INTELLIHIRE

Precise Recruitment for IT Pioneers

MEET THE TEAM

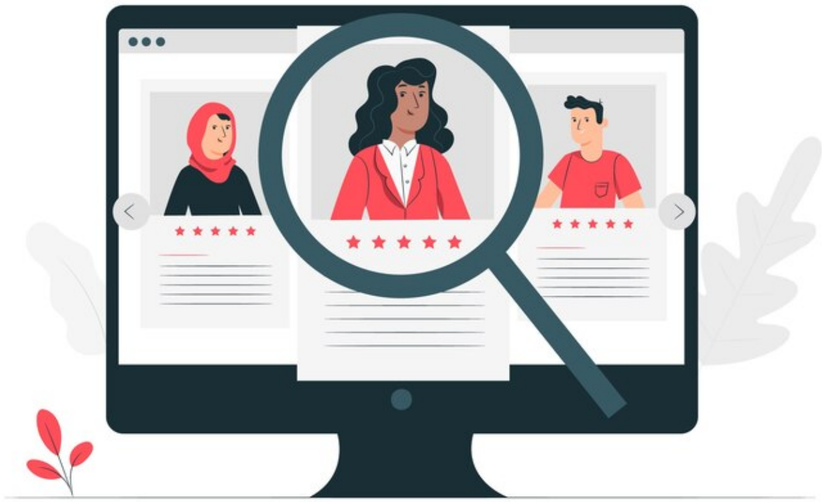
DE SILVA M.

ZOYSA E.S.

MALDENIYA M.M.D

DE SILVA S.R.

INTRODUCTION



Complicated

Time Consuming

Repititive

Expensive

A better solution?

WHAT IS INTELLIHIRE?

- All-in-one recruitment system
- Budget-friendly
- Time saving
- Focus on:
  - Skills
  - Experiences,
  - Personality traits

KEY FEATURES

Generate job decriptions	Analyze Academic Transcripts	Professional Skills Analysis	CV-Job Description Matching	Personality Traits Evaluation

CANDIDATE SELECTION THROUGH CV AND JOB DESCRIPTION MATCHING TECHNIQUES

MALDENIYA M.M.D

IT20203726

CV RANKING

BACKGROUND

Current Systems:

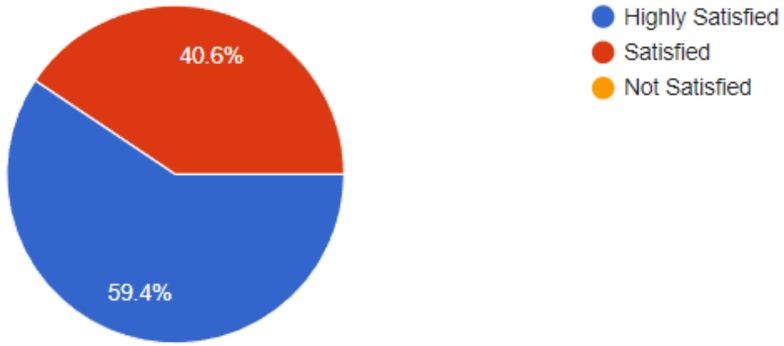
- Traditional resume screening is time-consuming
- No perfect way to match a candidate's skills with recruiter expectations.
- Limited focus on Skill Representation

INTELLIHIRE

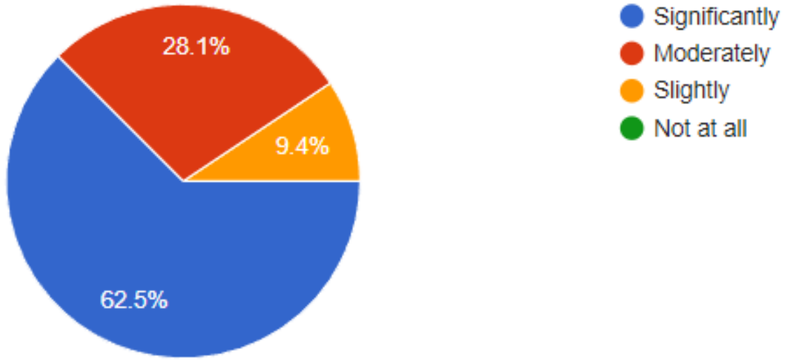
- **Job Description Generation**
- **CV Matching and Ranking**
- **Candidate Skill Representation**

VALIDATION

4. How satisfied are you with the Smart Job Matching feature's ability to generate precise job descriptions and skill-matching from CVs?



