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Automatic Personality Recognition

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ABSTRACT

Due to the pandemic, various industries are facing significant challenges. The IT sector is also struggling with recruitment processes due to the difficulties associated with analyzing candidates online. Consequently, automated video interview analysis has emerged as an active research topic, which can help identify specific personality traits. Convolutional neural network models based on DL techniques have been developed due to advancements of CV and pattern recognition, and this technology has various applications in areas such as personality computing, psychological testing, and human computer interaction. These models accurately detect nonverbal cues and ascribe personality traits to individuals using a camera. With the help of AI-based interview agents, organizations can either replace or supplement the current self-reported personality evaluation tools that job candidates often manipulate to obtain socially acceptable results. The development of an AI-based interviewing system involved the use of asynchronous video interviews (AVIs) and the application of a personality prediction model trained on the first impression v2 dataset. Theobjective was to achieve automated personality recognition (APR) through the extraction of relevant features from the AVIs and the use of genuine personality scores obtained from facial expressions. This was achieved through the utilization of the VGG-16 network to train the model for improved accuracy in personality prediction.

Keywords : *Convolutional Neural Networks(CNN); Asynchronous Video Interviews(AVI);Deep Learning(DL); Artificial Intelligence(AI);Computer Vision(CV).*

1. INTRODUCTION

Nowadays, the interview is a time-consuming procedure. Workers traveling to places and providing interviews is chaotic in the epidemic, and no proof is kept by any organization with the interviewer, such as how he answers or what he answers. The artificial intelligence system assists us in a variety of ways to make things easier. In the traditional way of interviewing a candidate for a specific job, an organization's HR department invites a prospect for recruitment based on their resume. This HR department personally evaluates candidate's talents via their resumes to see if they are qualified for the position. In the hiring process, interviewers play a crucial role in evaluating candidates and selecting the most suitable applicant for the position. To assess the candidate's skills and abilities,interviewer sales evaluate their personality as it is essential for the candidate to have a positive attitude and the right work ethic for the job.

The key goals of this project are to create a system that can recognize a person's face and speech emotions, as well as to analyze resumes. Our aim was to create an AI-based interviewing system that could classify candidate resumes identify crucial personality traits through asynchronous video interviews, thereby providing an end-to-end solution. Personality is commonly used predictors in employment selections, as reported by industrial and organizational psychologists. Although some businesses rely on self reported questionnaires to

assess job candidates personalities, it is possible for applicants to manipulate their responses in order to improve their chances of beinghired.To overcome this, some companies assess applicants personalities based on their facial expressions, others nonverbal cues during interview, which are harder tofake.However, not every job candidate can attend a job interview in person or attend in interview done via phone or webconference due to cost and time constraints. Asynchronous Video interview (AVI) software, which allows job candidates to be interviewed automatically at a convenient time and employers to review recorded interviews at a later date, can be a practical solution. AVI poses a challenge for human raters to accurately assess the personality traits of job applicants based on video recordings. According to a studybyBarricket al., human raters were not able to effectively identify applicant personality solely by watching videos recorded interviews. While work conducted

before this period is associated with many machine learning methods that are time- consuming and may have an impact on system performance.CNN has demonstrated outstanding performance in image processing tasks. CNN's methodology generates automated AI-based interviewers capable of classifying applications automatically. The suggested work categorizes person's performance in an interview based on videoanaly-sis. Discovering numerous face expression characteristics,resume analysis and parsing, tone analysis, voice emotion identification, and presenting it on the user's system.

Existing system:

The existing system for personality recognition relies on manual observation of facial expressions and body language, often requiring trained professionals to assess emotions and traits. This process can be time-consuming and subjective, leading to inconsistencies and potential bias. It often lacks real-time analysis, making it difficult to provide immediate feedback during important situations like interviews or assessments.

