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AI-Based Resume Screening and Career Path Recommendation System

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Abstract: ***Many companies' recruitment procedures entail the manual evaluation of several resumes, which is laborious and prone to human bias. In order to overcome this difficulty, this project suggests an AI-based Resume Screening and Career Path Recommendation System that evaluates candidates automatically and makes recommendations for appropriate career pathways based on each person's talents and qualifications. The system makes advantage of contemporary web technologies, such as Tailwind CSS for effective and responsive user interface design and Next.js for frontend development. Resumes are processed using a Python backend program that extracts pertinent data, including education, experience, and abilities. A machine learning model called Logistic Regression is used to analyse the gathered data and forecast the suitability of candidates for particular positions.***

The suggested approach seeks to shorten the hiring process, increase the accuracy of screening, and help applicants choose the right career path. The platform improves applicant career planning and recruiter productivity by utilising data-driven approaches and artificial intelligence. The system is a useful tool for contemporary recruiting and talent management systems since experimental evaluation shows that it can efficiently classify resumes and produce insightful career recommendations.

By comparing candidate skill profiles with industry role requirements, the system not only screens resumes but also suggests possible career routes. This gives consumers information about employment options that fit their skills and interests. Supabase is the database solution that allows for effective data management while safely storing user data, resumes, and model outputs. Scalability, quick processing, and better decision-making are guaranteed in recruitment workflows when machine learning is integrated with a contemporary full-stack architecture.

Index Terms: Artificial Intelligence, Resume Screening, Career Path Recommendation, Logistic Regression, Next.js, Supabase Database.

I. INTRODUCTION

The hiring process is time-consuming and ineffective for recruiters because it frequently entails reviewing a huge number of applicants. Inconsistencies and bias in the selection of candidates can also be introduced via manual screening. Intelligent automated technologies are being used more and more in contemporary hiring procedures to address these issues. An AI-based resume screening and career path suggestion system that evaluates candidate resumes and forecasts appropriate employment roles is shown in this project. The solution enhances recruitment efficiency and accuracy by utilising both contemporary web technology and machine learning approaches.

A. BackgroundandMotivation

Organisations receive thousands of resumes for a single job posting due to the explosive rise of digital recruitment platforms and job applications. It is ineffective and frequently causes delays in the hiring process to manually review these resumes. Furthermore, a lot of applicants find it difficult to determine appropriate career options based on their current credentials and skill set. Opportunities to automate resume processing and enhance hiring decision-making are presented by developments in artificial intelligence and machine learning. The goal of this project is to create an intelligent system that can effectively scan resumes and suggest suitable career routes in response to these challenges. The method aims to direct job seekers toward better employment prospects and assist recruiters in selecting candidates.

Additionally, the creation of scalable and user-friendly recruitment solutions is made possible by the integration of machine learning models with contemporary online technologies.

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B. ProblemStatement

Manual resume screening is a laborious and ineffective method because organisations frequently receive a high amount of job applications. Each CV must be carefully examined by recruiters, which can cause delays in the hiring process and could result in the passing over of qualified applicants.

Furthermore, human bias and inconsistent candidate judgement may be introduced by conventional screening techniques. However, many job seekers do not receive adequate help in determining appropriate career options based on their qualifications and talents. An automated system that can effectively evaluate resumes and offer precise career recommendations is therefore required. The project's objective is to create an AI-powered platform that expedites resume screening and helps applicants look into appropriate career prospects.

C. Objectives

This project's main goal is to create an intelligent system that uses machine learning techniques to automate the resume screening process. By evaluating candidates' abilities, credentials, and experience, the system also seeks to offer tailored career path recommendations.. The specific objectives of this project are:

- Building a system that can automatically analyse resumes and assess candidate profiles is the main goal of this project. The solution speeds up the hiring process and eliminates the need for manual resume analysis.
- To extract and examine pertinent data from resumes.
- Resumes are processed by the system to determine important information including education, employment experience, and abilities. The machine learning model then uses this extracted data as input to conduct analysis.
- To suggest appropriate career paths to applicants.
- The algorithm recommends possible job prospects based on the candidate's qualifications and skill set. This aids users in determining which positions best suit their skills and passions. .
- Resumes, analytical results, and user data are all safely stored in Supabase. It facilitates effective data retrieval for the program and offers dependable database administration.

D. ContributionsandPaperOrganization

In order to support contemporary hiring procedures, this article offers a thorough foundation for an AI-based resume screening and career path suggestion system. The creation of an automated resume analysis system using a Logistic Regression model, the incorporation of a responsive web interface made with Next.js and Tailwind CSS, and the deployment of a scalable Python backend with Supabase for effective data management are the main contributions of this work.