5. Has the CV Job Matching feature increased the efficiency of your candidate selecting process?



ANALYSING ACADEMIC TRANSCRIPT

DE SILVA S.R.

IT20216900

ANALYZING ACADEMIC TRANSCRIPT

BACKGROUND

Current Systems:

- No skill-based transcript categorization.
- No use of Grades of a candidate to categorise skill areas
- Lack of graphical skill representation.

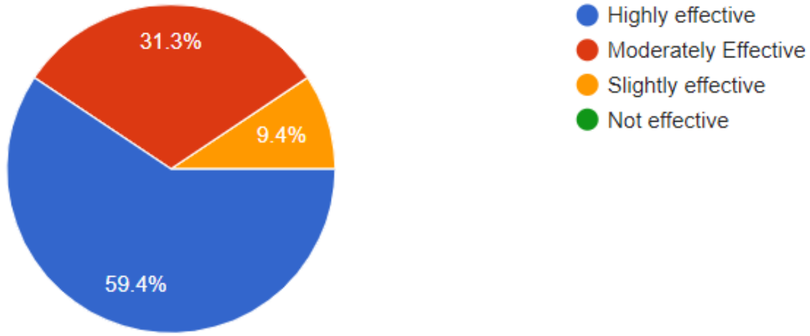
INTELLIHIRE

- **Skill-based transcript categorization.**
- **Use of Grades of a candidate to categorise skill areas**
- **Comprehensive graphical skill representation.**

VALIDATION

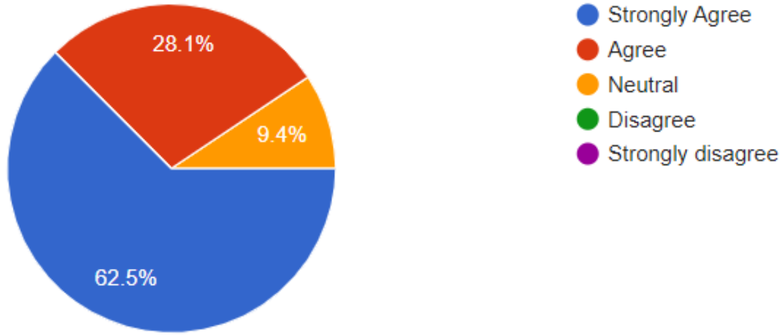
8. How efficient do you find INTELLIHIRE's Academic Transcript Analysis in categorizing candidate skills from academic transcripts?

32 responses



9. Has the Academic Analysis feature significantly improved your understanding of a candidate's qualifications and skills?

32 responses



PROFESSIONAL SKILL ANALYSIS USING DIGITAL FOOTPRINTS

ZOYSA E.S.

IT20231200

PROFESSIONAL SKILLS

BACKGROUND

- The IT industry has a competitive job market.
- Manual recruitment process is time consuming.
- CVs are not 100% reliable.
- GitHub, LinkedIn are popular professional media platforms in 21st century.
- Employee background checking has been importnant

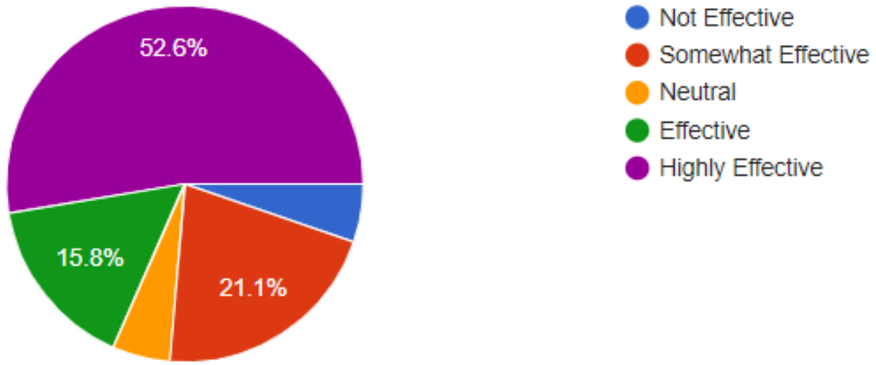
INTELLIHIRE

- **GitHub** based programming language proficiency calculator
- **LinkedIn** skills based Job Category Prediction
- Sentiment Analysis on **Recommendation Feedback**
- Programming language proficiency cross-validation with CV

