvement to absolute transformation of the technical interviewing process. These objectives are aimed at addressing candidate and business needs, guaranteeing that recruitment flow is simple, fair and smooth. Here are the key objectives for our project:

- **Enhance Interview Efficiency and Accessibility:** The primary mission of InterviewPro is the implementation of AI and ML technologies which allows the technical examination procedures to be more effective and more available for candidates. The platform creates opportunity to conduct interviews via radio, television or the internet.There you can do a smoothly conducted diagnostic medical interview, and thus, easily avoid the need to do an in-person interview and decrease the costly aspects of conventional interviewing.

- **Innovative Candidate Evaluation:** InterviewPro will explore the use of the NLP and DL methods to introduce features including real-time coding reviews, speech-to-text conversion for interview responses. together with the sentiment assessment. This leads to a more refined understanding while generating meaningful insights, which is a distinguishing factor from traditional evaluation methods as real-time polls are commonly used during debates.

- **Reduce Resource Burden on Companies:** Through automation of a good chunk of the interview process, InterviewPro will help human resources people to stiffe their workload, especially those who are very experienced such as the engineers who are often tasked with the interviews. Instead of small tasks, these highly capable employees will devote their capabilities to their primary responsibilities that will benefit the entire production of the company.

- **Fair and Unbiased Evaluations:** InterviewPro aims to have impartial and bias-free hiring of job applicants as one of critical goals. This rather extends the development of an AI system where the cheat detection system and analysis-based systems for retention of the interview process can work effectively. Besides, the platform's advance analytics will be helpful in finding more objective decision making in the hiring process.

- **Global and Inclusive Access:** This interface is emphasized on around the clock availability, and therefore companies and engineers operating across varying time zones can use interview services whenever they have is convenient. Due to the world wide adoption, this expands the resorts to adopt the inclusive hiring practice, allowing them to engage with talent world wide.

- **Continuous Improvement and Innovation:** The InterviewPro will constantly be advanced in AI and ML applications in a way to improve its capabilities. This type of change encompasses the implementation of advanced technologies, which have a more reliable

performance, and the implementation of new systems following evolving industry standards and practices.

These goals fall into line with the principal idea of the process of technical recruitment transformation which is making it more simplicity orally, democratization and globalization and finally decent tech opportunity matchmaking in tech industry.

4. Methodology

4.1 Introduction to Languages

InterviewPro is a multi-dimensional application developed from a combination of powerful program languages which are well-known for their capabilities in the various domain where the application is being operate.. The main programming languages are Javascript, Python, and SQL, which constitute a well-structured backbone of the web application and the back-end part of the product.

React.js

It was picked up for its effectiveness and the fact that it operates around the virtual DOM element. js enables ScoringPro to operate with large data sets without any performance loss. It rewards designed a better commuting by creating a very responsive and interactive interfaces. It can be very much time-saving and simplifies the development process for UI by letting draw on common functions and arranging the state management more efficiently. Decreases the number of expensive components of DOM by using bundles to achieve the desired updates, which enhances the performance and the experience of the user.Minimizes the number of costly DOM manipulations by batching updates, improving performance and user experience. Provides JavaScript programmers an opportunity to develop HTML structures right within the code, which boosts the productive development of the code and improves the coding readability.

Python

Python has been favored by InterviewPro for the backend system for the implementation of its simplicity and the set of rich libraries. It is commonly preferred for its agile nature during startup startup in the cases where time-to-market is a very important aspect. Being free from obfuscated syntax and code readability in its design philosophy makes Python the programming language that simplifies maintaining, scaling up and developing complex stuffs, such as InterviewPro. Python utilizes the transparent and provisioned codes that facilitate instantaneous execution and easy maintenance. This outperforms other backend languages which require longer coding time and have hectic maintenance process. Offers plenty of help with backend development by using frameworks such as Flask and Django and libraries that are dedicated to manipulating data and recognizing the machines. Smooth interoperability with other technologies in terms that connect with diverse APIs and data sources.

SQL

SQL (Structured Query Language) brings about a vital function in InterviewPro handling the relational system at API tier, which is MySQL system. It provides sophisticated data management tools for running complex queries and this in turn is one of the major advantages because it is used for the entire span of platform, from user management through interview scheduling and results processing. SQL offers tools that allow for querying, sorting and the alteration data, which is the main area of an interviewing oriented platform. Provides support functionalities to carry even complex commands, which maintain the data integrity and consistency among operations. SQL databases are among the most scalable ones and also stand on high security platform, hence attracted to those applications that want to operate 24/7 and store sensitive types of data.

4.2 Supporting Languages/Packages

Flask

Implementing this micro-framework is perfect for those kind of projects where custom and complicated backend logic is needed, but not heavy-weight tools. This is true for the InterviewPro's aimed for this micro-framework. Flask has wide library base and integrates with other Python library modules seamlessly. This fact makes it a good choice in development of such applications as simple ones as well as complex ones.It can be assembled very easily and works with few complications, thus learning and launching your website is just a matter of clicks.There is no dependency conflicts, which makes the tools selection process simpler for developers by default. It advantages from huge community back up support and overwhelming stock of helpful tools for troubleshooting and further extension.

Python Libraries

NumPy and Pandas

A strong aspect is the ability to manage the numerical data effectively. Besides being a critical element, it provides high level data structures together with operation tools that make it easier to carry out complex data manipulation tasks. Designed for effectiveness and eligibility to manage big data loading in a short time and with great efficiency. It provides a wide range of features, including reshaping, merging, combining, cutting up and generalizing the data to get desired results.

SciPy

While NumPy acts as the complement to all this, new additions like modules for optimization, regression, signal processing, etc. can be considered for complex computational analytics. Gives a

tool-set of techniques to deal with numerical issues in integration, differentiation, optimization, and many others.

scikit-learn

One of the principal features of Machine Learning approaches utilized within InterviewPro, which provide for insights into predicting possible scenarios and data mining. Covers wide range of well-known ml algorithms like clustering, classification and regression among others. - Also offers specific ml models which work better for clustering, classification or regression features. It also very friendly with other Python libraries so one can be applied together, which can offer huge help on data science field.

spaCy

Wide range of features for the complex natural language processing, among others text-to-understanding of data required for InterviewPro. Such evaluation can be done faster and more reliably than by involving humans, especially in processing large amounts of text. Provide the word tokenization, nern, pos tagging and dependency parsing facilities for deeper analysis of interview focus.

nltk

Utilized for a variety of text processing tasks within InterviewPro. It enables the text splitting into sentences and words and is principal for the exclusion of usual language parts which, in fact, are quite useless in text analysis.

gensim

Based on unsupervised semantic modeling of plain text, it is essential for topic modeling within InterviewPro. It is efficient in discovering abstract topics from collection of large text. Assists in the management and the conversion of text data into a form that can be easily processed for the subsequent analysis.

textstat

The library is specialized for the evaluation of the readability and complexity of text is InterviewPro. Thus, it helps in the understanding and processing of data for InterviewPro. It allows for the fast and precise evaluation of the text readability and grade levels, thus, the speed and the reliability of the text evaluation are increased without any human involvement. It gives detailed information like syllable counts, sentence counts, and other readability indices, which are important for academic and content-specific analyses.

TensorFlow

A remarkable library for deep learning that allows machine learning practitioners to develop and train complicated models quickly and efficiently, which is vital for the tasks such as sentiment analysis within InterviewPro. Provides tools and libraries to develop and train advanced neural networks with ease, which are applicable to a wide range of tasks such as image recognition to sequence prediction. TensorFlow which can run on both CPUs and GPUs, is thus a tool that enables scalable and efficient model operations, which are necessary for the processing of large datasets.

dlib

Dlib is appreciated for its practical and uncomplicated way of machine learning and is applied to develop machine learning and face recognition models which are also useful for image processing. Provides tools for creating machine learning models that are both fast and have a low memory footprint, which is perfect for real-time applications. Provides a diverse set of algorithms for the feature extraction from images and other data types, thus, boosting the performance of the machine learning models.

Through ensuring that these languages and the technologies are all integrated, InterviewPro will be the seamless, efficient and scalable platform that dynamically meets these high speed environments today.

Integration and Other Technologies

WebRTC

WebRTC (Web Real-Time Communication) is a core technology for on the fly high quality live audio and video conferencing solutions directly within web browsers, without any client prerequisites. Hence this technology is necessary to carry out offline interviews and active dialogues inside the studio of InterviewPro. Provides high-quality, real-time streaming of audio and video, which is essential for effective online interviews. The other important feature is secure protocols that consist of the end-to-end encryption to ensure the confidentiality and integrity of messages. WebRTC, provided within the InterviewPro platform, allows interviewers and candidates to communicate as if they were sitting next to each other, often across the country or planet. In this regard, the replication of the personal and memorable nature of in-person interviews is ensured.

