

AUTOMATED INTERVIEW PROCESSING SYSTEM

24-25J-047





INTRODUCTION

Traditional interview methods often fail to capture the complete picture of a candidate's capabilities and personality.



RESEARCH PROBLEM

- Current interview processes are often subjective and limited in scope, failing to provide a holistic assessment of candidates.
- There is a need for an automated tool that integrates multiple evaluation techniques to offer a comprehensive and objective analysis of candidates' capabilities and suitability for roles.

Team



**Gunarathna
N.W.P.B.M**



**Thennakoon
T.M.R.G.S**



**Anjalie P.M.R.S
IT21167232**



**Pinsara A.R.D
IT 21158186**

Marketing Head

Team

Pinsara A.R.D

IT 21158186

VIDEO BASED MOCKUP EXAM

Thennakoon

IT 2117096
T.M.C

ASSESS STRESS IN GAMIFIED ENVIRONMENT

Anjalie P.M.R.S

IT 21167232

ASSESS CODE COMPLEXITY AND MAINTAINABILITY

Gunarathna

IT 2113979
N.W.P.E.M

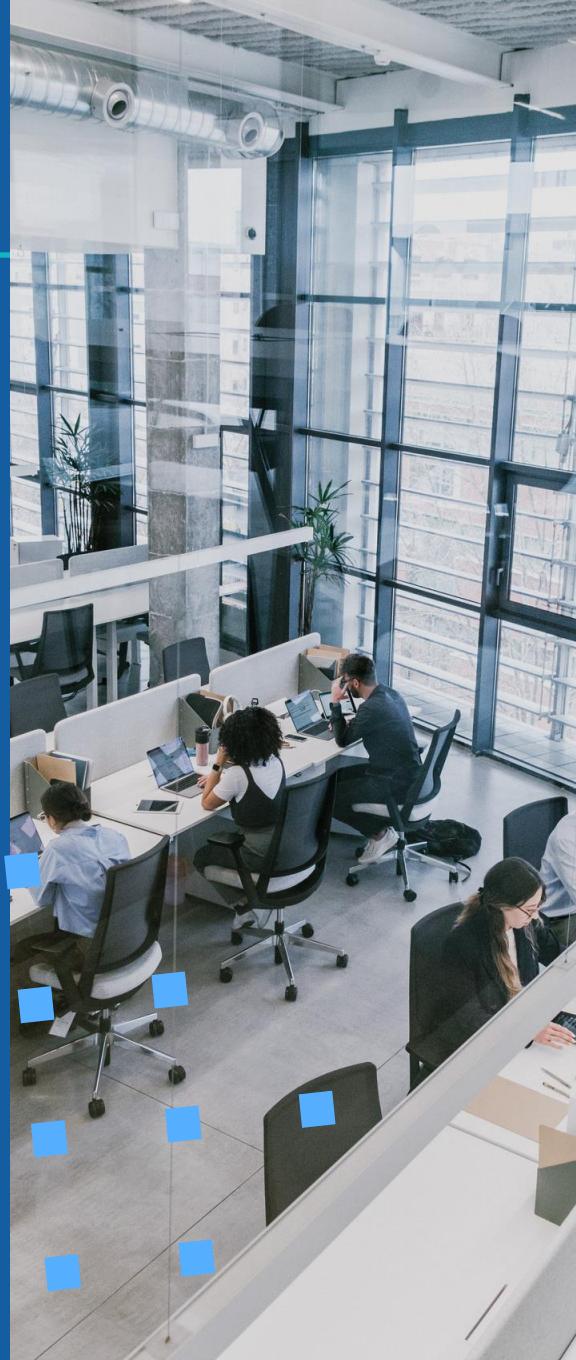
ASSESS CONFIDENCE LEVEL FROM VOICE FREQUENCY

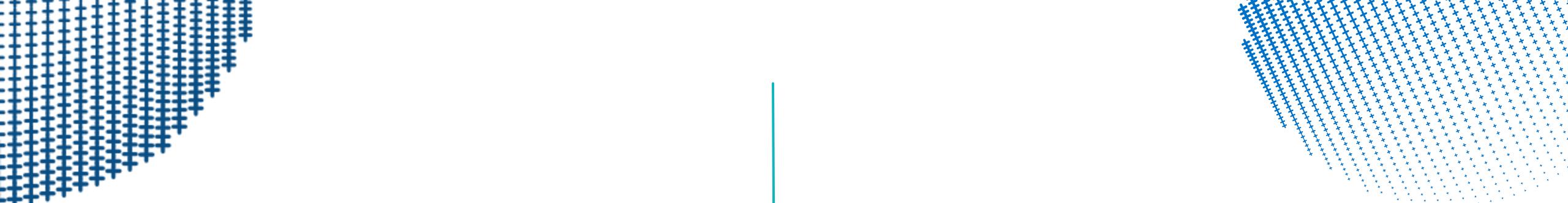
Working Head

RESEARCH OBJECTIVES

To develop an automated interview process tool that provides a comprehensive and objective assessment of candidates by evaluating personality traits, technical skills, problem-solving abilities, code complexity, maintainability, and non-verbal communication aspects.

- To create algorithms that assess personality traits and confidence levels from vocal features.
- Integrate emotional analysis and gamified assessments for evaluate technical skills.
- Assesses the complexity and maintainability of code submissions.
- create video-based mockup tests and cover letters to evaluate candidates' Background suitability to the company.
- Validate the effectiveness of the integrated tool against traditional assessment methods and industry benchmarks.