VALIDATION

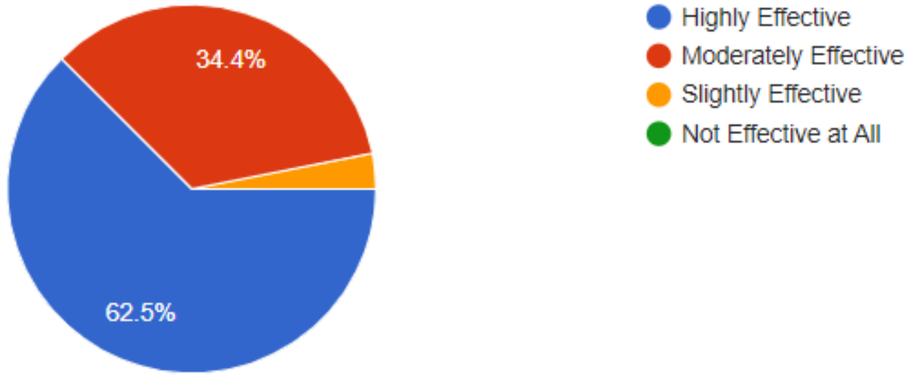
10. On a scale of 1 to 5, with 1 being "Not Effective" and 5 being "Highly Effective," please rate the effectiveness of our automated employee reference checking process in helping you make informed hiring decisions.

19 responses



11. How effective is the Digital Profiling feature in verifying candidate profiles through platforms like GitHub and LinkedIn?

32 responses



PERSONALITY ASSESSMENT OF CANDIDATES

DE SILVA M.

IT20207854

PERSONALITY ASSESSMENT

BACKGROUND

Current Systems:

- Limited focus on assessing personality
- Personality as a predictive factor of professional effectiveness

Research Problem:

- "How well does this candidate's personality suit this job role?"

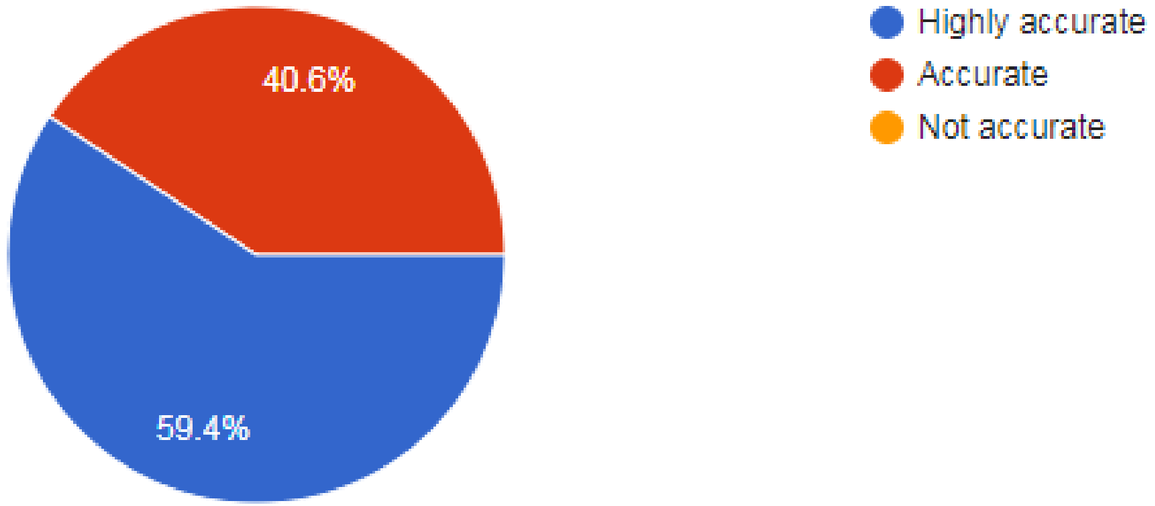
INTELLIHIRE

- Big Five Model
- Questionnaire; self-rating & open-ended
- Evaluates Personality - Job Role Fit