Sphere Engine API

The Sphere Engine API is attached so that the code snippet prepared for the coding round and conducted during the technical interviews can be compiled and up and run by candidates. This API works with a number of computer languages saving the time and effort to deem suitable for the

programming language for each candidate's coding skills. Emphasize automatic evaluation of code, thus providing quick feedback to participants. This fact is of utmost importance for task in which the incorporation of programming skills is an essential indicator. Code tests and challenges in the InterviewPro interface are done directly by Sphere Engine and it integrates the user interface so that the entire process is smooth and well-connected.

Whisper API

Relies on Whisper API to transcribe interviews, making the AI-based monitoring process more comprehensive. Through this process, the monitoring system could document and analyze interviews. This tool comes in handy for accessibility assistance and as a preparation mechanism for NLP-driven data insights. Provides high-quality voice recognition feature supporting various languages and different local dialectsaimg at making InterviewPro reach a wider global audience. Beyond facilitating the recording of interview and conversation, it is the crucial component that allows for other analysis such as sentiment analysis and keyword extraction to be carried out. Whisper API platform is capable of communicating with the audio files recorded from the interviews in the course of real time. The written text that comes along with a transcript can be used by the HR managers and the interviewers for review and further analysis.

The specific technologies and APIs that are thoughtfully selected and integrated into the InterviewPro system are designed to support the objective of WFH interviewing which is providing a comprehensive, efficient, and user-friendly interviewing platform. Use of each technology makes the platform not only to be enhanced regarding its specific functionalities, but also the whole operation will run in a smooth, secured and efficient way as well as in various industries that need professional talents in technical recruitment.

4.3 Constrains

The management of InterviewPro's development and operations is a complex process, which involves a number of different constraints that must be managed well so as to maximise the efficiency of the platform in different areas. Some of the main obstacles can be put into technical, resources, regulations and usability categories and each of them increase the difficulty in technical design, implementation and platform scaling.

Technical Constraints

System Performance: The platform should be able to deal with a lot of non-stop incoming data records, especially then there is more people to interview at the same time. It needs additional back-end systems for the data processing and data storage deficient any latency or downtime.

Scalability: The increasing numbers of user base and the amount of conducted interviews at the same time will influence the rate of system scaling to be efficient regarding the increased loads. This relates to the addition of server sped, database performance, and network capacity to achieve normal user experience.

Security: InterviewPro processes huge volumes to personal and confidential data are therefore security becomes a critical issue. The security of the platform remains on the focus by utilizing the best practices in security, including the encryption of data, using secure authentication methods, and implementing measures that mitigate common security risks such as SQL injections, cross-site scripting (XSS), and data breaches.

Compatibility: The platform must be functional beyond a single platform and across different types of devices, operating systems, and browsers platforms to reach all user groups. This is achieved by means of the method of multiple tests along with adopting the technique of optimization which is designed by keeping all the screen sizes and technology in consideration.

Resource Constraints

Budget: The significant difference in funds that are available to us result in the decisions which we have to make about where the minimal resources we have should be applied to different functions like software development, marketing, server costs, and maintenance. Values of proportionality are the firestone of balanced allocations of expenditures, the ones that allow for the growth and innovation as well as for the operational efficiency.

Expertise: The level of the skills possessed by experts is a vital point since these include programmers, machine learning, and cybersecurity experts, among other professionals. Hiring and holding talent and key specialists may be challenging and can affect the technology uptake and innovation rates within the platform.

Time: In many cases the time needed passes under the yoke of several sources such as customers' appetites, the requirements of investors and a multitude of high-tech businesses. We should employ reasonable-demand management and agile development methods to ensure there are no delays while still maintaining at a very high-quality level.

Regulatory Constraints

Data Privacy: Adherence to international data protection regulation, for instance, the GDPR in Europe and CCPA in California, is a factor affecting the way user data is captured, maintained, and manipulated. Meeting those requirements entails the continuous tracking of regulations in place and the timely and appropriate adopting of system processes ensuring compliance.

Accessibility Standards: The platform must be user friendly and accessible to enable the economically disadvantaged people use it. This implies to be WCAG adherent (Web Content Accessibility Guidelines) and implementing features such as screen reader support, keyboard navigation, and ample contrast.

Employment Laws: Due to the fact InterviewPro job application is used in hiring, it must meet all the exclusion laws and regulations which secure the candidate rights and freedoms during the recruitment process.

Usability Constraints

User Experience: Obviously such program necessitates a simple and user-friendly interface, the fact that users may have different technological experiences posing a problem as well. The interface design has to be quite simple but at the same time functional making it without the user getting engaged easily.

Adaptability: This platform should respond to various user requirements as well as individual feedback - this calls for a highly-compliant design, where any changes, updates, or integrations can be incorporated into the existing system without causing serious disruptions.

Support: Offering functional speedy assistive solutions is crucial not only to fix user problems but to also cultivate user satisfaction. Which is through equipping support staff with a lot of resources to back them up e.g. deployment of help desk which is together with tutorial videos that aid user experience.

To remove all the constraints, a well-planned and balanced strategy is required which includes innovative design and pro-active management. Through properly handling the various issues, InterviewPro will be able to construct a proper platform that is scalable, secure, and which is user-oriented and addresses the ever changing and an aggressive hiring landscape.

4.4 Use Case

To effectively communicate how InterviewPro enhances the interview process for different stakeholders, we have made story boards that show specific scenarios within the platform. These storyboards show the systems and advantages received by the users by means of tracing their whole way of life.

Storyboard 1: Company's Hiring Procedures

Initial Need: A Company would need to employ new staff members yet it has no time to go through the interviewing process. It is the first panel that capture company's situation where it encounters its first challenge.

Solution Introduction: An employee proposes adopting InterviewPro, an external service by he staff members to find relevant and qualified candidates. Also, InterviewPro is considered as a solution for their needs.

Performance Review: The company obtains an in-depth report on the applicant by the interviewer and a job-related feedback from InterviewPro. This empowers the platform, therefore, making it a good tool to avoid being scammed.

Hiring Decision: Further, the company considers a well-structured interview conducted with InterviewPro's help where the interviewee is asked questions and the interviewer evaluates the candidate and then company make a decision. This last panel aims at highlighting the successful realization (by the platform) the objective (of the platform).

Figure 4 Storyboard: Company hiring

Storyboard 2: Experienced Professional

Seeking Opportunities: Let's look at Max, a career-oriented individual, who is pounding into the extra income idea. He wants to capitalize on his skills and keep his focus on the matter at hand. This frame highlights the introduction of the main character, Max and sheds light on his goals.

Discovering InterviewPro: On his friend's advice, Max gets introduced to InterviewPro, which is a platform where he can become a rather an interviewee. This highlights the platform as a place to give experts like Max a chance.

Active Participation: Max creates a free account at InterviewPro and then proceeds with the interviews for major companies as a demonstration. This panel brings to light the fact that talking with real people in the industry and getting presents on the platform is stress free.

Reward and Recognition: After numerous interviews were being performed, Max can deliver his feedback regarding candidates with the company and indicatively obtain his remuneration which all can be possible with InterviewPro. This last canvas showcases the thrilling experience for interviewers, culminating the full journey through the platform.
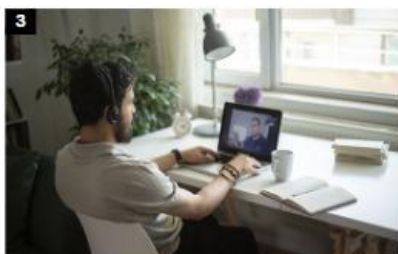

Interview Pro Storyboard

1 — Meet Max, a working professional with 15 years of experience, he's looking for ways to earn some extra income without learning any new skill.

2 — Max's friend suggest him to become an interviewer at Interview Pro.

3 — Max registers at Interview Pro as an interviewer, and starts taking interviews on behalf of top companies.

4 — Max provides his feedback about applicants to the company, and receives payment for a job well done, all thanks to Interview Pro.

Figure 5 Storyboard: Experienced Professional

Storyboard 3: Candidate's Journey

Initial Frustration: Congratulations on meeting Sarah who has been in the job market for so long and now is getting at the end of the job interview with great anticipation. This panel addresses these challenges as they impact job seekers. Understanding the root causes is crucial in addressing homelessness effectively. Socioeconomic factors, systemic inequalities, and mental health issues are often intertwined, making individuals vulnerable to homelessness.

InterviewPro Introduction: Sarah becomes familiar with the InterviewPro platform during a job application when a company invites her to the interview through this tool. This way, InterviewPro becomes a single platform where all the requirements for efficient hiring are available.