The relevant research and current methods for resume screening and AI-based hiring systems are reviewed in Section II. The suggested system architecture and methodology, which includes database integration, machine learning model construction, and resume processing, are covered in Section III. The system implementation and evaluation are presented in Section IV, The outcomes, constraints, and possible enhancements of the system are covered in Section V. The work is finally concluded in Section VI, which also suggests potential avenues for further research and advancement.

II. LITERATURE SURVEY

Using machine learning algorithms to categorise resumes according to job role requirements and candidate skill sets has been the subject of several research. Candidate suitability for particular roles has been predicted using methods including logistic regression, decision trees, and support vector machines. In order to effectively handle candidate data, contemporary recruitment platforms are also progressively using web-based technology and cloud databases.

A. AI Powered Systems For Screening Resumes

Organisations are implementing automated technologies to expedite the hiring process in response to the growing volume of online job applications. Conventional manual screening techniques take a lot of time and can result in inconsistent candidate judgement.Recent research emphasises the application of machine learning and artificial intelligence methods to increase the effectiveness of applicant selection and resume analysis. By extracting pertinent data from resumes, such as education, work experience, and abilities, machine learning algorithms are able to analyse candidate profiles. Intelligent algorithms can categorise candidates based on their fit for particular positions by comparing these characteristics with job requirements.

According to research, AI-driven screening methods improve the fairness and accuracy of candidate evaluation while drastically cutting down on recruitment time.

B. Machine Learning Methods For classifying Resumes

The use of machine learning algorithms for automated resume classification and candidate rating has been the subject of numerous studies. Based on information taken from resumes, algorithms like Support Vector Machines, Decision Trees, and Logistic Regression are frequently employed to estimate candidate appropriateness. These algorithms provide predictions about candidates' suitability for specific job roles by analysing trends in their profiles.

Among these methods, logistic regression is thought to be a useful and computationally efficient model for classification issues. It enables systems to assess the likelihood that a candidate is qualified for a certain position by analysing structured data obtained from resumes. According to research, these models offer accurate forecasts while preserving decision-making process transparency and interpretability.

C. Web-Based career Recommendation Platform

In order to develop accessible recruitment tools, recent study also highlights how crucial it is to integrate machine learning models with contemporary web-based platforms. The creation of interactive applications that allow users to upload resumes, receive screening results, and receive career recommendations is made possible by web frameworks. Both recruiters and job searchers can benefit from these systems' increased user engagement and real-time insights.

Cloud-based databases like Supabase and contemporary full-stack technologies like Next.js for frontend development enable systems to manage user data effectively and offer scalable solutions. These systems connect candidate skill profiles with industry role needs by merging machine learning algorithms with flexible web interfaces to provide intelligent career coaching. These solutions improve decision-making in the recruitment ecosystem and assist users in identifying possible career choices.

III. PROPOSED METHODOLOGY

The suggested method is intended to offer job seekers individualized career path advice in addition to automating the resume screening process. The platform's main functions are to analyze resumes that have been uploaded, extract pertinent data, and utilize a machine learning model to identify appropriate job roles and provid ethe ATS and career path.

A. System Architecture (Python Backend, Next.js Frontend, and Supabase Database Integration)

Theplatformisbuiltonarobust,three-tierwebarchitecture that separates the user interface from the underlying data processing logic.

- Presentation Layer: Next.js and Tailwind CSS are used to create the application's frontend, which offers an interactive and responsive user experience. Users can upload resumes, see screening results, and get career path recommendations in an aesthetically pleasing manner with this layer.
- Application Layer: Python is used to implement the backend processing, which includes feature extraction, text preparation, and resume parsing. Based on retrieved resume data, a machine learning model called Logistic Regression is utilized to categorize candidate profiles and forecast appropriate job opportunities.
- Data Layer: The system manages and stores user data, uploaded resumes, and prediction results using Supabase as the database solution. Supabase offers a dependable and expandable cloud-based architecture that makes it possible for the application to store, authenticate, and retrieve data effectively.