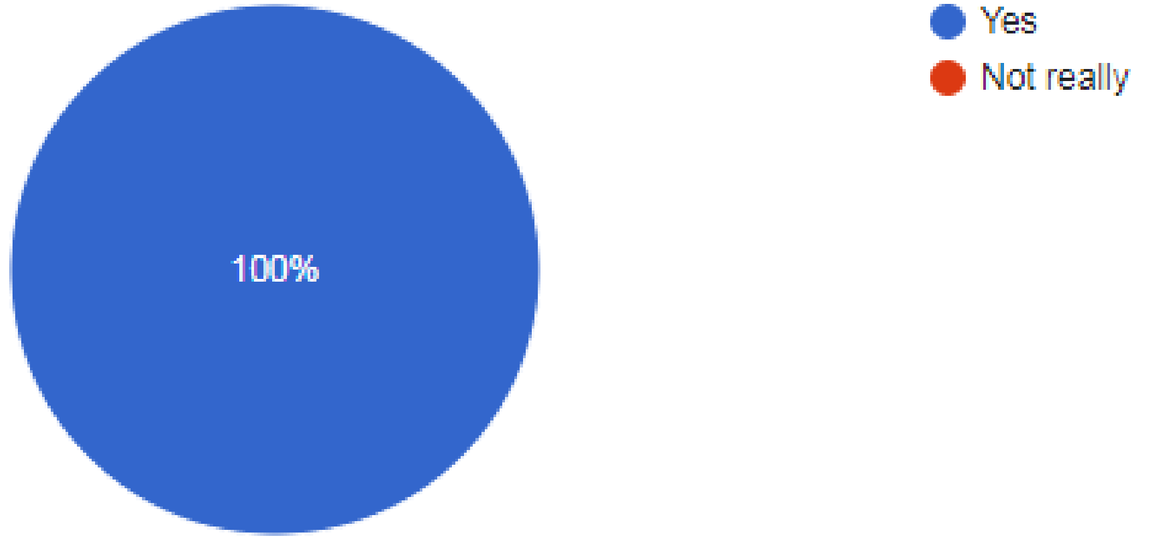
$$\text{Score} = \Sigma\left(\frac{trait(candidate)}{trait(expected)}\right) * \frac{100}{5}$$

VALIDATION

6. To what extent do you find the Personality Assessment feature accurate in predicting candidate traits and aligning them with job requirements



7. Has the personality assessment feature in INTELLIHIRE been valuable in identifying candidates who are a cultural fit for your organization?



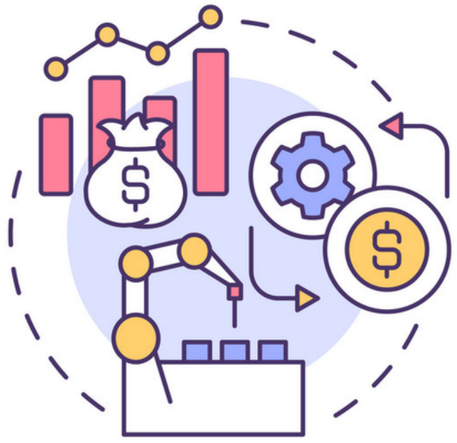
COMMERCIALIZATION

TARGET CUSTOMER BASE

- Recruiters in IT Companies

MARKETING APPROACH

- Trial version
- Free and paid versions



Commercialization

ICAC ACCEPTANCE

Enhancing Recruitment Processes Through Integration of Personality Traits and Professional Skills Analysis