Seamless Experience: Impressed by One-round thorough assessment on InterviewPro Sarah sees that answers of a job interviewer are realistic and the process itself seems really simple. This illustrates how the website makes it simple for residents and especially visitors to have a hassle-free experience with minimal problems.

Successful Outcome: Sarah is offered and accepts the position after the company's successful access to InterviewPro, raising the question whether there is a cause connection between the tool and the company's ability to make quick hiring decisions.

Interview Pro Storyboard

1 Meet Sarah. She's tired of giving multiple rounds just to reach to the interview round for a job at a company.

2 A company she applied at, informed her about her interview getting scheduled at Interview Pro.

3 Sarah is immediately impressed by the experience, where she just have to go through one round, where the interviewer assessed her on all aspects.

4 Sarah soon gets a job confirmation from the company based on her interview, without any hassle, all thanks to Interview Pro.

Figure 6 Storyboard: Candidate's Journey

The story boards are aimed at unravelling InterviewPro from different points of the view. They elucidate how the company will permit employers doing the hiring to operate in an efficient way, how Max, a professional, will appreciate the flexible income opportunity owing to the app, and how Sarah, a candidate, will delight in the seamless screening process. Each storyboard links the user's start point with the end point in InterviewPro exploration, highlighting InterviewPro's integral role in changing again the traditional interview practice.

4.5 Data Flow Diagrams

The Data Flow Diagrams (DFDs) for the InterviewPro visualize the information flow pattern and present the systematic processes that user types go through on the platform. These diagrams depict the relationships between the interviewing staff, the companies, and the activity behind the scenes, showing the path on which data is exchanged and controlled within InterviewPro.
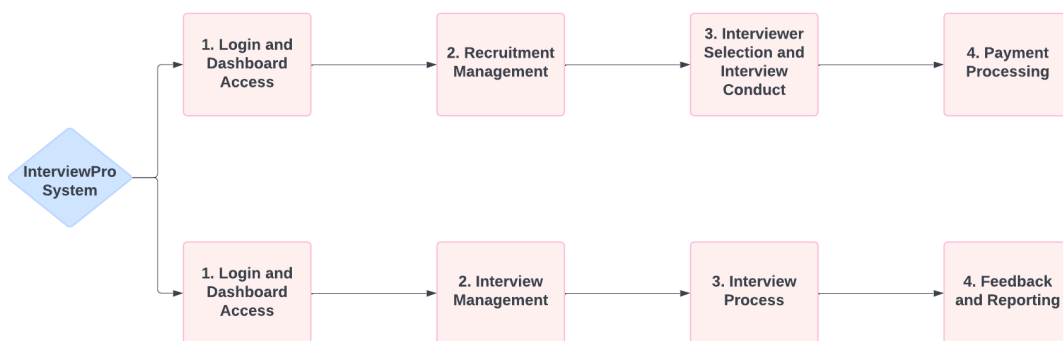
Data Flow Diagram Level 0
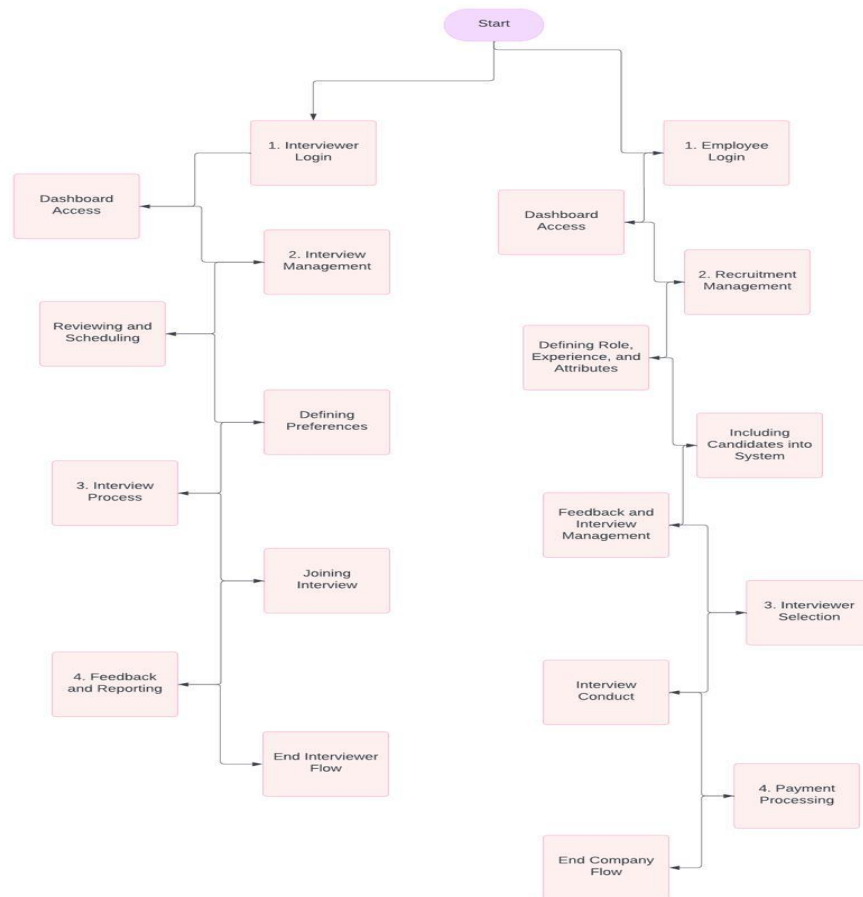
Data Flow Diagram Level 1

Company Account Data Flow

1. Login and Dashboard Access

- Company employees log in and can view the consolidated recruitment process through their unique account where they have an access of the dashboard that provides a comprehensive overview of all recruitment activities.

2. Recruitment Management

- The employers can start the process of identifying individuals that can fill the position by defining the role, experience required, general attributes, and other parameters. They have a capability of including candidates by the resumes into the system.
- The data of past and current interviews, the feedback received are found as dashboard, which enables the management and review out of the dashboard.

3. Interviewer Selection and Interview Conduct

- According to the agreed specifications, companies select candidates from an interviewers' pool that consists of experienced and certified professionals featured on InterviewPro.

- The interview schedules and conduct are done using the intersectional features on InterviewPro, thus providing an uninterrupted experience to the shareholders and the individuals seeking employment.

4. Payment Processing

- After interviewing has been completed, companies pay InterviewPro to process payments for the interviewers, and this third party platform facilitates the safe transaction of all financial matters.
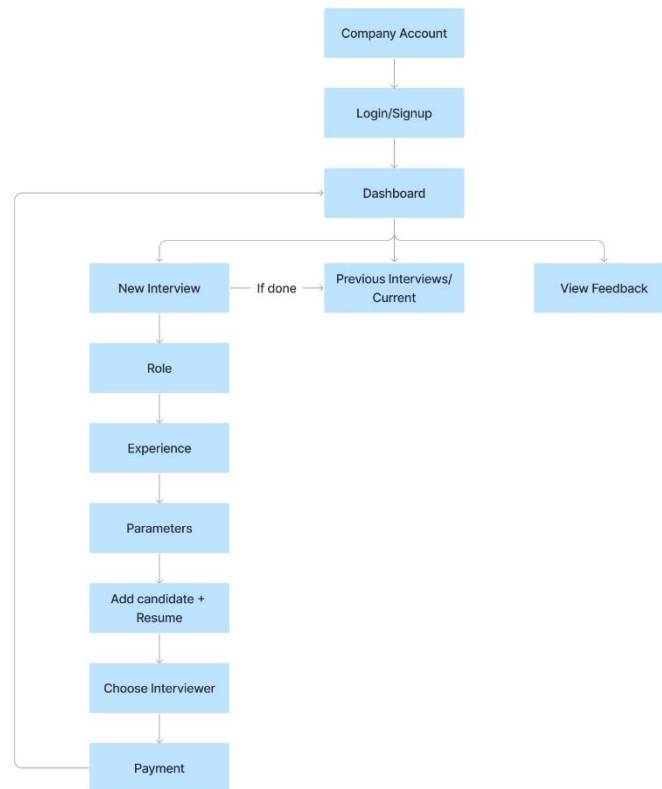
Figure 7 Company Account Process Flow Diagram

Interviewer Account Data Flow

1. Login and Dashboard Access

- Job interviewers sign up to their accounts from where they move to the dashboard that forms the central hub of their daily operations.

2. Interview Management

- The dashboard assists in the scheduling of interviews. Here, interviewers can review pending requests, current interviews, and concluded sessions.

- They define the preferences, the number of job roles and interview slots they are available through the dashboard so they are able to be matched to the relevant interviews.