Proposed System:

The proposed system improves upon this by automating the recognition of emotional states through facial expression analysis. It provides a faster, more and scalable solution that can be easily applied in various settings, such as interviews or mental health assessments, without requiring specialized training or equipment. It provides objective, real-time analysis of facial expressions, eliminating bias and ensuring consistent results for a variety of applications, such as interviews and emotional assessments.

2. REQUIREMENT ANALYSIS

Funtional Requirements

System functional requirements describe the features or services that the system should provide. These are descriptions of what services the system will provide, how it will respond to certain inputs, and how it will behave under specific circumstances.

User Registartion: User Register with their Registration details. User Login: User Login their account using password

Live Inputs: Inputs Given By the User requirement.

Load Model : Trained or Tested Model will be load .

Predict Output : Output will be predict based on parameters.

Non-Functional Requirements

In designing an automatic personality recognition system using Convolutional Neural Networks (CNNs) for interviews, considering non-requirements is crucial to avoid unnecessary complexity and ensure ethical use. Here are some non- requirements that could be considered:

Performance: Real time facial expression analysis with quick feedback and minimal delay..

Usability :Simple and intuitive interface, accessible to users with basic computer skills.

Reliability: stable operation with minimal errors or crashes during analysis.. **Compatibility:** Works across standard operating systems and supports common webcams..

Security: Protects user data and ensures secure facial expression analysis. **Portability:**Easily adaptable to different devices and platforms with minimal changes.

Maintainability: Simple to update, troubleshoot, and support multiple users with varying needs.

Scalability: Handles multiple users and scales to support different levels of analysis complexity.

Hardware Requirements:

Processor	:	Intel Core i3
RAM	:	4GB
Hard Disk	:	256 GB

Software Requirements:

Operating System	:	Windows 10
Frond end technologies	:	HTML, CSS, JavaScript Framework
	:	Flask
Programming Languages	:	Python

3. DESIGN

Project architecture represents number of components we are using as a part of our project and the flow of request processing i.e. what components in processing the request and in which order. An architecture description is a formal description and representation of a system organized in a way that supports reasoning about the structure of the system.

Software Architecture:

The software architecture for the proposed Automatic Personality Recognition system is designed using a modular client-server approach to ensure efficient processing and maintainability. The system accepts a video clip as the sole input, provided by the user through a secure login interface built using a Flask-based web application. Once the video is uploaded, it is processed by four independently trained neural networks, each focused on a different modality—to extract high-level characteristics from the video.

These networks are trained and tested in a Jupyter Notebook environment using personality- labelled datasets and advanced preprocessing techniques. Each model predicts one or more of the Big Five personality traits—Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism—which are widely used to assess individual behaviour and job suitability. Although merging multiple models can be complex, the architecture keeps them separate to preserve the accuracy and specialization of each modality. The final predicted personality traits are generated by combining the outputs from all networks and are displayed back to the user through the Flask interface, ensuring a seamless and robust personality recognition experience.