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Abstract— The success and growth of an organization are heavily dependent on the selection of the right candidates. The conventional approach of relying solely on resumes and academic backgrounds falls short in adequately evaluating a candidate's suitability for a job role. This research paper proposes a novel method of candidate recruitment that streamlines the process by integrating advanced machine learning algorithms and natural language processing techniques. This study introduces a new approach to measuring programming language proficiency by analyzing GitHub data and comparing candidates using a knowledge graph. LinkedIn skill data is used to predict job categories through a SVM multiclass classification machine learning model. Additionally, Referee feedback is evaluated using sentiment analysis to improve recommendations. The study also utilizes K-means clustering and NLP techniques to identify the Big Five personality traits distribution among candidates and assess their alignment with specific job roles. The XGBoost model shows the best performance in predicting the personality cluster of candidates. The findings of this study contribute to the growing field of HR technology and provide valuable insights for optimizing recruitment practices in the IT industry using machine learning.

Keywords—Big Five traits, Machine Learning, Natural Language Processing, Professional Skills, Recruitment, Reference checking, Sentiment analysis

I. Introduction

Recruiting the most suitable candidates is a crucial process for any organization striving for success. However, when selecting candidates for IT job positions, decisions cannot solely rely on their resume and academic background. It's essential to consider their experience in relevant areas, proficiency in programming languages, and how well their personality aligns with the job role.

Understanding and identifying personality attributes of employees in the workplace is essential for creating a positive and productive work environment. According to British psychologist Adrian Furnham[1], personality traits play an important role in an individual's success at work, and studies show that personality is more predictive of professional effectiveness than previous experience.

Professional skills, also called technical skills, are a type of skill we use in the workplace. These skills cover all the knowledge and experience we specifically use to do our jobs[2]. Hiring candidates with the right professional skills is a good way to ensure high job performance.

Although many recruiters are familiar with modern technology tools and their benefits, not all of them effectively utilize technology to analyze candidate data and pinpoint the most fitting individuals for specific roles [3]. Nevertheless, analyzing data from diverse sources like GitHub and LinkedIn, referee feedback on candidates along with the assessment of personality traits, can significantly enhance the identification process[4]. The drawback, however, is that this approach can be time-consuming, leading some companies to abandon the use of such data.

To address these challenges, this research paper proposes a machine learning-based approach that streamlines the recruitment process by leveraging professional skills and personality traits to identify the most suitable candidates for specific job roles.

The 'Big Five Model' was chosen as the personality evaluation model in this research due to its strong relevance to workplace performance. Research from the Academy of Management[5] indicates that The Big Five personality traits can influence job performance outcomes. Different job roles and tasks can trigger specific traits, and knowing which individuals possess compatible traits for a position allows you to create a high-performing team.

Candidate's professional skills are predicted by scraping and analyzing data from platforms such as GitHub, LinkedIn, and reference feedback forms. This process aims to provide recruiters with a comprehensive understanding of the candidates' abilities and talents prior to the recruitment.

The study's findings carry significant implications for HR technology, as integrating machine learning and natural language processing techniques can lead to improved candidate selection, reduced time-to-hire, and overall enhanced recruitment outcomes within the IT industry.

II. Literature Review

In recent years, numerous studies have focused on exploring methods to go beyond evaluating only CVs and academic skills during candidate recruitment, with the aim of optimizing the overall recruitment process.

The research paper titled "DevFlair: A Framework for Streamlining the Pre-screening Process in Software Engineering Job Applications" authored by Jayasekara et al.[6] presents a novel system designed to automate the evaluation of job candidates' suitability. The system leverages data from various sources such as social media,

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From:	**Microsoft CMT** <email@msr-cmt.org>
To:	**Maleesha De Silva** <it20207854@my.sliit.lk>
Subject:	Acceptance Notification: 5th International Conference on Advancements in Computing
Date:	14.10.2023 06:30:58 (+02:00)

[EXTERNAL EMAIL] This email has been received from an external source – please review before actioning, clicking on links, or opening attachments.

Dear Maleesha De Silva,

Congratulations! We are pleased to inform you that your paper has been accepted to be presented at the 5th International Conference on Advancements in Computing 2023.

Paper ID: 170
Paper Title: Enhancing Recruitment Processes Through Integration of Personality Traits and Professional Skills Analysis

Please visit https://cmt3.research.microsoft.com/5ICAC2023/Submission/Index to view the reviews given during the double-blind review process.