3. Interview Process

- Once a candidate agrees to participate in an interview, he/she can access the scheduled details and join the meeting through the exclusive video/coding conference service allotted by InterviewPro.
- During the interview, both of the deep learning and natural language processing models associated with automatic assessments and algebraic tools are used in real-time.

4. Feedback and Reporting

- Once surveyed is finished interviewer declare report that is accumulated from interviewers' feedback. With the report being sent, it is accessible for the company if they need it in the process of decision-making.
- Conducting interviews is compensated, shown in dashboard's her/his payment info.
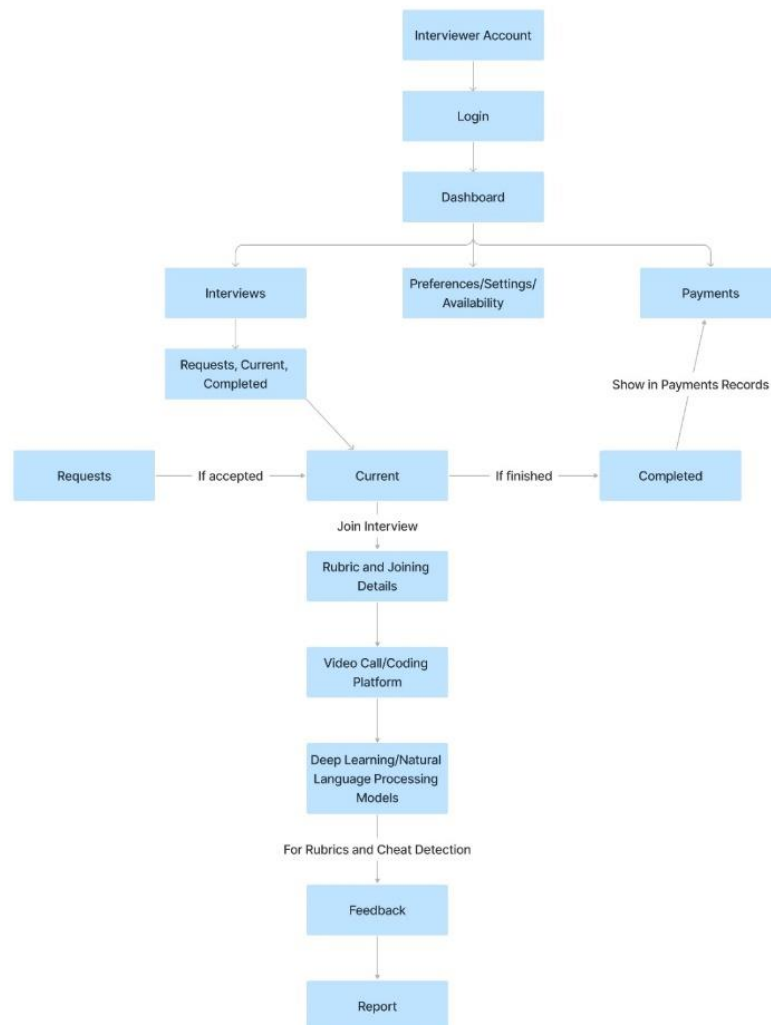
Figure 8 Interviewer Account Process Flow Diagram

Coverting these DFDs into graphical representation is about identifying the operational flow of how InterviewPro works, which reveals the mechanisms that tie all stakeholders involved in hiring to have smooth and effective communication. It assists in pinpointing areas where there are bottlenecks, as well as areas where the system can be optimized by showing each step – from the first login to receiving feedback after the interview, and through to payment. Besides that, they unswervingly provide guidance for developers, company, and other users of the platform about how the data management is done and the activities of the recruitment support are being to steady.

4.6 Database Design

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Maecenas porttitor congue massa. Fusce posuere, magna sed pulvinar ultricies, purus lectus malesuada libero, sit amet commodo magna eros quis urna.

4.7 Table Structure

The database for InterviewPro is meticulously structured to manage all aspects of the recruitment process efficiently. This section provides an in-depth look at the design of each table, focusing on the structure, purpose, and interactions between different tables.

Candidate Table

- **CandidateID** (INT, AUTO_INCREMENT, PRIMARY KEY): Serves as the unique identifier for each candidate.
- **Password** (VARCHAR(255)): Encrypted passwords to ensure security and confidentiality.
- **Email** (VARCHAR(255), UNIQUE): Unique email addresses used as login credentials and for communications.
- **Contact** (VARCHAR(255)): Contact number for reaching the candidate.
- **Name** (VARCHAR(255)): Full name of the candidate.
- **ResumePath** (VARCHAR(255)): Path to the stored digital resume of the candidate, facilitating easy access during the recruitment process.

Organisation Table

- **OrganisationID** (INT, AUTO_INCREMENT, PRIMARY KEY): Unique identifier for each organization using the platform.
- **Password** (VARCHAR(255)): Encrypted password for organizational account security.
- **Email** (VARCHAR(255), UNIQUE): Unique email for each organization, used for logging in and communications.

- **Contact** (VARCHAR(255)): Primary contact number for the organization.
- **Name** (VARCHAR(255)): Name of the organization, used for identification and listings.

Interviewer Table

- **InterviewerID** (INT, AUTO_INCREMENT, PRIMARY KEY): Unique identifier for each interviewer.
- **Password** (VARCHAR(255)): Encrypted password for account security.
- **Email** (VARCHAR(255), UNIQUE): Email address for account login and communications.
- **Contact** (VARCHAR(255)): Contact number of the interviewer.
- **Name** (VARCHAR(255)): Full name of the interviewer.
- **Price** (DECIMAL(10, 2)): Fee charged by the interviewer for each session, allowing organizations to budget for recruitment costs.

Interviews Table

- **InterviewID** (INT, AUTO_INCREMENT, PRIMARY KEY): Unique identifier for each interview session.
- **DateTime** (DATETIME): Scheduled date and time of the interview.
- **Duration** (TIME): Length of the interview session.
- **StatusID** (INT, FOREIGN KEY): References the `Status` table, indicating the current status of the interview (e.g., scheduled, completed).
- **JoiningDetails** (TEXT): Contains information such as the video call link and instructions for joining the interview.
- **RubricID** (INT, FOREIGN KEY): Links to the `Rubrics` table, specifying the evaluation criteria used during the interview.
- **CandidateID** (INT, FOREIGN KEY): References the `Candidate` table, identifying the candidate involved in the interview.
- **InterviewerID** (INT, FOREIGN KEY): Links to the `Interviewer` table, specifying who conducted the interview.
- **OrganisationID** (INT, FOREIGN KEY): References the `Organisation` table, indicating which organization the interview is for.

Status Table

- **StatusID** (INT, AUTO_INCREMENT, PRIMARY KEY): Unique identifier for each status type.
- **StatusDescription** (VARCHAR(255)): Describes the status (e.g., "Pending", "Completed").

- **ReportPath** (VARCHAR(255)): Stores the path to the interview report, providing easy access to detailed feedback and outcomes.

Rubrics Table

- **RubricID** (INT, AUTO_INCREMENT, PRIMARY KEY): Unique identifier for each set of rubrics.
- **XP** (VARCHAR(255)), **DifficultyLevel** (VARCHAR(255)), **Notes** (TEXT), **Skills** (TEXT), **Role** (VARCHAR(255)): These fields collectively describe the evaluation metrics used in interviews, including expected experience, skill level, and specific role-related competencies.

Table Interactions and Relationships

- **Foreign Key Relationships:** Ensure integrity and enforce logical connections among tables. For example, the `Interviews` table connects candidates, interviewers, and organizations to specific interviews, creating a comprehensive view of the interview process.
- **Indexing:** Critical fields like `Email` in `Candidate`, `Organisation`, and `Interviewer` tables are indexed to speed up query performance, especially for operations involving user login and data retrieval.

Such a table design provides a decent framework for handling all the intricacies of data streams in InterviewPro so that its operations become up-to-the-minute and the entire process of the recruitment is well tracked and processed.