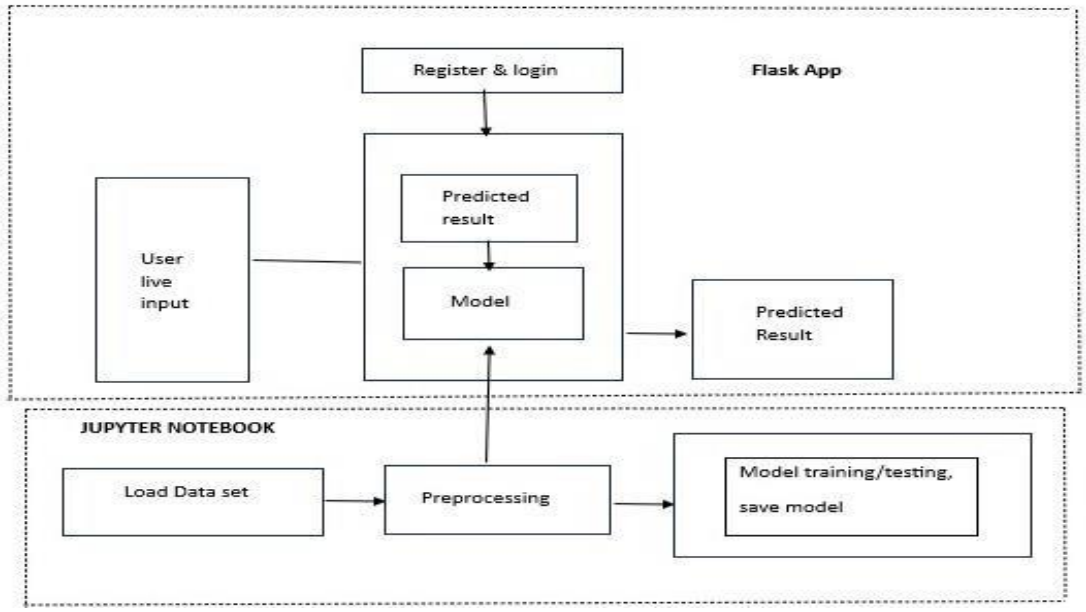


Fig.3.1 Software Architecture

Technical Architecture:

The technical architecture of the Automatic Personality Recognition system is structured using a three-tier model that ensures modularity, scalability, and smooth data flow between the user interface, backend logic, and database. The front-end layer is built using HTML, CSS, and JavaScript, providing a responsive and interactive user interface where users can upload video files and view personality prediction results. This layer communicates with the backend, developed in Python, which acts as the core processing unit of the application. Python handles user requests, interacts with the personality prediction models, processes the video input, and manages server-side logic using the Flask framework.

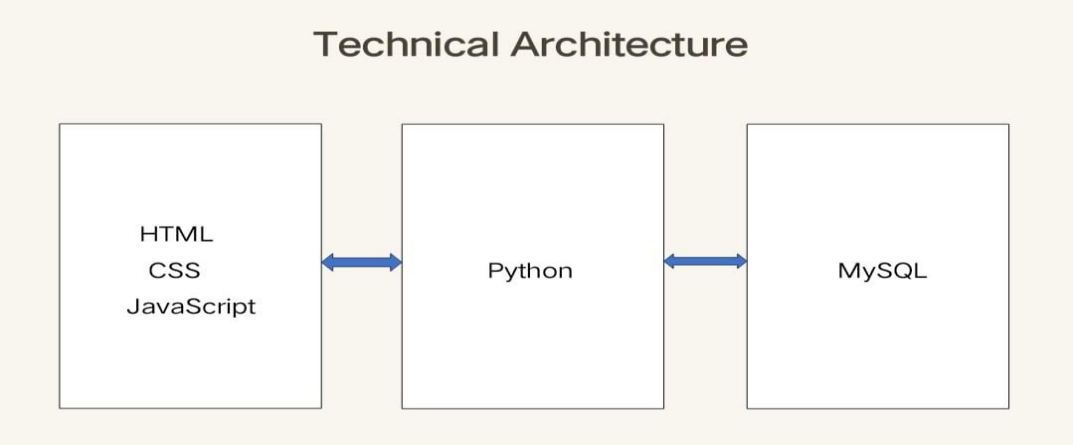


Fig.3.2 Technical Architecture

4-IMPLEMENTATION **Python**

Python is a popular and powerful programming language known for its simplicity and wide range of libraries, making it ideal for machine learning and deep learning projects like automatic personality recognition in interviews using CNN. Its clear syntax and ease of use help in quickly developing and testing models. In your project, Python supports key tasks such as video or image frame extraction using OpenCV, data handling with libraries like NumPy and Pandas, and building CNN models with frameworks like TensorFlow or Keras.