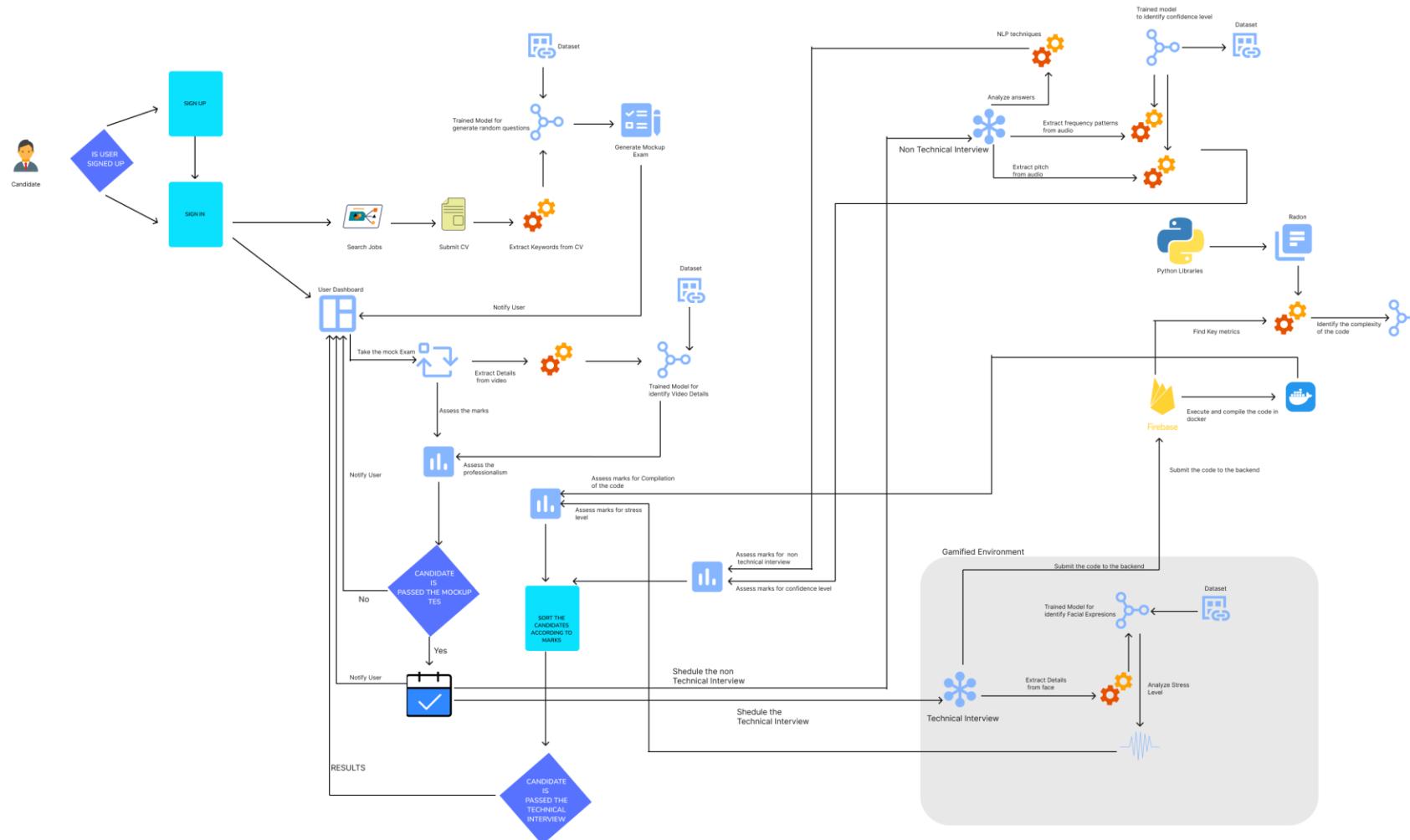
WHAT THIS SYSTEM WILL EVALUATE

During Interview Process

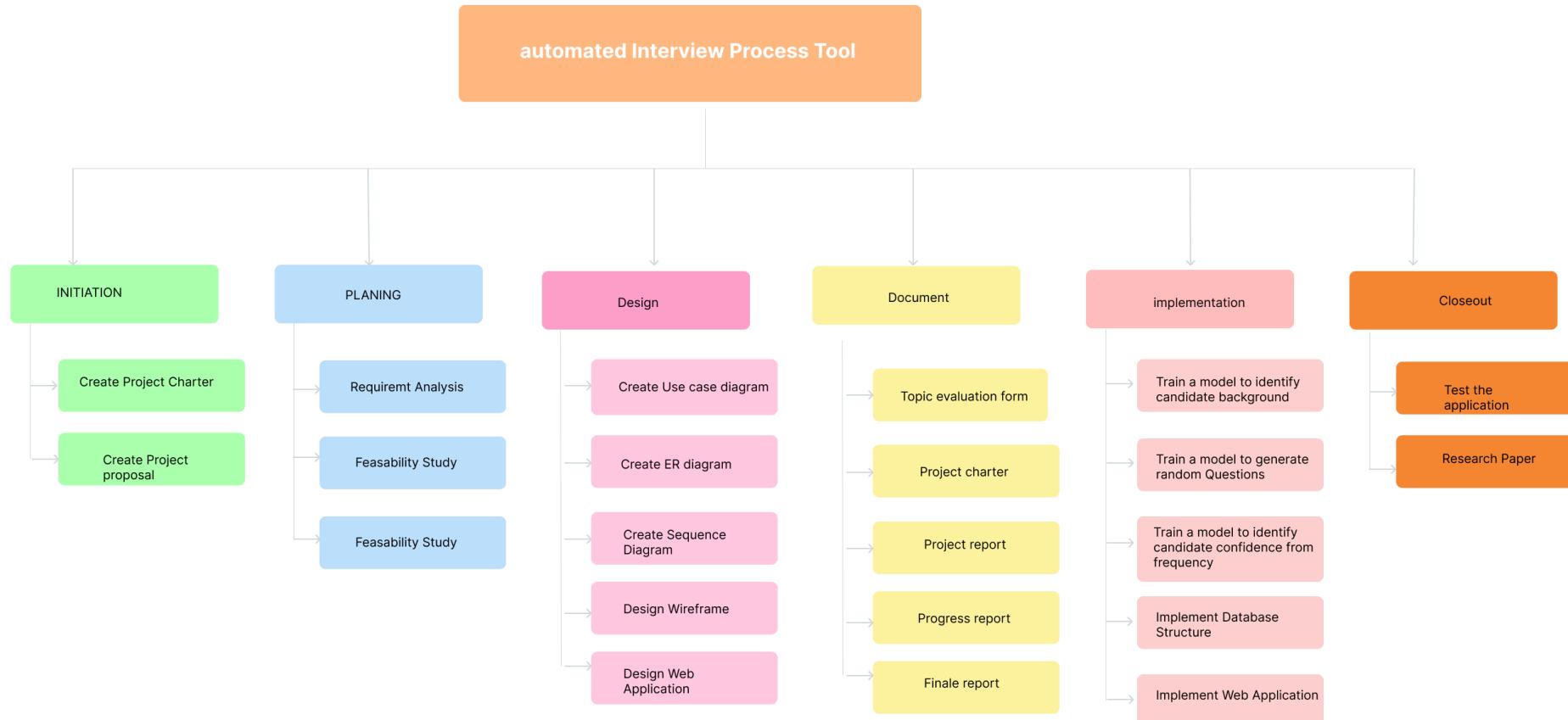


PERSONALITY TRAITS
TECHNICAL SKILLS,
PROBLEM-SOLVING ABILITIES
CODE COMPLEXITY & MAINTAINABILITY
STRESS LEVEL
CONFIDENCE LEVELS

OVERALL SOLUTION



Workload Distribution



Technology Used

- 01 Front End
- 02 Back End
- 03 Data Base
- 04 Libraries





IT21158186 | Pinsara A.R.D

Specialization : Information Technology



INTRODUCTION

"Introducing an innovative system that evaluates candidates primarily on their skills through a video-based mock-up test. Additionally, it assesses grooming, professionalism, and the working environment to provide a comprehensive candidate evaluation."

RESEARCH QUESTION

"How effective are video-based mockup tests in shortlisting candidates based on skill evaluation and assessing grooming, professionalism, and working environment? This research aims to address the reliance on subjective evaluations in current methods."

RESEARCH GAP



- Current interview processes heavily rely on subjective evaluations and traditional metrics, often overlooking the nuanced information embedded in vocal features.

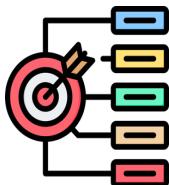
Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Skills Extraction from CV	✓	✓	✗	✓
Generate Questions related to extracted Skills	✓	✗	✗	✓
Use of Video-Based Mockup Tests	✗	✓	✗	✓
Evaluation of professionalism and working environment using machine learning	✗	✓	✗	✓
Rating skills of candidates automatically	✗	✗	✓	✓

SPECIFIC AND SUB OBJECTIVES



- Specific Objective:

- To develop a system that uses video-based mock-up tests to objectively assess candidates' skills. The system will also evaluate grooming, professionalism, and working environment as supplementary criteria.