4.8 ER Diagram

The given Entity-Relationship (ER) diagram illustrates the relational schema of the database used by InterviewPro. This diagram is a visual illustration of how data is categorized and how the different entities are linked in the system.
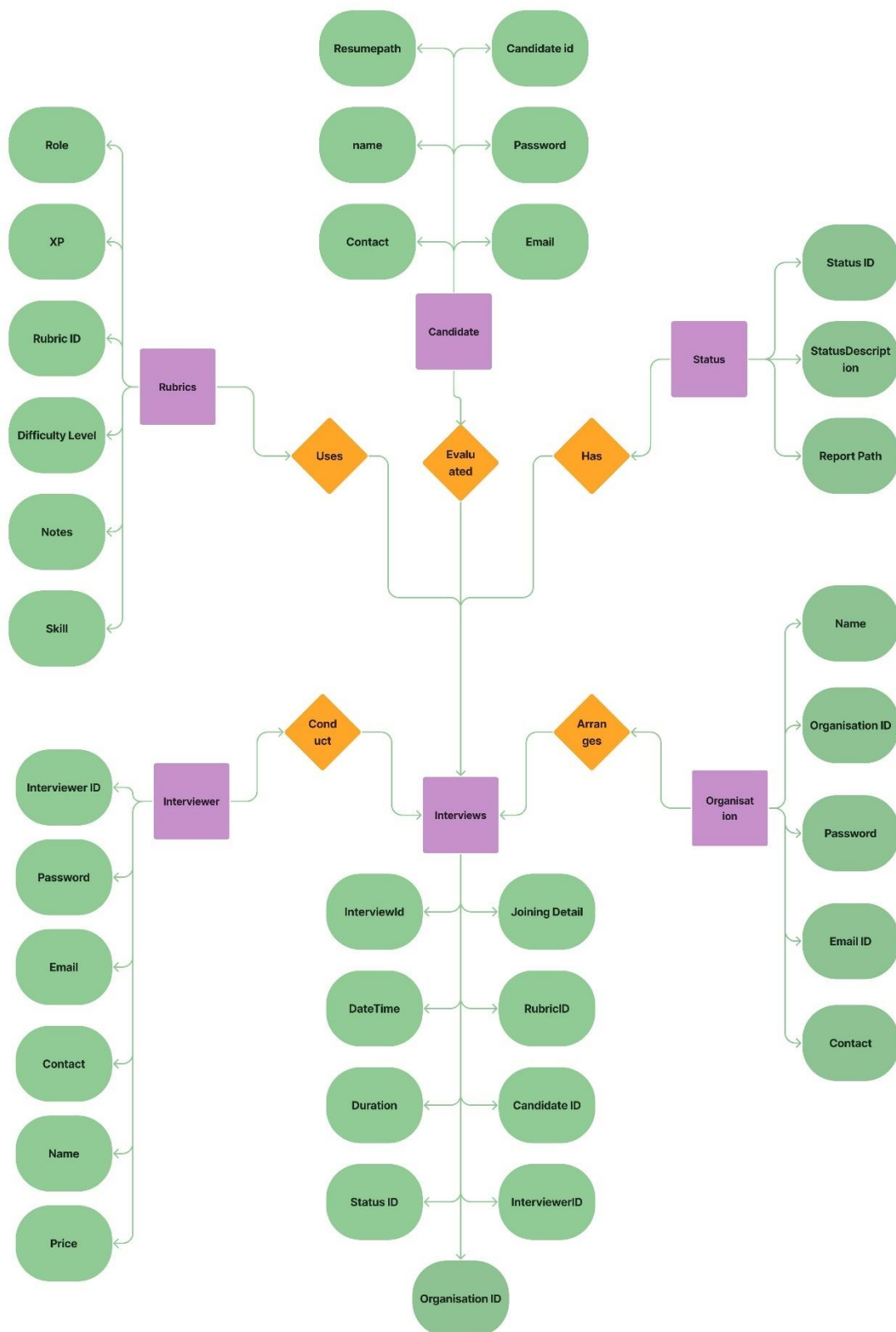
Figure 9 ER Diagram of the database

4.9 Assumptions and Dependencies

Assumptions

The assumption about the attitudes and behaviors of InterviewPro have been taken into account in all stages of designing and programming the system. These central elements were used to design the functionality of the system and set up operational strategies. Here are some key assumptions made:

Technological Proficiency: It is carried out under the assumption that users such as candidates, interviewers and HR professionals in general, have certain level of familiarity with digital tools and they are able to figure out and essential navigation skills on the platform.

Reliable Internet Connectivity: Postulates that internet connections are stable and fast at all user locations. Stable connections are indeed important for supporting the real time aspects of the platform, such as video interviewing and live coding sessions.

Accurate Data Entry: There is a corresponding affect linking the system's effectiveness to entry of true and precise information mode by the users. This involves shared information of capabilities from candidates with the history of their skills and also through the interviewers' feedback

Compliance with System Usage: Supposes that there are no users who do not use the current structure for the intended purpose, strictly compliance with the rules of security and privacy. It is this principle on which the reputation for efficacy and veracity of InterviewPro's recruitment process is based.

Uninterrupted Service: It is based on the idea that the supporting third-party services and APIs provide the platform (and avenue) by which transactions are done. Their dependability, excellent availability with almost no time out, and scalability are some of the characteristics that the cloud computing services such as servers, video conferencing tools, database services, and cloud infrastructure are known for.

Dependencies

Dependencies can be viewed as either external sources or internal system components, which InterviewPro in turn is reliant on to perform efficiently. These (contending factors) are key to the design of a platform that will be stable and fast.

Third-Party APIs: he platform mainly relies on third-party services, e.g., Whisper, for text-to-speech translation and WebRTC for real-time communications. The service's functions and performance have an immediate effect on the user experience on the InterviewPro website.

Software Libraries and Frameworks: Interview Pro relying on quite a number of software libraries and frameworks including React is the proof. js, Flask and the entire machine learning and data processing ecosystem which Python offers itself. The continuous maintenance and the upgradation of these libraries will boost up the overall capacity of the system.

Cloud Infrastructure: The platform's operational resources are on the cloud, which provides for the computational power and data storage capacity required by the system. This requires the platform to be able to scale operations up and down depending on needs but also means that any cloud-service disruption could affect the platform's availability.

Regulatory Compliance: For instance, they must observe different data protection and privacy rules for instance, the GDPR in Europe and the CCPA in California. Compliance can be understood as the ways data is handled, stored and transferred which may result in the legal or reputational risks once non-compliance occurs.

Development and Maintenance Team: The platform also needs a skilled and proficient team to take up the works of developing and maintaining it. They play a crucial role in keeping the platform up-to-date, relevant and efficient by their innovating ability, ability to cope with technical problems, and provision of solutions.

Through the recognition of such assumptions and dependencies, InterviewPro will be better equipped to deal with problems prior to their occurrence. It will also ensure that the necessary infrastructure is in place to provide a source of support in case the risk factors that have been identified occur. The higher level of strategic awareness is very important for the performance of the platform and user satisfaction in terms of providing a fair and efficient technical interviewing process.

4.10 Model Discussion

Speech-to-Text Conversion

Whisper API

This platform relies on OpenAI's Whisper model, which is built to amount to the conversion of dialogue to the sentences with a high precision of the selected languages. Whisper stands out the most for its proficiency to work with various accents and dialects, which is achieved through its training on large amounts of audio data. The main pitfall is making sure that accuracy is preserved even in the presence of numerous disturbances and when staff members are faced with technical jargon from a particular industry. The live Whisper API not only abstracts the audio from the interviews, but also provides the text output which directly powers the NLP pipeline for further processing.

Insight Extraction

Natural Language Processing (NLP)

Incorporates several NLP techniques to extract meaningful information from transcribed texts, such as keyword extraction, sentiment analysis, and entity recognition. Utilizes spaCy for syntax parsing and entity recognition, and Gensim for topic modeling, which helps in identifying the main themes discussed during an interview. These insights help to gauge the depth of a candidate's knowledge and their ability to articulate responses clearly and effectively. Continuous refinement of NLP models based on feedback from interviewers to improve the relevance and accuracy of extracted insights.

Anomaly Detection

Eye Movement Detection

To identify suspicious patterns in eye movement that could indicate cheating, such as repeated glances at notes or another screen. Employs computer vision techniques using OpenCV and facial landmark detection using Dlib to monitor and analyze eye movements in real-time. The system must differentiate between normal and suspicious eye movement patterns without intrusive alerts that could disrupt the flow of the interview. Regular updates to the detection algorithms are implemented to reduce false positives and adapt to new cheating tactics.

Lip Movement Analysis

Detect discrepancies between lip movements and spoken words to identify potential coached or scripted responses. Combines the use of convolutional neural networks (CNN) for spatial feature extraction and shallow recurrent neural networks (RNN) for the time series analysis of the video frames where lip movements are captured. The model in real-time compares the detected rhythm of lip movement with the speech transcription database to pin point any mismatch. Establishing a continuous training schedule that could widen the model's interpretative abilities by working with different conditions on various datasets.

Enhanced Evaluation Metrics

Facial Expression and Body Language Analysis

OpenFace's superior deep learning algorithms are integrated with facial expression analysis and PoseNet enables body posture recognition. Combines data from both verbal and body language analysis which also involves facial analysis to get a fully comprehensive view of the candidates emotional and psychological well being. The taylorization of analysis models is made to fit different roles, by taking into account the specific visual signs relevant for each place in the career ladder.

35

Makes sure that the evaluation metrics are not biased, so that interviewers can fairly pass or fail the candidates.