When preparing the camera-ready version of your paper, please address all the review comments and follow the camera-ready guidelines given in the https://icac.lk/for-authors

Please note that the camera-ready deadline is 1st of November 2023.

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1. Check the review comments in the CMT. The authors are expected to address all reviewer comments and revise the paper accordingly. (NOTE: You are not allowed to make significant structural changes to the accepted article.)
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FEEDBACK

This is a multifaceted recruitment system and it can truly transformed the way companies approaches hiring. This system's diverse set of features can make recruitment process not only more efficient but also much more accurate.

- JD Bot (Job Description Bot)
  It takes all the guesswork out of creating job descriptions. When we input the criteria, it generates comprehensive job descriptions that are spot-on. This saves a lot of time and ensures the recruiting team is attracting the right candidates for desired

- CV Ranking
  The CV Ranking feature will make it easy to compare and rank candidates based on their qualifications, experience, and educational background. This will be a massive time-saver and will significantly improve the hiring decisions.

- Academic Transcript Ranking
  It automatically ranks academic transcripts based on results, helping the recruiter identify candidates with the most relevant qualifications. This will increase the precision of the candidate selection process.

- Professional Skills Ranking
  The system's ability to evaluate professional skills using data from LinkedIn and GitHub is remarkable. The recruiting team can quickly gauge a candidate's expertise and experience, making it easier to identify top talent.

- Personality Ranking
  Assessing candidates based on their personality traits is a unique but highly valuable feature. It can help recruiting team find individuals who not only have the right qualifications but also fit company's culture.

In summary, this system can be a game-changer for hiring processes. It is good for ranking candidates and can be easily used in the recruiting process to identify candidates with high potential.

Thank you very much.
Best regards,

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Dialog

THANKYOU

TESTING

Test Case No	01
Description	Matching a resume with job description
Input	Input resume of a candidate Input the related job description for the position candidate applied for. Input required skills for the position.
Expected Output	Matching percentage
Actual Output	`Matching Percentage Prediction: [33.82926765]`
Result	Passs

Test Case No	02
Description	Rank resumes of candidates according to the matching percentages
Input	Input resumes of candidates Input the related job description for the position candidate applied for. Input required skills for the position.
Expected Output	Ranked matching percentages of candidates from highest score to the lowest

Actual Output	`Matching Percentage Prediction: [54.79086921]`
	`Matching Percentage Prediction: [52.04995315]`
	`Matching Percentage Prediction: [41.98185231]`
	`Matching Percentage Prediction: [25.39284305]`

Result	Pass

Test Case No	03
Description	Create job description for a specific job position
Input	Input responses for the prompted questions of the chatbot.
Expected Output	Job description
Actual Output	What is the job title or position for which you are creating the job description? Your input -> data engineer Could you please provide a brief summary of the job? Your input -> analyze, and interpret large volumes of data. You will assist in developing reports, conducting data research, and supporting data driven decision maki ng processes. What are the main responsibilities and duties associated with this role?
Result	Pass

Test Case No	04
Description	Get Matching keywords
Input	Input candidate resume Input job description
Expected Output	Matching and Not Matching Keyword List

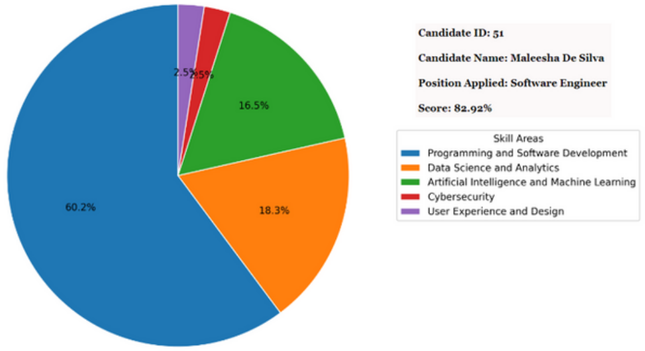
Actual Output	`0 | company | No Match`
	`1 | client | No Match`
	`2 | bods | Match`
	`3 | etl | Match`
	`4 | consultant | No Match`
	`5 | sme | No Match`
	`6 | month | Match`
	`7 | contract | No Match`
	`8 | basis | No Match`