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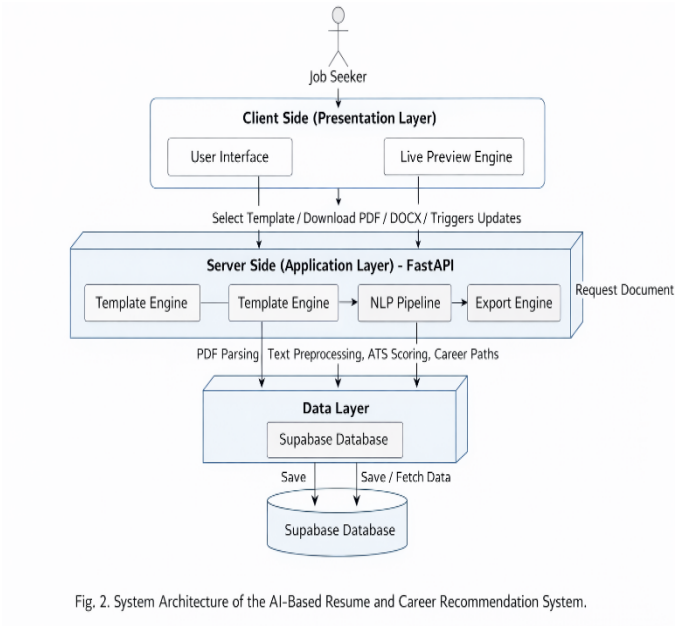


Fig.1.Systemarchitectureoftheproposednext.js and fast API product

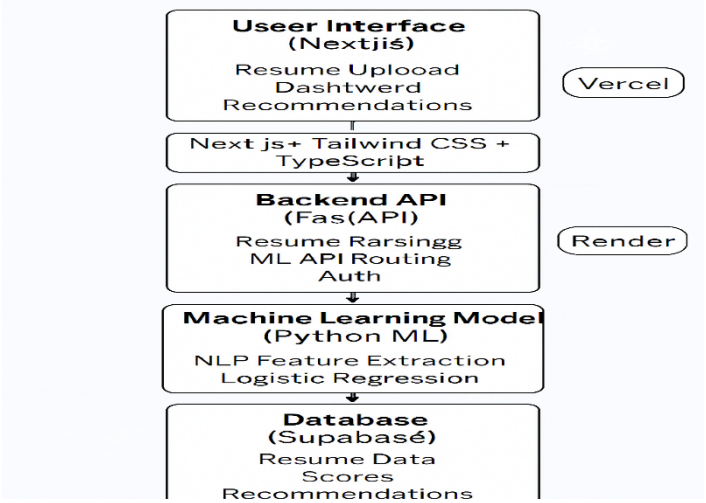


Fig. 2.Entity Relationship diagram detailing the database schema for users,resume content, and calculated ATS scores.

B. FunctionalModules(Resume Upload, Resume Analysis, and Career Recommendation)

The suggested system is broken up into a number of functional modules that direct users through the resume review process in order to offer a straightforward and effective user experience. The Resume Upload Module, where users can submit their resumes via the online interface, is where the workflow starts. This module enables the system to receive resume documents and get them ready for the backend processing system's additional analysis.

The Resume Analysis Module is accessed by the system once the resume has been uploaded. In order to extract pertinent information like skills, education, and work experience, the backend uses Python-based text processing techniques to process the document. The Logistic Regression machine learning model is then used to examine the extracted data in order to assess a candidate's fit for particular employment roles.

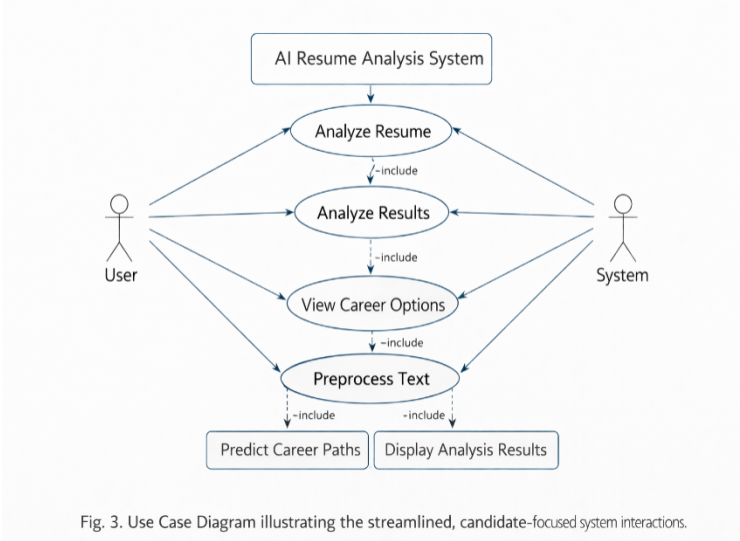


Fig. 3. Use Case Diagram illustrating the streamlined, candidate-focused system interactions.