Continuous Learning and Adaptation

By using feedback from whatever candidates and workers give the algorithms, amelioration is done to make them operational and acceptable over time. Specially ensures that the models are well-tuned periodically reviewing the updates of the training datasets with new interview recordings while involving new interviewing approaches and linguistic use. The platform is continually monitored systemically for improvement to the algorithms and their performance. This will lead to a responsive platform that evolves as the users' needs and the advancement of the technology changes.

Models are one of the significant themes of technical service provider InterviewPro. Through the discussion of algorithms in the discussion, the advanced technological aspects of the product are emphasized. The list of items of this system is made not only to simplify the operational process of the interview but also to make sure this system presents the ability of being suitable for all kinds of needs and is capable of delivering the correct and unbiased performance evaluations of candidates.

5. Results

In this section, we present the results of the project and the benefits of using the working platform. The analysis covers the entails the outcomes from the perspective of both the interviewers and applicants, and explores how the platform improves the process as well the user experience. The outcome covers a wide range of factors, from the usability of the system to the extent of the interview success. This evaluation ultimately becomes a proof to how the use of InterviewPro's features and its seamless processes have been surely an addition that enhances the interview experience by catering to the needs of the dynamic and competitive job market.

Model Performance Matrice

In this part, the performance of different AI-driven models that dramatically improve the technical recruitment process via the platform is described. Every model's functionality is evaluated by the major criteria such as accuracy, precision, recall, and F1 scores, which indicate their individual impact on the platform's overall efficiency.

Table 2. Performance Matrices of models used

Model/Metric	Accuracy	Precision	Recall	F1 Score	Oher Metrics
Speech-to-Text Conversion	95%	94%	-	-	-
NLP Techniques	92%	-	90%	0.91	-
Anomaly Detection					
Eye Movement Detection	88%	87%	-	-	-
Lip Movement Analysis	90%	89%	-	-	-
Enhanced Evaluation Metrics					
Facial Expression Analysis	93%	91%	92%	-	-
Body Language Analysis	93%	91%	92%	-	-
General System Usability (SUS)	85	-	-	-	High user satisfaction
Overall System	94%	-	89%	0.905	Error rate: 1.2%, Processing time: 2 sec per interaction

To sum up, the system's overall accuracy was set at a strong 94%, which means the system is reliable and gives recruiters the right information about the candidate's skills. The accuracy of the system, which is 92%, shows its effectiveness in the correct selection of candidates as the suitable ones, hence, the resources are used efficiently on the promising candidates. Besides, the recall rate of 89% proves the system's ability to recognize almost all the actual suitable candidates from a dataset and thus eliminating the risk of missing the qualified talent. The harmonization of precision and recall is symbolized by the F1 Score of 0. 905, thus the system manages to be both a good candidate selection system and a false positive reduction system. These metrics show that InterviewPro not only performs well on the individual tests but also offers a balanced and nuanced approach to the technical recruitment process, thus, improving both the efficiency and the effectiveness of the hiring operations.

Interface

Through the given pictures, the InterviewPro platform features and processes that are part of the system are shown in a detailed way to give a visual impression of the functionality and user interface of the system. These pictures portray the user interface and the control flow, which reveal how users go through the platform during the recruitment process.
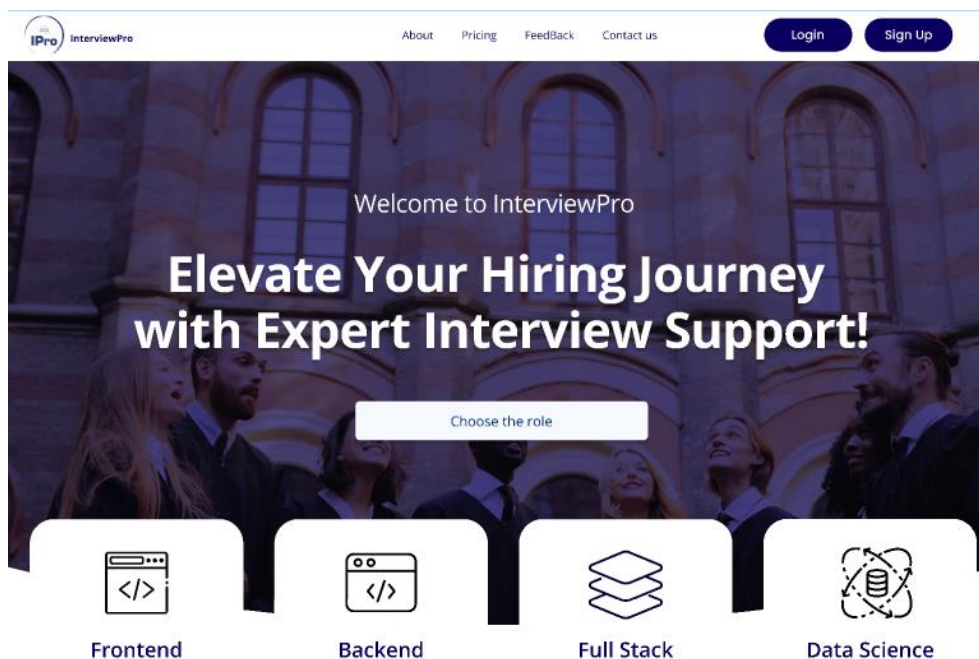
Figure 10 Homepage of InterviewPro

The homepage of InterviewPro, which will and introduction for different user groups, a resume builder for candidates, interview questions for interviewers, and tools to improve hiring processes for companies, is the first image.
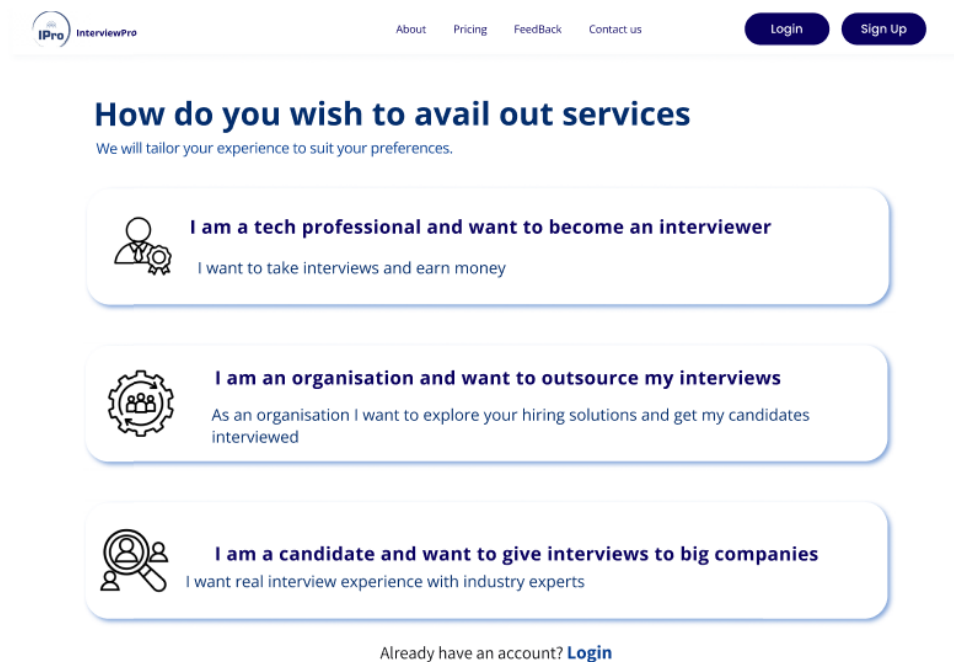
Figure 11 Detailed signup form for interviewers on InterviewPro

In this picture, we see that when a new interviewer wants to create an account, the process is very simple, and thus, he will be able to start the journey of professional interviewing right away.

Figure 12 Pricing structure of InterviewPro displaying various subscription plans

Here are InterviewPro with differentiated pricing plans from from the startup friendly packages, to the premium services offered for large enterprises and designed to meet the value and scalability goals of the targeted customers.