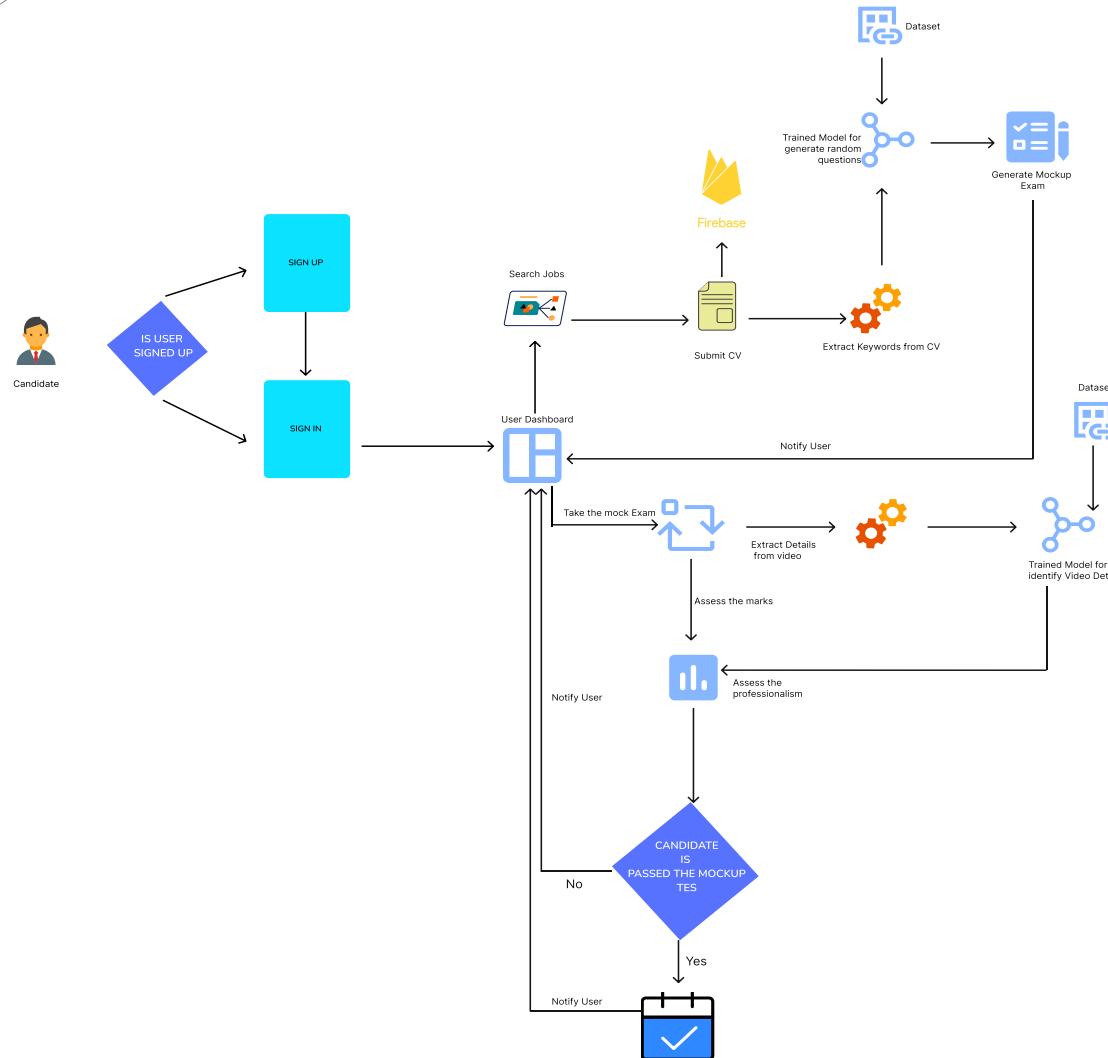


- Sub Objectives:

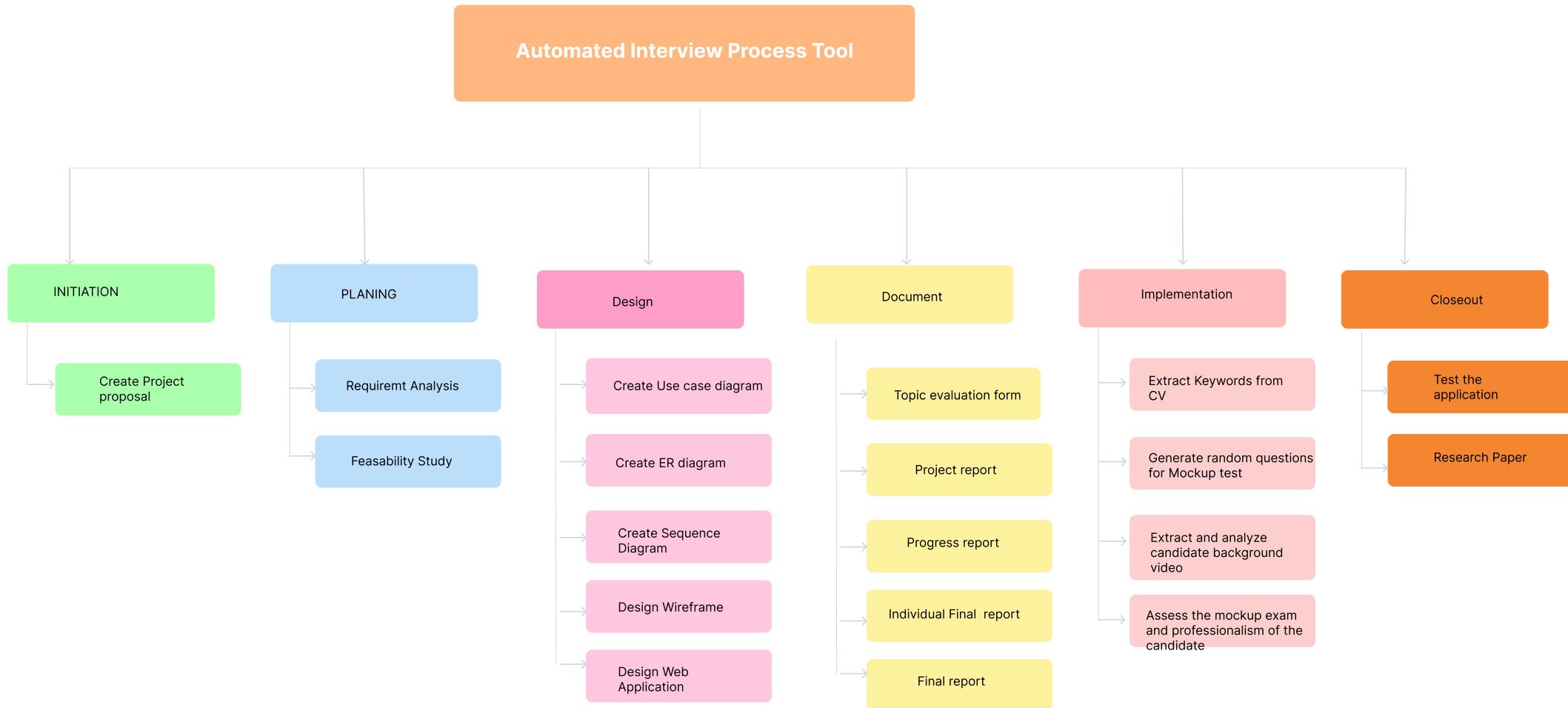
- To identify key skills from candidates' CVs and generate relevant mockup test questions.
 - To develop machine learning algorithms for assessing grooming, professionalism, and work environment.
 - To validate the effectiveness of this integrated evaluation system.



METHODOLOGY



Workload Distribution



Technologies, Techniques, Algorithms

Technologies

Backend:

- Python-Flask
- DB - Firebase

Frontend:

- React

Text Processing:

- PyPDF2: Extracts text from PDFs.
- spaCy: NLP for extracting entities from CVs.
- pandas: Manages and analyzes data.