To provide a user-friendly interface for your system, Flask—a lightweight Python web framework—can be used to create a simple web application. This allows users, such as interviewers or HR professionals, to upload interview videos or images, which the CNN model then processes to identify personality traits. Flask smoothly connects the backend model to a front-end interface, displaying results in real time.

Together, Python and Flask form an effective combination: Python handles the intelligence and model execution, while Flask offers an interactive way to use the system. This setup is especially useful in academic or prototype-level projects where quick development, flexibility, and integration are important.

Features of Python

Simple and Easy to Learn: Readable syntax, beginner-friendly. Interpreted: Executes code line by line.

High-Level: Abstracts complex details.

Dynamically Typed: No need to declare variable types. Extensive Library: Built-in modules for various tasks. Cross-Platform: Runs on multiple operating systems.

Object-Oriented: Supports OOP concepts like classes and objects. Multiple Paradigms: OOP, procedural, and functional programming. Extensible: Integrates with C, C++, and Java.

Community Support: Large, active user base.

Applications:

Web Development: Frameworks like Django and Flask. Data Science: Libraries like NumPy, Pandas, and Matplotlib.

Machine Learning & AI: Tools like TensorFlow and PyTorch. Automation: Automating repetitive tasks with Python scripts. Game Development: Creating games using Pygame.

Flask web framework

Flask is a web application framework written in Python. Armin Ronacher, who leads an international group of Python enthusiasts named Pocco, develops it. Flask is based on Werkzeug WSGI toolkit and Jinja2 template engine. Both are Pocco projects.Unlike the Django framework, Flask is very Pythonic. It's easy to get started with Flask, because it doesn't have a huge learning curve.

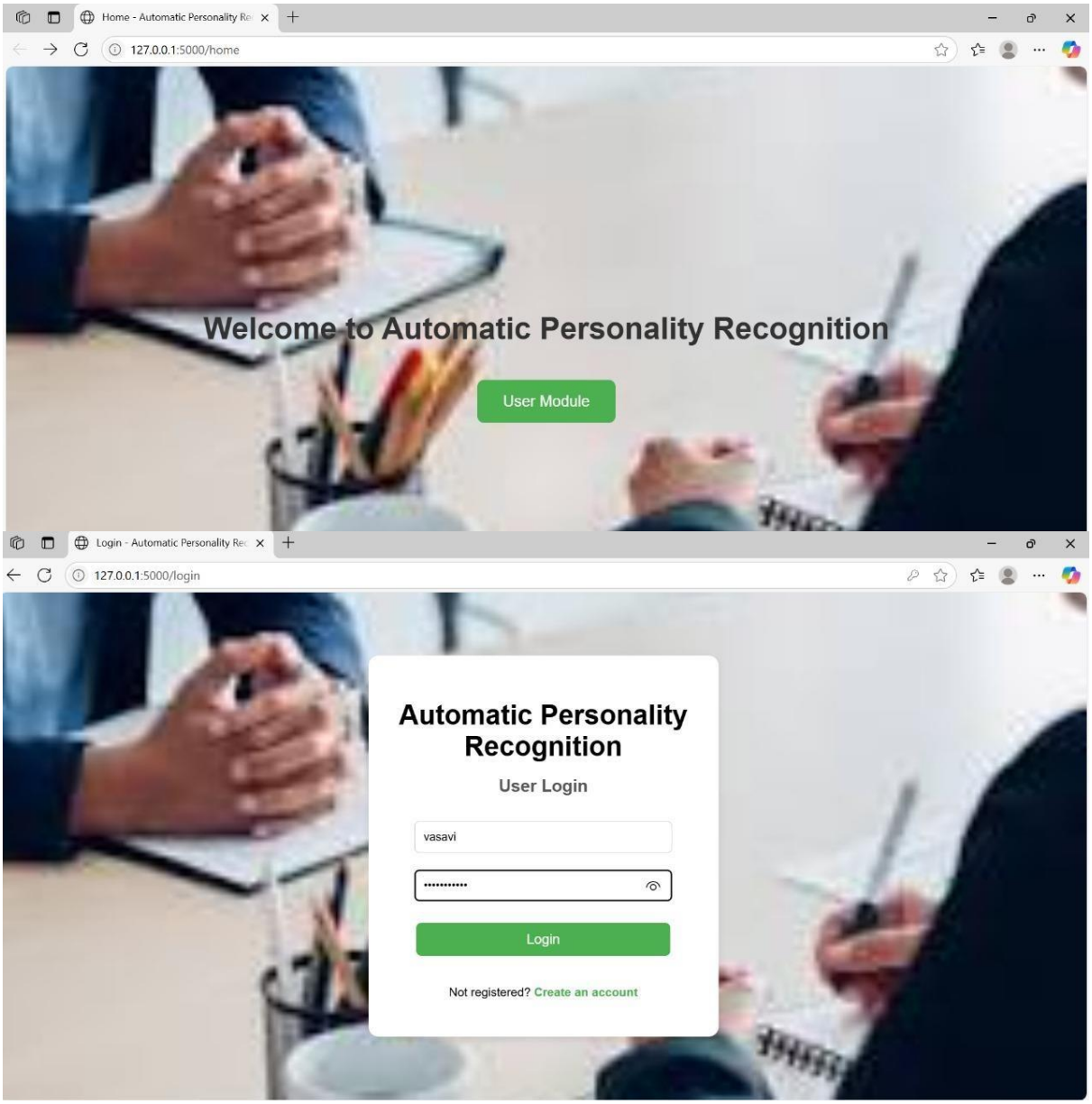
It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre- existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools.