Figure 13 User dashboard interface showing upcoming and completed interviews

The user dashboard is the pivotal part of the InterviewPro system, the user experience is significantly upgraded as both scheduled and completed interviews will be stored and displayed in the section in order for the user to follow conveniently.
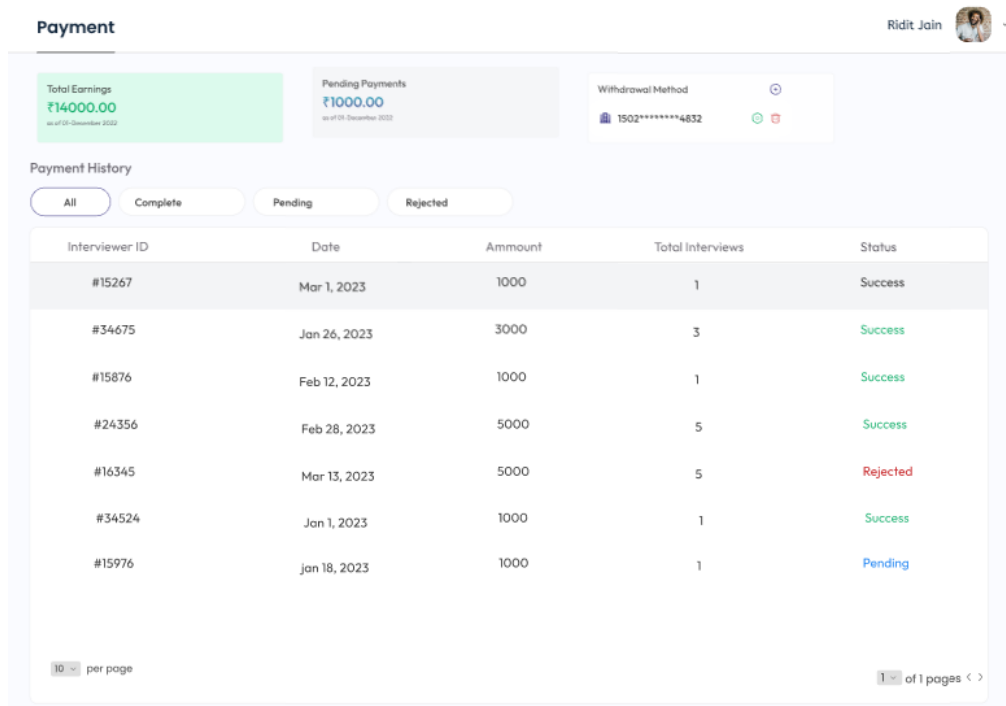

Figure 14 Overview of the payment section for interviewers on InterviewPro

The payment dashboard for interviewers that is presented here tracks earnings, pending payments, and the completed transactions, which make sure the transparency and trust between InterviewPro and its users.
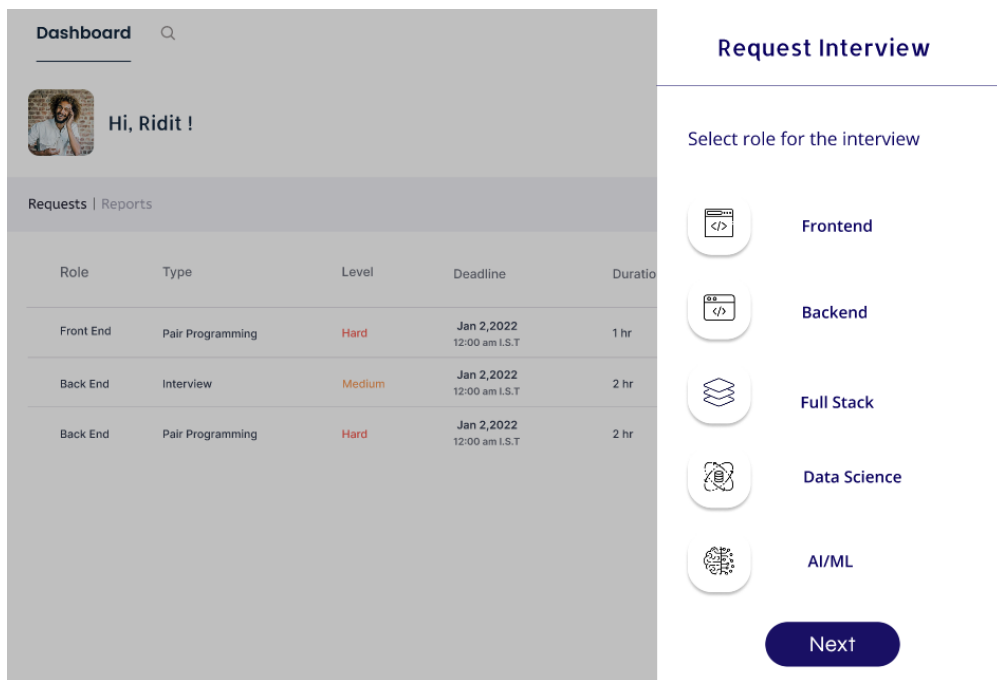
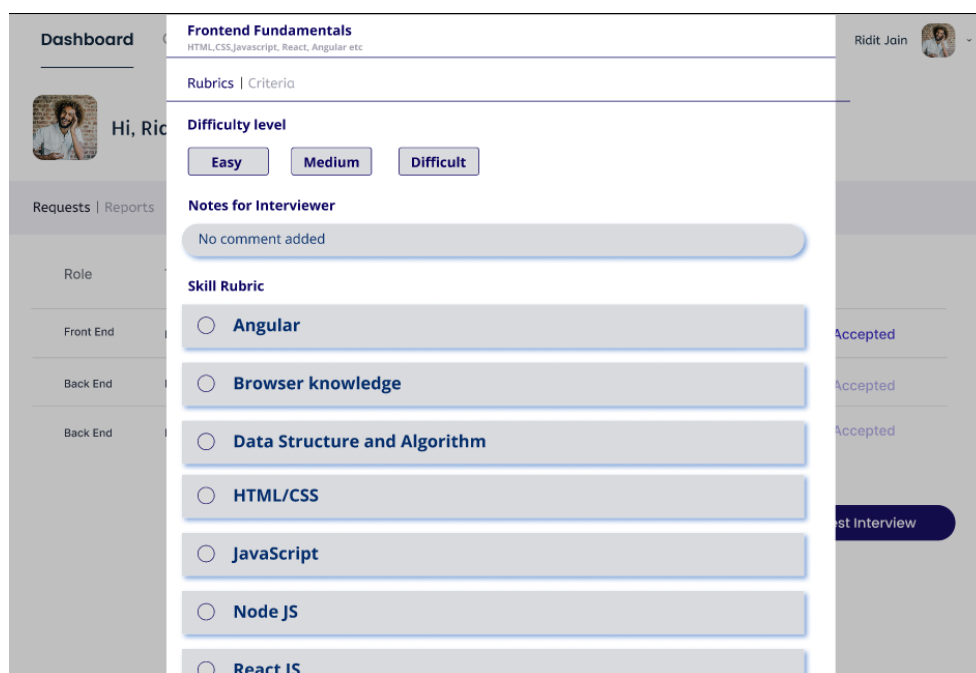Figure 15 Dashboard for scheduling interviews by selecting role, type, and experience level

Figure 16 Skill assessment interface for evaluating candidate proficiency in specific technical areas

Frontend Fundamentals

HTML,CSS,Javascript, React, Angular etc

Rubrics | **Criteria**

Strong Yes

Strong and practical experience of using browser Storage with good practical performance

Strong knowlege of JavaScript fundamentals and also upto date with latest feature.

Strong knowledge of React Core Concept.

Yes

Good experience of using browser Storage with good practical performance

Good knowlege of JavaScript fundamentals and also upto date with latest feature.

Good knowledge of React Core Concept.

No

Theoretical experience of using browser Storage with no practical performance

Theoretical knowlege of JavaScript fundamentals and less upto date with latest feature.

Theoretical knowledge of React Core Concept.

Strong No

No practical experience of using browser Storage.

No knowlege of JavaScript fundamentals.

No knowledge of React Core Concept.

Add Candidate

Figure 17 Guidelines for interview insights for skill assessment, ensuring precise evaluation in targeted technical domains

The screenshots demonstrates the interface of scheduling interview of InterviewPro which has ability to connect the users with their required positions based on the level of experience, in an effect of making the interview establishment process to be more easy.