Machine Learning & Video Analysis:

- TensorFlow: Builds and trains ML models.
- OpenCV: Analyzes video frames for grooming and environment.

Additional Tools:

- sklearn: Advanced analysis and evaluation.

Techniques

NLP:

- Named Entity Recognition
- Text Extraction

Machine Learning:

- Model Training
- Feature Extraction

Data Processing:

- Data Cleaning
- Random Question Generation

Evaluation:

- Scoring Algorithms
- Threshold Setting

Algorithms & Architecture

Text Extraction:

- **PDF/Text Conversion:** Converts documents into text.

NLP:

- **Entity Recognition:** Identifies key CV elements (skills, experience).

Machine Learning:

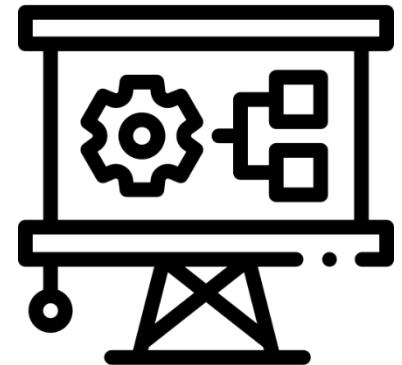
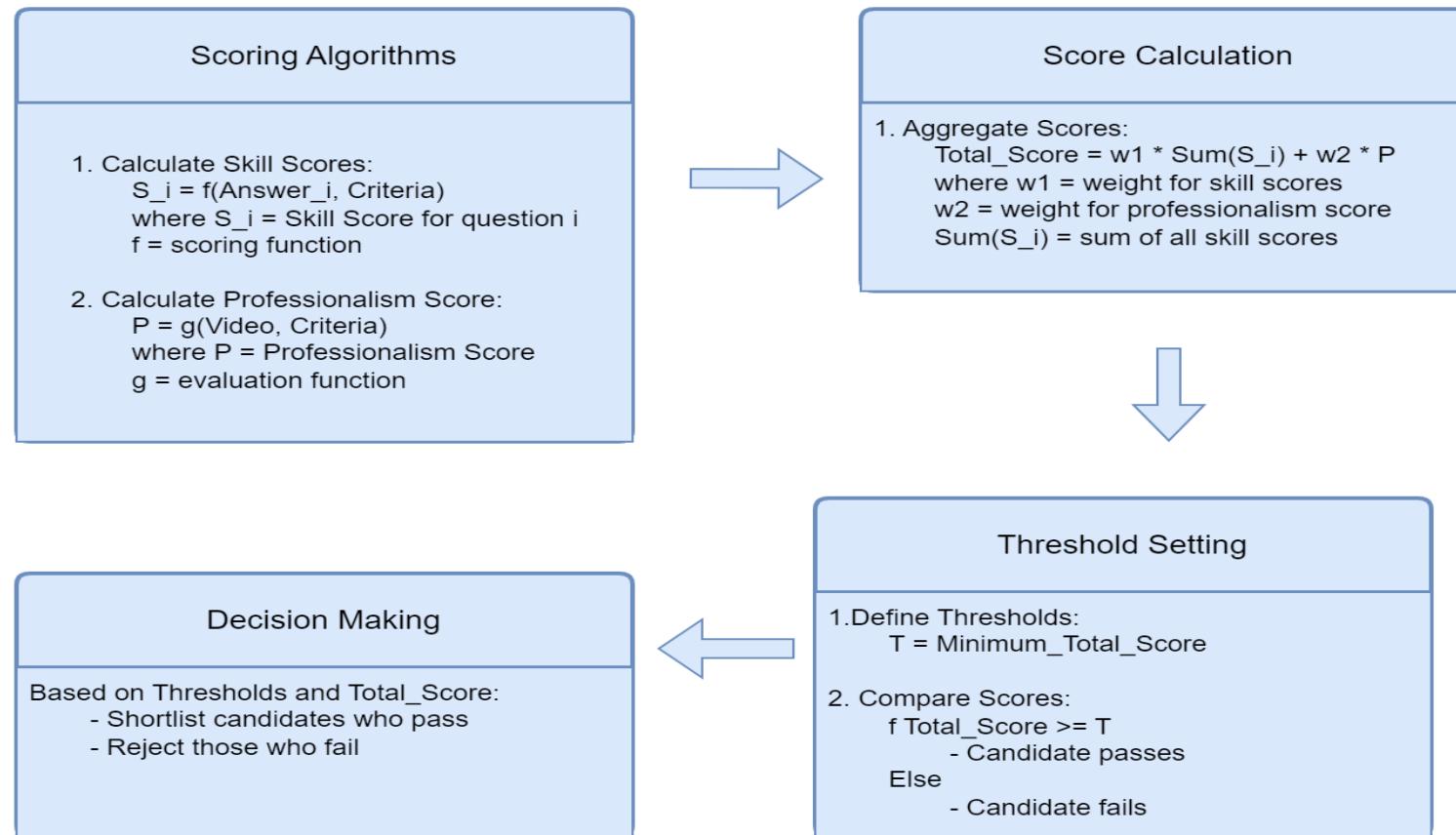
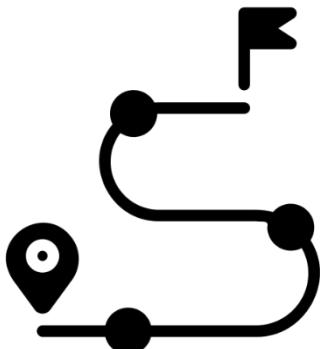
- **Classification/Regression:** Evaluates candidate responses and professionalism.

Video Processing:

- **Frame Extraction:** Analyzes video for grooming and environment.

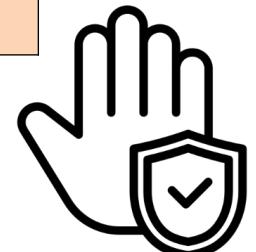
Candidate Evaluation Process

Video Based Mockup Test



System, Personnel, and Software Specification Requirement

		Server	Client Machines
Hardware	Processor	Multi-core CPU (e.g., Intel Xeon or AMD Ryzen)	Dual-core CPU
	RAM	Minimum 16 GB	Minimum 4 GB
	Storage	SSD with at least 500 GB of space	At least 10 GB free space
	Network	High-speed internet connection	Stable internet connection
Security	Data Encryption:	HTTPS for secure data transmission	
	Authentication:	Secure login mechanisms (e.g., JWT or OAuth)	
	Authorization	Role-based access control	



REFERENCES

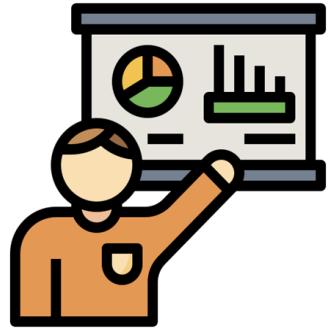
1. **S. Hu et al.**, "Manual Wiring Measurement of DC Deep Well Grounding Resistance," *2018 IEEE International Conference on High Voltage Engineering and Application (ICHVE)*, Athens, Greece, 2018, pp. 1-4, doi: 10.1109/ICHVE.2018.8642046. Keywords: Electrodes; Grounding; Electrical resistance measurement; Electric potential; Resistance; Current measurement; Voltage measurement; Compensation method; DC deep well grounding electrode; Manual wiring; Measurement of grounding resistance; Surface potential distribution.
2. **G. Li, Y. Liu, H. Zhao, and H. Cai**, "Research on Application of Network System to Nursing Management," *2019 11th International Conference on Measuring Technology and Mechatronics Automation (ICMTMA)*, Qiqihar, China, 2019, pp. 705-707, doi: 10.1109/ICMTMA.2019.00161. Keywords: Measurement; Mechatronics; Automation; Nursing Management; Network System; Medical Treatment.
3. **S. Yun, J. -M. Kang, I. -M. Kim, and J. Ha**, "Deep Artificial Noise: Deep Learning-Based Precoding Optimization for Artificial Noise Scheme," *IEEE Transactions on Vehicular Technology*, vol. 69, no. 3, pp. 3465-3469, March 2020, doi: 10.1109/TVT.2020.2965959. Keywords: Channel estimation; Precoding; Optimization; Training; MISO communication; Feature extraction; Wireless communication; Artificial noise; Deep learning; Deep neural network; Physical layer security; Precoding.