Result	Pass

Test Case No	05
Description	Match and get skills of resume
Input	Input candidate resume Input job description
Expected Output	Matching skills in resume and job description
Actual Output	`'sql': 6, 'java': 3, 'html': 2, 'python': 1, 'django':`
Result	Pass

TESTING

Test Case 01 - A Software Engineering Specialized Candidate applying for the Software Engineer Position



Candidate ID: 51

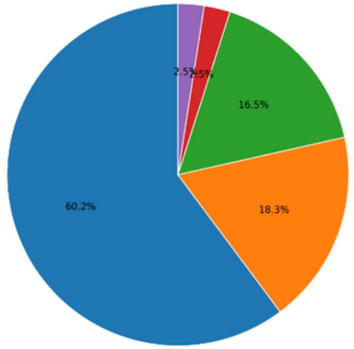
Candidate Name: Maleesha De Silva

Position Applied: Software Engineer

Score: 82.92%

Skill Areas
- Programming and Software Development
- Data Science and Analytics
- Artificial Intelligence and Machine Learning
- Cybersecurity
- User Experience and Design

Test Case 02 - A Software Engineering Specialized Candidate applying for the Machine Learning Engineer Position



Candidate ID: 51

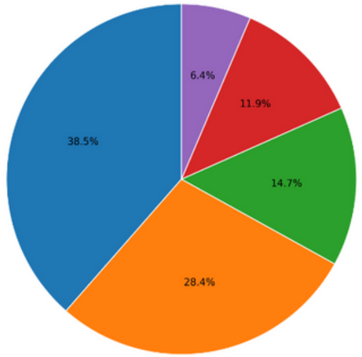
Candidate Name: Maleesha De Silva

Position Applied: Machine Learning Engineer

Score: 68.8%

Skill Areas
- Programming and Software Development
- Data Science and Analytics
- Artificial Intelligence and Machine Learning
- Cybersecurity
- User Experience and Design

Test Case 03 - A Cyber Security Specialized Candidate applying for the Cyber Security Analyst Position



Candidate ID: 52

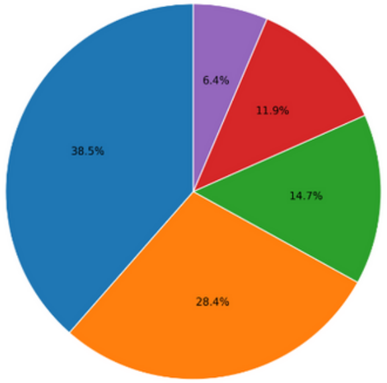
Candidate Name: Dilshan Rodrigo

Position Applied: Cyber Security Analyst

Score: 76.42%

Skill Areas
- Cybersecurity
- Data Science and Analytics
- Programming and Software Development
- Artificial Intelligence and Machine Learning
- IT Infrastructure and Networking

Test Case 04 - A Cyber Security Specialized Candidate applying for the UI/UX Designer Position



Candidate ID: 52

Candidate Name: Dilshan Rodrigo

Position Applied: UI/UX Designer

Score: 22.39%

Skill Areas
- Cybersecurity
- Data Science and Analytics
- Programming and Software Development
- Artificial Intelligence and Machine Learning
- IT Infrastructure and Networking

Test Case 05 – When the user uploads a wrong PDF that is not an Academic Transcript

Oops! Something Went Wrong :(

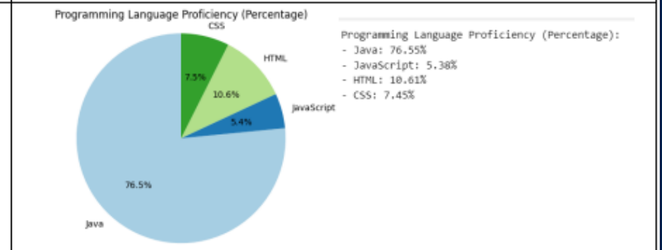
Make sure to upload a proper transcript.