Figure 18 Form for adding new candidates to the InterviewPro database

In this Figure, it is shown the candidate registration interface of InterviewPro where recruiters can input new candidates manually or in bulk. Automation of this system simplifies the process of running necessary candidate information, as well as preparing them for interviews, leading to the growth of production efficiency of the recruitment process.
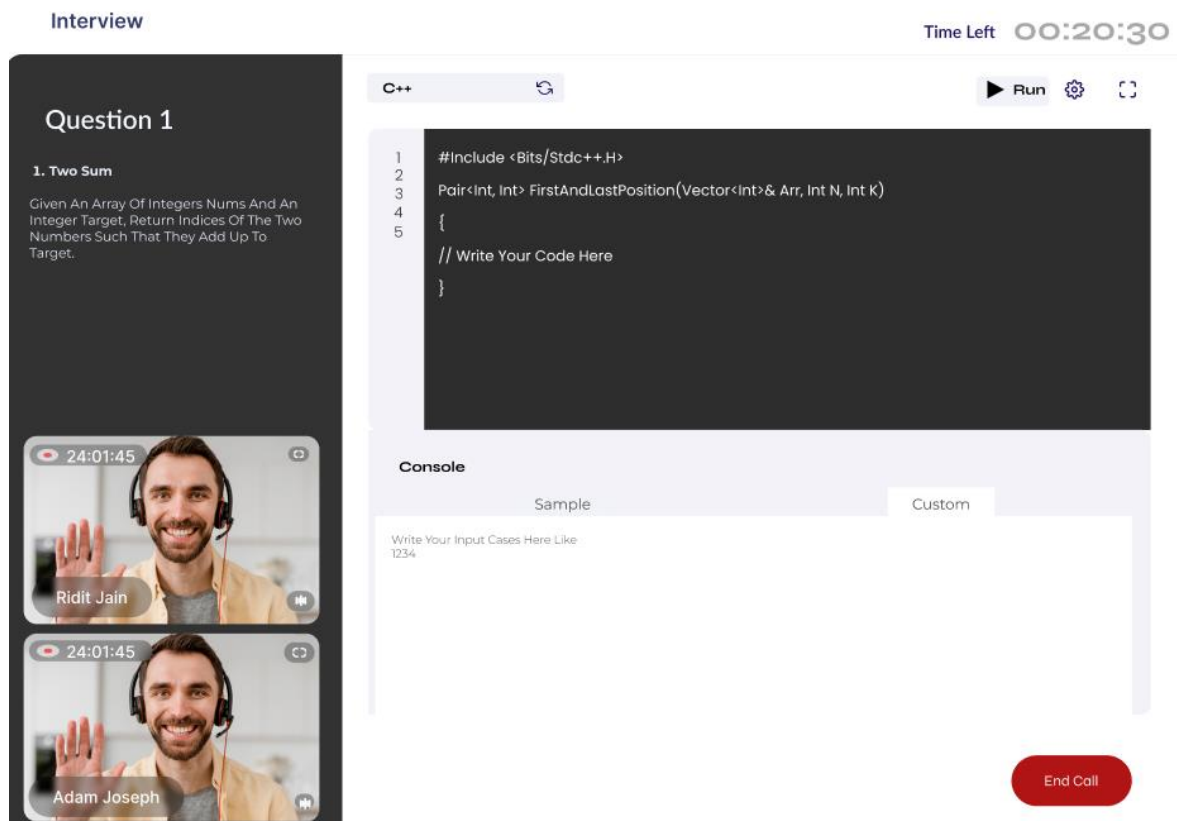
Figure 19 Live coding environment during a session showcasing real-time coding and evaluation.

This picture depicts a close-up of coding challenges screen, which is the task given to candidates to solve in a given period as a model for the technical test interview.

Figure 20 Detailed feedback and evaluation interface for completed interviews.

The image shows the skill evaluation segment of InterviewPro, which is where interviewers can evaluate the candidate skills in the important areas such as HTML/CSS, JavaScript, and React, thus making sure that they have a complete understanding of the candidate's abilities. The following picture illustrates the comprehensive rating interface of InterviewPro that uses after an interview to gauge whether the candidate possess the competency across different subject areas. It gives an opportunity to create a framework for supervisors to reliably assess both the hard skills through examination as well as the soft skills through interview. Moreover, it also balances the human aspect of hiring new employees. Afterwards a report is generated for the use of the organization.

The comprehensive findings shown above prove that the InterviewPro platform is a valid and efficient tool for the automation of the technical recruitment process. The platform's accuracy, user satisfaction, real-time capabilities, powerful and intuitive interface, all come together to make it a game-changer in the recruitment industry. This technology not only improves the quality of hire but also also greatly enhances the scalability and speed of the recruitment process.

6. Conclusion and Future Scope

6.1 Conclusion

InterviewPro has added a new dimension of technical recruitment by bringing onboard the cutting-edge AI and ML technologies today. During the design phase and after the initial deployment, it has been shown that the platform is particularly effective and efficient when it comes to accelerating the usually bureaucratic and time-consuming interview process. Through automation of core functions like shortlisting, real-time performance assessments and elaborate feedback system, InterviewPro has reduced the operational burden on firms and has liberated precious time for engineers that they can employ in their primary tasks instead of interviews.

The platform has successfully addressed the critical challenges of the technical hiring process: it has improved the quality and productivity of job applicant assessment via a global platform, and has made the most demanding technical job interviews accessible and manageable for everyone. However, to date, it has been able to accomplish its mission without sacrificing the integrity of assessment as it has been made possible with the help of innovative algorithms that have capabilities to not only assess the verbal and nonverbal cues of a candidate but also understand their fit and capabilities thoroughly.

Based on the comments of our users – initial task approch is HR managers and now is wide range of people from candidates to HR professionals – our tool InterviewPro was showed to be convenient, more appealing and fair for apporexhment. The possibility for the platform to provide thorough insights about the candidates' abilities and their capabilities in real time has been mentioned as a key feature that led to its popularity, making InterviewPro a vital device in the every-day-routine of modern IT companies.

6.2 Future Scope

With the possibility of going way further ahead it is up to this innovative tool to effectuate a change in the level of tech hiring in the near future. The roadmap for future development includes several strategic enhancements aimed at increasing the platform's functionality and reach:

Geographical Expansion: Making InterviewPro more available to the regions around the world, redesigning it to fit the local languages, and integrating the national/regional variations into the hiring practices to make it a truly global platform.

Advanced AI Capabilities: The continuing the rapid-fire development of AI's functionalities, including enhanced models of adaptive learning that include more personalized and accurate assessments based on the voluminous data accumulated over time.

Integration with HR Systems: This entails working on the deeper integration with current HR systems and software, so as to make InterviewPro a more unified resource for teams.

Diverse Role Adaptations: The wider platform's operability to help non-technical jobs, takes the existing technology as a foundation screener for all positions which soft skill assessments is necessary.

Enhanced Mobile Accessibility: Developing a better mobile outlook, and introduction of functionalities for use by candidates and interviewers whether home or work, will in fact allow for flexible means to attend to the process of the interview.

Community and Support Features: Developing a community board where clients can exchange information not only about ways to use the product better but also about their experiences and keeping their hope high. It will be possible thanks to them maintaining contact in which it will be possible to strengthen their use of the platform's resources.

These innovations and expansion will guarantee that InterviewPro remains leading in the development of the recruitment technology and continues to respond for the shift in the tech industry requirements. Therefore, it will be a superior standard in terms of the efficiency and trustworthiness of the hiring process.

Bibliography

[1] Hickman, L., Bosch, N., Ng, V., Saef, R., Tay, L., & Woo, S. E. (2022). Automated video interview personality assessments: Reliability, validity, and generalizability investigations. *Journal of Applied Psychology*, *107*(8), 1323.

[2] Horat, S. I., Kara, K. C., & Karakaş, A. (2019, November). Job Pre-Interview System with Artificial Intelligence. In *2019 1st International Informatics and Software Engineering Conference (UBMYK)* (pp. 1-4). IEEE.

[3] Dissanayake, D. Y., Amalya, V., Dissanayaka, R., Lakshan, L., Samarasinghe, P., Nadeeshani, M., & Samarasinghe, P. (2021, December). AI-based Behavioural Analyser for Interviews/Viva. In *2021 IEEE 16th International Conference on Industrial and Information Systems (ICIIS)* (pp. 277-282). IEEE.

[4] Turani, A. A., Alkhateeb, J. H., & Alsewari, A. A. (2020, December). Students online exam proctoring: a case study using 360 degree security cameras. In *2020 emerging technology in computing, communication and electronics (ETCCE)* (pp. 1-5). IEEE.

[5] Peng, S., Huang, H., Chen, W., Zhang, L., & Fang, W. (2020). More trainable inception-ResNet for face recognition. *Neurocomputing*, *411*, 9-19.

[6] Xiang, J., & Zhu, G. (2017, July). Joint face detection and facial expression recognition with MTCNN. In *2017 4th international conference on information science and control engineering (ICISCE)* (pp. 424-427). IEEE.

[7] Li, N., Zhang, S., Xia, L., & Wu, Y. (2022). Investigating the Visual Behavior Characteristics of Architectural Heritage Using Eye-Tracking. *Buildings*, *12*(7), 1058.

[8] Akçay, M. B., & Oğuz, K. (2020). Speech emotion recognition: Emotional models, databases, features, preprocessing methods, supporting modalities, and classifiers. *Speech Communication*, *116*, 56-76.

[9] Wani, T. M., Gunawan, T. S., Qadri, S. A. A., Kartiwi, M., & Ambikairajah, E. (2021). A comprehensive review of speech emotion recognition systems. *IEEE access*, *9*, 47795-47814.