IT21170966 | Thennakoon T.M.I.C.

Specialization : Information Technology

INTRODUCTION



- The fusion of emotional analysis with gamified assessments offers a novel approach to evaluating technical skills and problem-solving abilities.
- By leveraging emotional cues and interactive, game-based tasks, this method provides a dynamic and engaging way to assess candidates' competencies beyond traditional testing.

RESEARCH GAP

- Existing research often focuses on isolated aspects of emotional analysis or gamified assessments.



Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Emotional Analysis	✓	✗	✓	✓
Gamified Assessments	✗	✓	✗	✓
Integration of Emotional and Performance Data	✗	✗	✓	✓
Evaluation of Technical Skills	✗	✓	✗	✓
Evaluation of Problem-Solving Abilities	✗	✓	✗	✓

RESEARCH QUESTION

How effective is the integration of emotional analysis and gamified assessments in evaluating technical skills and problem-solving abilities of candidates?

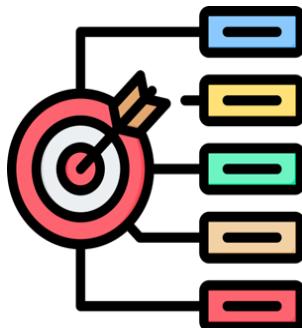




SPECIFIC AND SUB OBJECTIVES

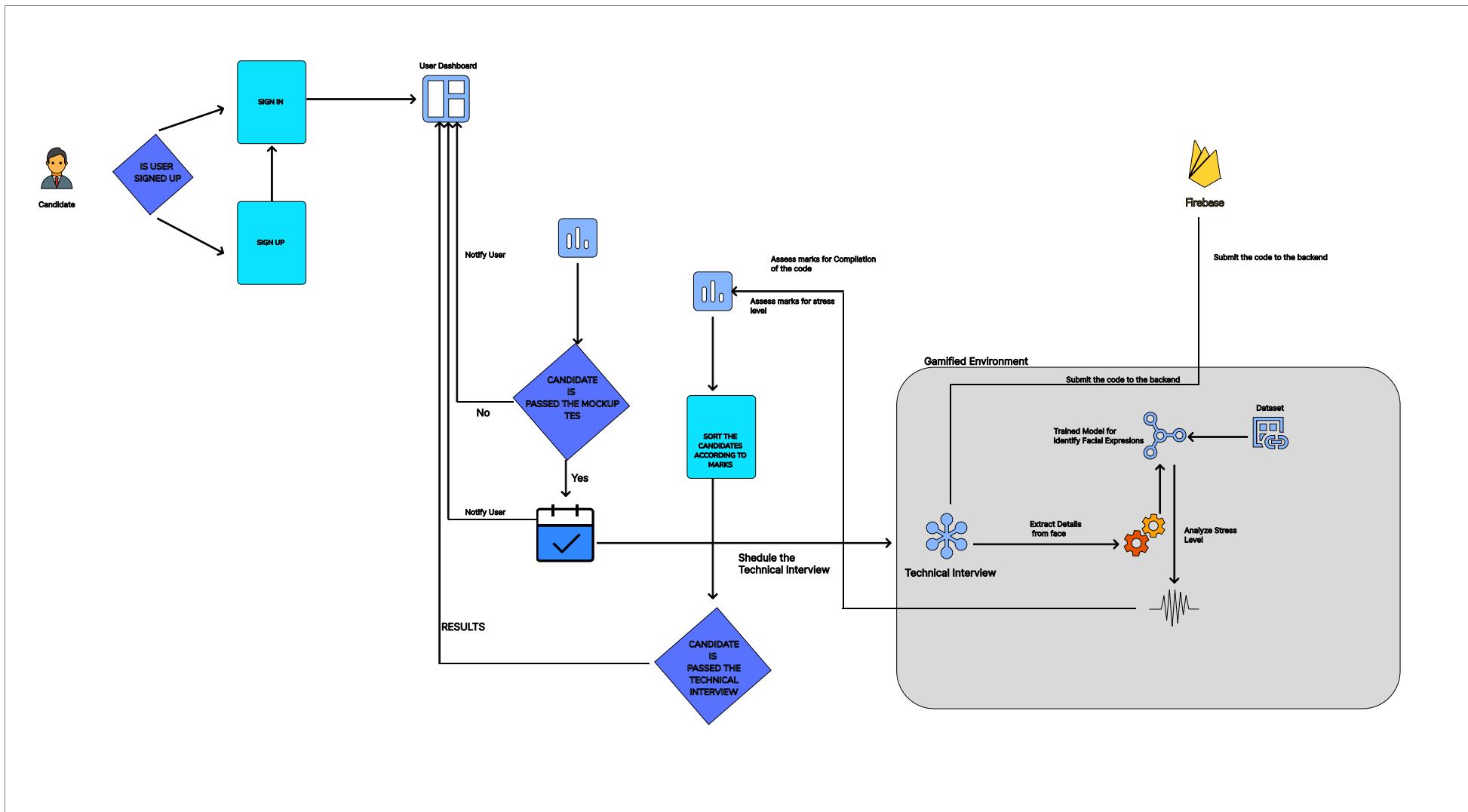


- Specific Objective:
 - To develop a system that evaluates technical skills and problem-solving abilities while using emotional analysis within a gamified environment.