Pseudocode

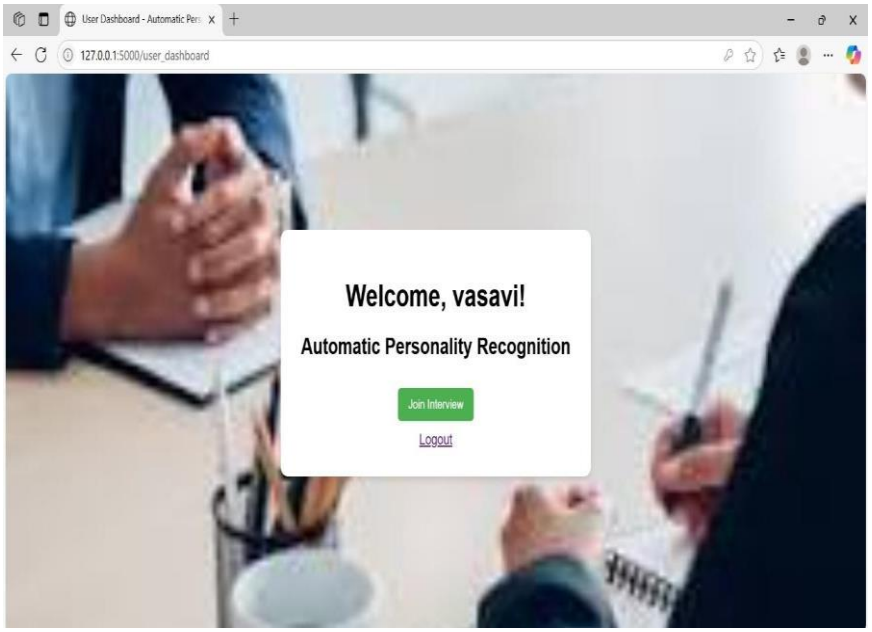
Pseudocode is a detailed yet readable description of what a computer program or algorithm must do, expressed in a formally-styled natural language rather than in a programming language. It allows designers to express the design in great detail and provides programmers a detailed template for the next step of writing code in a specific programming

language. Because pseudocode is detailed yet readable, it can be inspected by the team of designers and programmers as a way to ensure that actual programming is likely to match design specifications. Catching errors at the pseudocode stage is less costly than catching them later in the development process. Once the pseudocode is accepted, it is rewritten using the vocabulary and syntax of a programming language.