TESTING

Test Case	01
Description	Testing LinkedIn skills-based job category classification for famous personality
Input	`# Example LinkedIn profile URL` `linkedin_profile_url = 'https://www.linkedin.com/in/chanuxbro/'`
Expected Outcome	Executive Leadership / Infrastructure and Operations

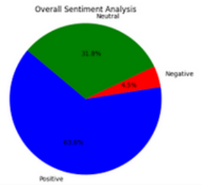
Actual output	`# Example LinkedIn profile URL`
	`linkedin_profile_url = 'https://www.linkedin.com/in/chanuxbro/'`
	
	`# Call the function to get skills`
	`skills = scrape_linkedin_skills(linkedin_profile_url)`
	
	`predicted_category = model.predict(fitted_vectorizer.transform(skills))`
	`result = f"Predicted Job Category: {predicted_category[0]}"`
	
	`print(result)`
	
	`Predicted Job Category: Insfastructure and Operations`

Result	Pass

Test Case	01
Description	Testing programming language proficiency of student in SLIIT
Input	`# Fetch user information` `username = "Maldeniya99"`
Expected Outcome	Proficient in Java
Actual output	
Result	Pass

Test Case	01
Description	Testing and applying sentiment analysis truly filled form.

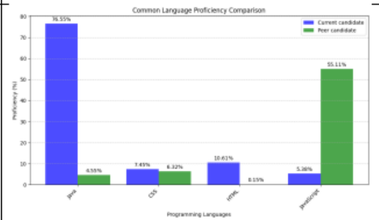
Input	A CSV file containing referee responses.
	`# Read CSV file into a DataFrame`
	`csv_file_path = 'Responses.csv'`
	`data = pd.read_csv(csv_file_path)`

Expected Outcome	There should be real-world output with a mix of all sentiments.
Actual output	
Result	Pass

Test Case	02
Description	Testing programming language proficiency of student in SLIIT
Input	`# Fetch user information` `username = "Maldeniya12345"`
Expected Outcome	There should not be a user account under the name: Maldeniya12345
Actual output	✓ 0.7s `User 'Maldeniya12345' not found.`
Result	Pass

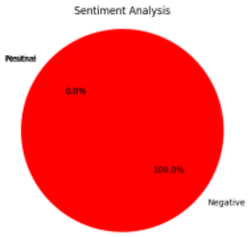
Test Case	03
Description	Testing Programming language proficiency for two peer candidates.

Input	`# Fetch user information`
	`current_username = "Maldeniya99"`
	`current_user = g.get_user(current_username)`
	
	`other_username = "IT20207854"`
	`other_user = g.get_user(other_username)`

Expected Outcome	Common languages – Java, CSS, HTML, Javascript
Actual output	
Result	Pass

Test Case	02
Description	Testing and applying sentiment analysis purposely filling the Google form with negative.

Input	A CSV file containing the referee's responses (intentionally negatively filled)
	`# Read CSV file into a DataFrame`
	`csv_file_path = 'Responses.csv'`
	`data = pd.read_csv(csv_file_path)`

Expected Outcome	Negative Sentiment should be the highest one.
Actual output	
Result	Pass

TESTING

Test case Number	**04**	
Description	Testing the final score calculation for candidate–job role fit	
Input	Expected scores	Candidate scores
	Openness 3.5 Conscientiousness 4.4 Extraversion 2.0 Agreeableness 4.0 Neuroticism 3.5	Openness 3.31 Conscientiousness 3.26 Extraversion 2.04 Agreeableness 3.86 Neuroticism 3.04
Expected Output	88.3	
Actual Output	`Candidate personality score: 88.3`	

Test case Number	**03**
Description	Testing the mapping of job role requirements to Big Five traits – when the recruiter provides the requirement for the job role it should be mapped to the Big Five traits
Input	Innovative 5 Fast learner 4 Organization skills 3 Attention to detail 4 Assertiveness 2 Leadership skills 2 Team Player 5 Communication skills 3 Confidence 3 Adaptability to changes 4
Expected Output	Openness 3.5 Conscientiousness 4.4 Extraversion 2.0 Agreeableness 4.0 Neuroticism 3.5
Actual Output	openness conscientiousness extraversion agreeableness neuroticism 4.5 3.5 2.0 4.0 3.5
Test Result	Pass