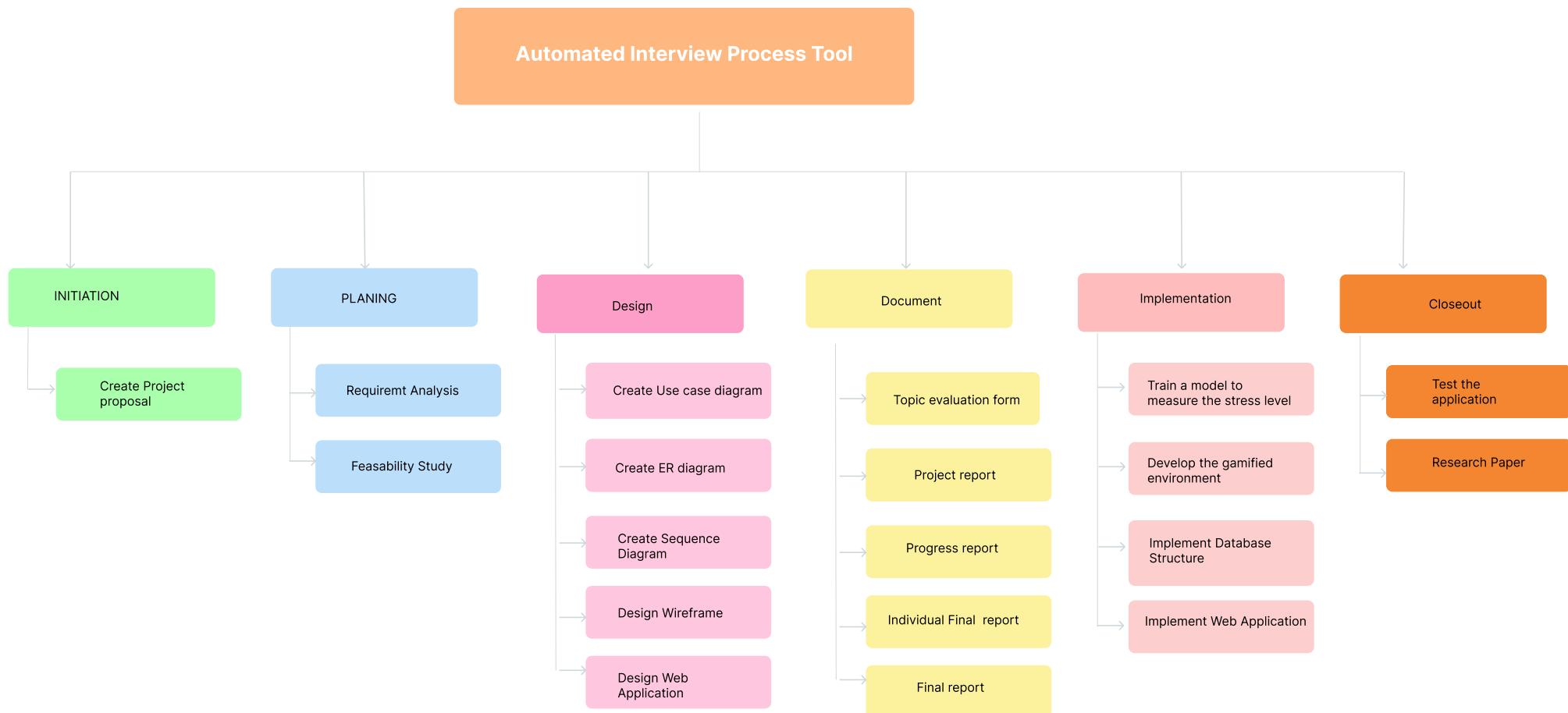


- Sub Objectives:
 - To enhance candidate's experience
 - To design gamified assessments that accurately evaluate technical skills.
 - Measure stress levels during problem-solving tasks

METHODOLOGY



Workload Distribution



System and Software Specification Requirement



Functional Requirements

- Real-time Facial Expression Analysis
- Stress Level Measurement
- Problem-Solving Skill Assessment
- Integration with Gamified Environment
- Data Storage and Management

Non-Functional Requirements

- User-Friendly Interface
- Real-Time Processing
- High Accuracy and Reliability
- Security and Privacy



Software Requirements

- Jupyter Notebook
- Unity
- IntelliJ Idea



Technologies, Techniques, Algorithms



Technologies

- ReactJS
- Python
- Tensorflow
- Firebase
- Unity
- OpenCv

Algorithms & Architecture

- Convolutional Neural Network (CNN)



Techniques

- Transfer Learning
- Data Augmentation

REFERENCES

- [1] J. Smith, R. Brown, and L. Wang, "Real-Time Emotional Analysis in Online Learning Environments," IEEE Transactions on Affective Computing, vol. 12, no. 3, pp. 456-467, July-Sept. 2023, doi: 10.1109/TAFFC.2023.1234567.
- [2] A. Johnson and M. Lee, "Gamified Assessment Techniques for Evaluating Technical Skills in Remote Education," in Proc. 2022 IEEE Global Engineering Education Conference (EDUCON), Tunis, Tunisia, 2022, pp. 234-239, doi: 10.1109/EDUCON.2022.1234567.
- [3] K. Patel, D. Nguyen, and P. Garcia, "Integrating Emotional Analysis with Performance Metrics in E-learning Systems," International Journal of Educational Technology in Higher Education, vol. 18, no. 1, pp. 78-89, Jan. 2024, doi: 10.1007/s12345-024-1234-x.



IT21167232 | P.M.R.S Anjalie

Specialization : Information Technology

INTRODUCTION

Evaluating code complexity and maintainability is crucial in determining a candidate's coding proficiency in a technical role.

By developing an automated tool to assess these factors, we can streamline the interview process and ensure a higher quality of candidate selection.

RESEARCH QUESTION

How can the complexity and maintainability of code be effectively assessed to shortlist candidates during a technical interview?

RESEARCH GAP

- Current research provides individual metrics for code complexity and maintainability but lacks using 3 metrics for assess the code.



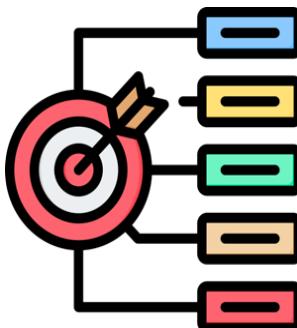
Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Code Complexity Assessment	✓	✓	✓	✓
Code Maintainability Assessment	✓	✓	✗	✓
Using CC, WCC ,CFS	✗	✗	✗	✓
Automated Tool for Interview Use	✗	✗	✗	✓
Validation Against Industry Standards	✗	✓	✗	✓



SPECIFIC AND SUB OBJECTIVES

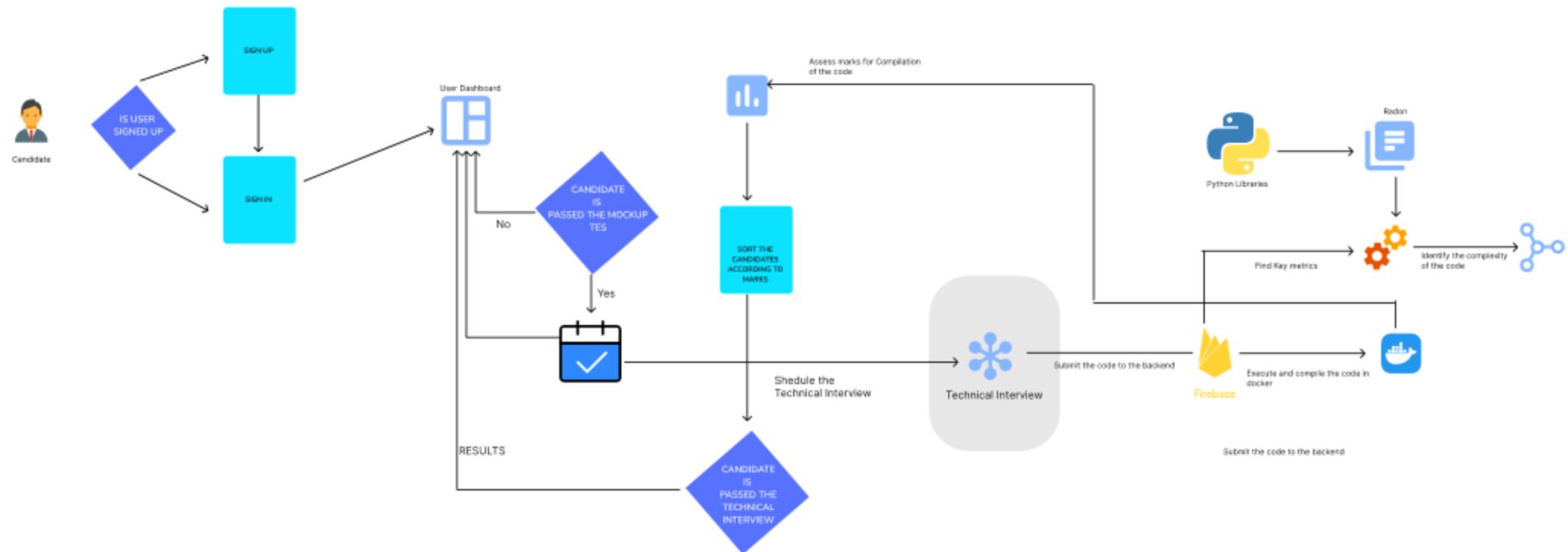


- Specific Objective:
 - To create a tool that assesses the complexity and maintainability of code submissions during technical interviews.