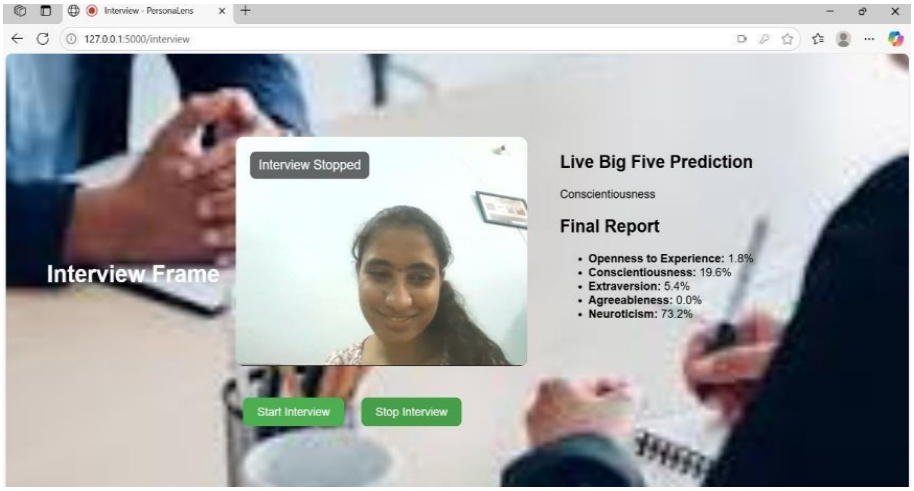
5-Screenshots



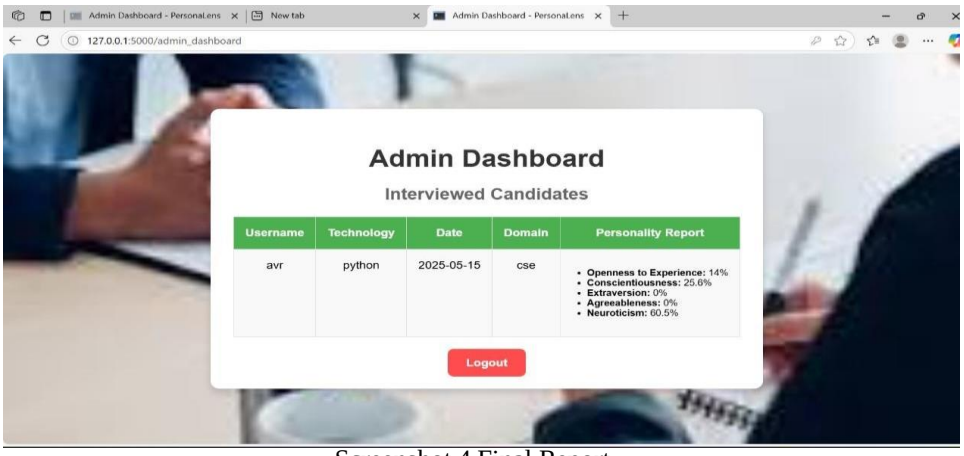
Screenshot 1User Authentication Process



Screenshot 2 User Authentication Process



Screenshot 3 Interview status



Screenshot 4 Final Report

6-CONCLUSION

The Automatic Personality Recognition project offers an innovative and efficient solution for assessing emotional states in real-time.

By leveraging advanced technology, it provides objective, accurate, and scalable analysis, making it ideal for applications in interviews.

This approach minimizes human bias, enhances reliability, and enables faster decision-making, making it especially valuable in areas like recruitment, psychology, and human-computer interaction. As digital assessments continue to gain importance, this system stands out as a forward-looking tool that aligns with the evolving demands of modern evaluation processes.

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