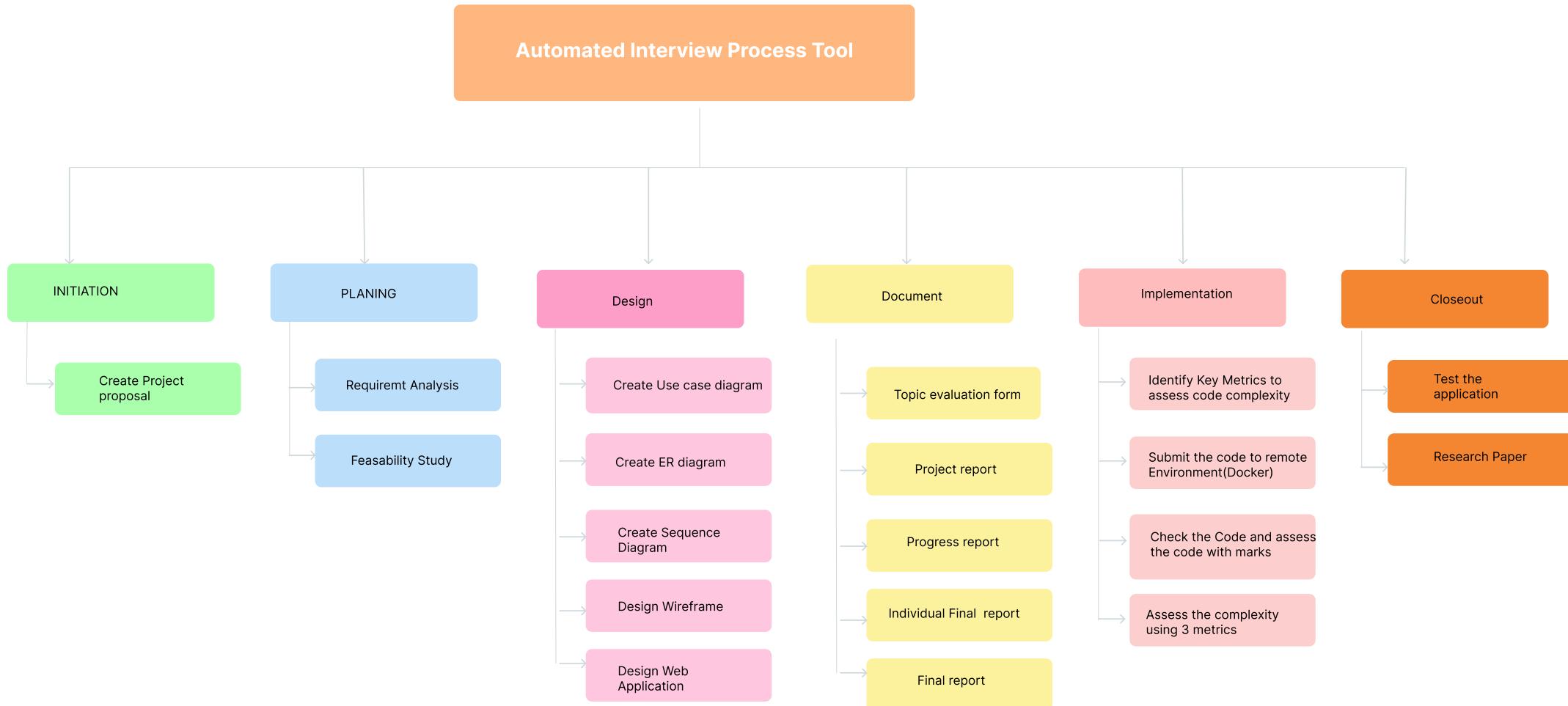


- Sub Objectives:
 - To identify key metrics for code complexity and maintainability.
 - To develop algorithms that analyze code submissions based on these metrics.
 - To validate the tool against industry-standard benchmarks and expert evaluations.

METHODOLOGY



Workload Distribution



System and Software Specification Requirement



Functional Requirements

- Complexity Metrics Calculation
- Code Input
- Multi Language support

Non-Functional Requirements

- Performance
- Accuracy
- High Accuracy and Reliability
- Security and Privacy



Software Requirements

- VS Code
- Docker



Technologies, Techniques, Algorithms



Technologies

- ReactJS
- Python
- Firebase
- Radon
- Docker

Algorithms & Architecture

- Cyclomatic Complexity
- Cognitive Complexity
- Weighted Cyclomatic Complexity



Techniques

- Code Parsing

REFERENCES

1. U. Chhillar and S. Bhasin, "A New Weighted Composite Complexity Measure for Object-Oriented Systems," Department of Computer Science, Kurukshetra University, Kurukshetra,Haryana, India.
2. J. Shao and Y. Wang, "A New Measure of Software Complexity Based on Cognitive Weights," Proceedings of the Third International Conference on Cognitive Informatics (ICCI'04), Victoria,BC, Canada, 2004, pp. 60-70.



IT21319792 | Gunarathna N.W.P.B.M.

Specialization : Information Technology



INTRODUCTION

- The evaluation of non-verbal cues such as tone, pitch, and frequency provides deep insights into an individual's personality and confidence.
- By analyzing these vocal features, we can derive valuable information that complements traditional interview assessments.

STATISTICS

80%



candidates experience anxiety during interviews, which can significantly alter their vocal pitch and frequency

Around

20%



of interviewers may unintentionally let their biases influence their perception of a candidate's vocal confidence





RESEARCH QUESTION

How can tone, pitch, and frequency analysis accurately assess a candidate's personality and confidence during an interview?

How this would help the IT industry and how this will be a Innovative approach

RESEARCH GAP

Current interview processes heavily rely on subjective evaluations and traditional metrics, often overlooking the nuanced information embedded in vocal features.

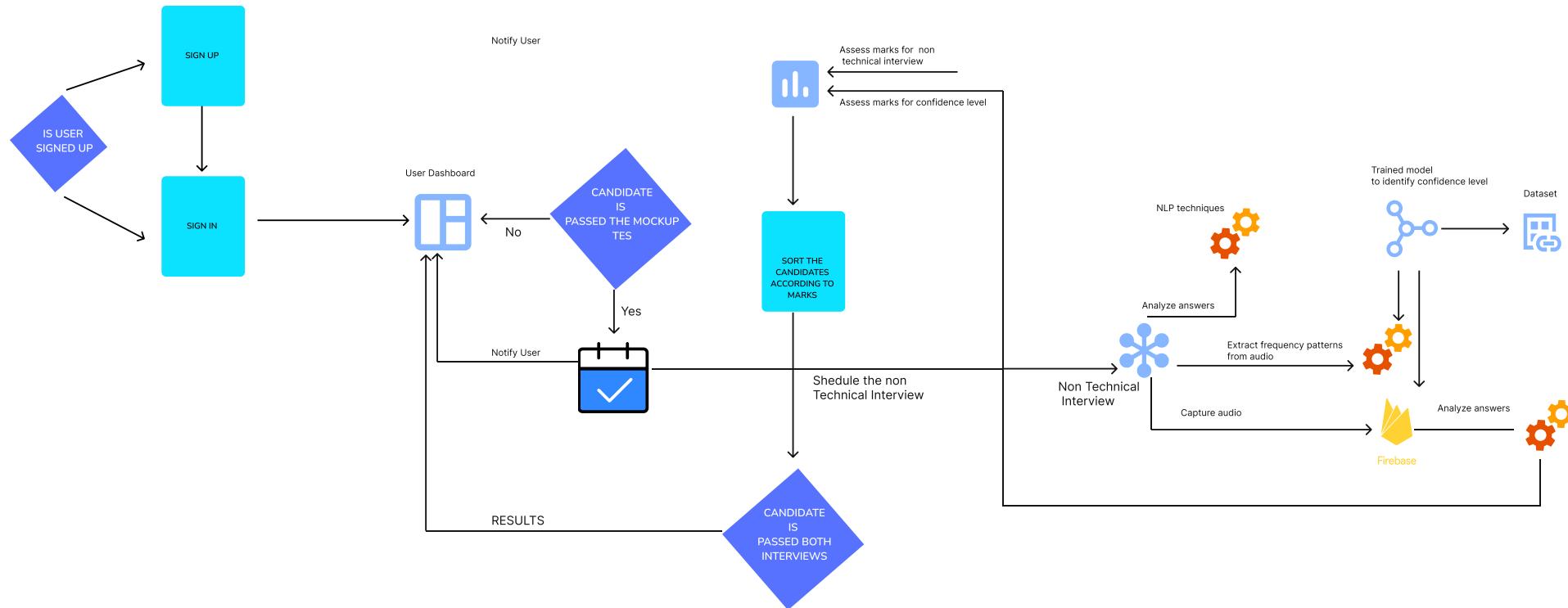
Reference	Research Paper 1	Research Paper 2	Research Paper 3	Proposed Function
Analysis of Tone	✓	X	✓	✓
Analysis of Pitch	✓	X	X	✓
Analysis of Frequency	X	✓	X	✓
Correlation with Personality Traits	X	X	✓	✓
Confidence Level Indicators	X	X	X	✓



SPECIFIC AND SUB OBJECTIVES

- Specific Objective:
 - To develop an algorithm that evaluates personality and confidence using tone, pitch, and frequency during interviews.
- Sub Objectives:
 - Identify key voice features that correlate with personality traits and confidence levels.
 - Collect and preprocess voice data for analysis.
 - Train and validate machine learning models on the voice data.
 - Integrate the voice analysis tool into the automated interview process.

METHODOLOGY



System and Software Specification Requirement



Functional Requirements

- Audio Input
- Frequency Analyze
- Confidence Scoring
- Feedback and reporting

Non-Functional Requirements

- Performance
- Accuracy
- High Accuracy and Reliability
- Security and Privacy

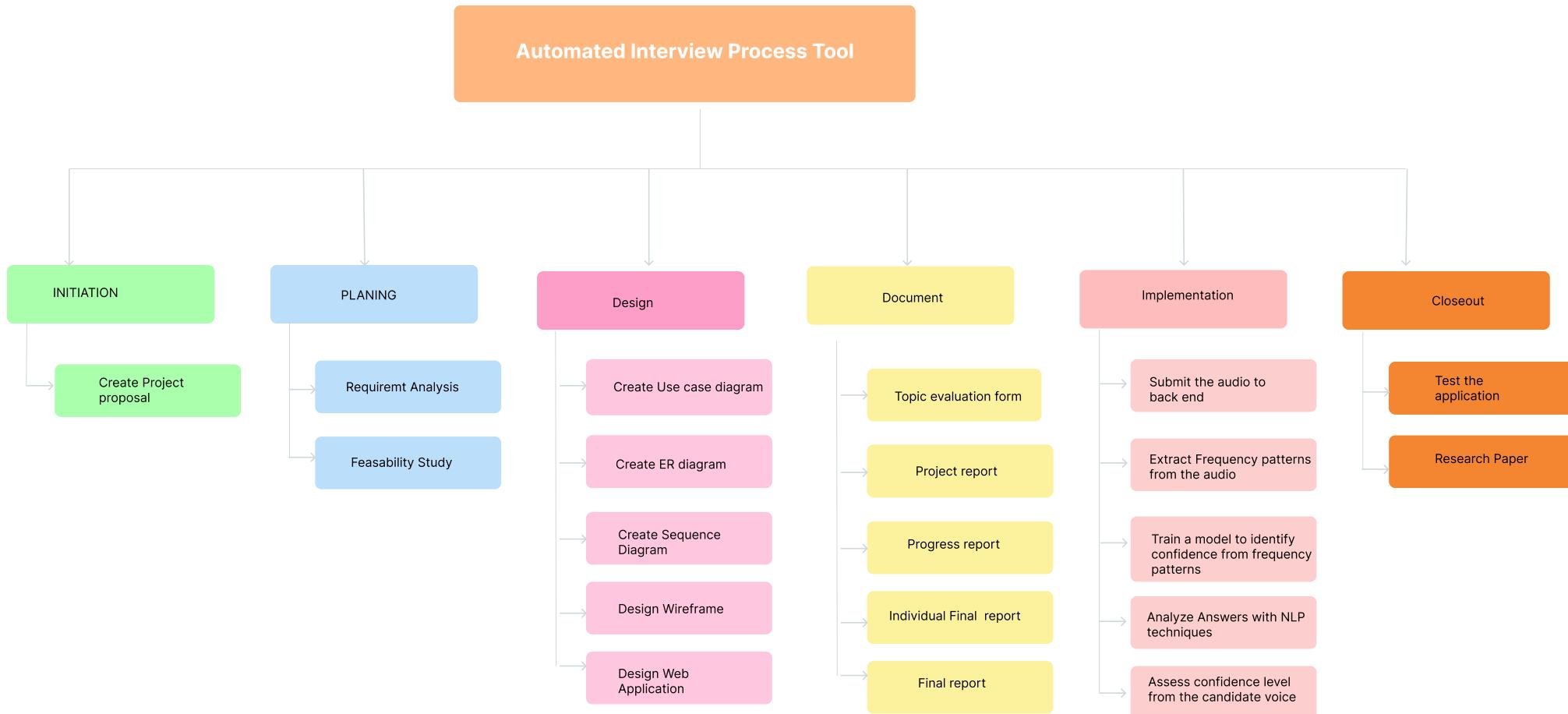


Software Requirements

- VS Code
- Jupiter Notebook



Workload Distribution



Technologies, Techniques, Algorithms



Technologies

- ReactJS
- Python
- Firebase
- Librosa

Algorithms & Architecture

- Fast Fourier Transform (FFT)
- MFCC Extraction
- Regression Models



Techniques

Signal Processing
Feature Extraction

REFERENCES

1. S. P. Dubagunta and M. Magimai.-Doss, "Segment-level Training of ANNs Based on Acoustic Confidence Measures for Hybrid HMM/ANN Speech Recognition," ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, UK, 2019, pp. 6435-6439, doi: 10.1109/ICASSP.2019.8683513
2. D. Yu, J. Li, and L. Deng, "Calibration of Confidence Measures in Speech Recognition," IEEE Transactions on Audio, Speech, and Language Processing, vol. 19, no. 8, pp. 2461-2473, Nov. 2011, doi: 10.1109/TASL.2011.2141988.
3. B. Ziółko, T. Jadczyk, D. Skurzok, and M. Ziółko, "Confidence measure by substring comparison for automatic speech recognition," 2012 International Conference on Audio, Language and Image Processing, Shanghai, China, 2012, pp. 314-318, doi: 10.1109/ICALIP.2012.6376632.

Do you have
any
questions?