Fig.3.Usecasediagramillustratingthestreamlined,candidate-focusedsysteminteractions.

C. Resume Processing and Career Recommendation Workflow

Text extraction and preparation methods based on Python are used to process the uploaded résumé. Skills, education, and experience are examples of important information that is found and transformed into structured data that the machine learning model may utilize. After processing, the candidate's suitability for various job roles is assessed using the Logistic Regression classifier.

The system provides the user with appropriate career path recommendations based on the classification results and extracted skill patterns.

D. Resume Evaluation(ATS) and Skill Matching Pipeline

Evaluating submitted resumes and determining appropriate career routes based on the candidate's skill set constitute the system's primary analytical component. After a resume is submitted, it is processed and subjected to a structured analysis by the backend Python program. The resume's textual information is extracted by the algorithm and transformed into structured features for additional assessment.

- Word count analysis: By examining the quantity of words and the existence of significant descriptive information, the algorithm assesses the resume's overall content.
- Skill Extraction:Using text preprocessing methods, the backend processing module finds professional and technical talents listed on the resume. The machine learning model can use the structured data created from these extracted skills for additional classification.
- Skill to role matching**:** Predefined skill sets linked to various employment positions are compared with the extracted skills.

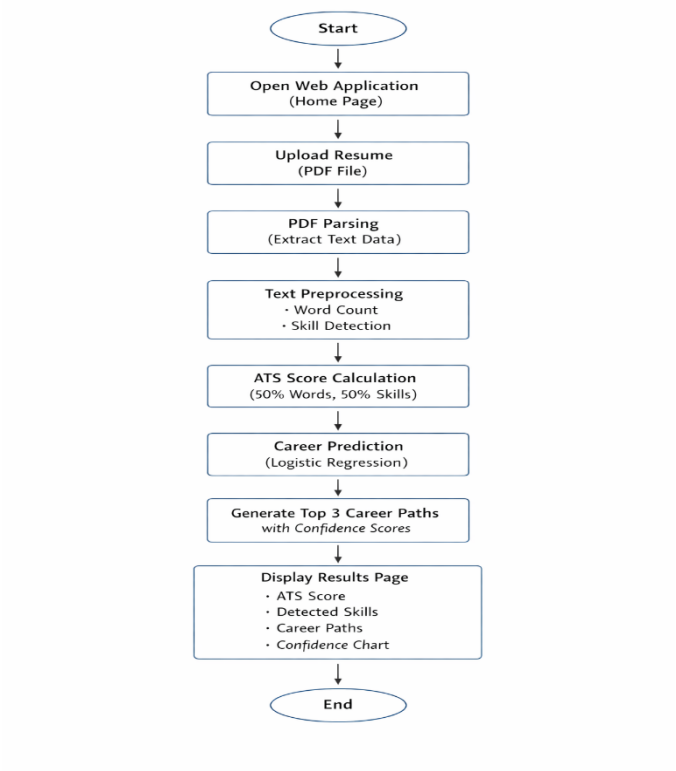
Based on the candidate's talent profile, the system uses the Logistic Regression model to determine the best employment role and provide career recommendations.

Basedonthismathematicalevaluation,thesystemnavigates theusertoasummarypagedisplayingtheirfinalscoreout of 100, alongside specific, AI-driven recommendations (e.g.,” Expand your summary with more impact-driven metrics” or ”Include more technical skills”).

E. Results Visualization and Recommendation Output

A number of significant evaluation components are shown on the results page. The platform first displays an ATS compatibility score, which is determined by the resume's word count and the presence of pertinent abilities. . The algorithm highlights the key facts and skills that were derived from the supplied résumé in addition to the score. The Logistic Regression model forecasts the candidate's top three career paths based on these extracted skills. A confidence graph, which shows the probability scores connected to each suggested career path, is used to further visualize the results.

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Fig. 4.System flow chart detailing the sequential execution from resume upload to result generation

IV. EVALUATION AND RESULTS

Several functional tests were carried out to assess the efficacy of the suggested AI-based resume screening and career path suggestion system. The accuracy of resume parsing, the computation of ATS scores, and the caliber of career recommendations produced by the machine learning model were the main areas of assessment. Several simulated candidate resumes in PDF format were used for testing in order to see how the system handled various resume formats and skill combinations

A. UserInterfaceandWorkflowEfficiency

Developing an easy-to-use and effective resume review workflow was one of the system's main goals. Users were able to upload their resumes straight through the web interface during testing, without the need for complicated configurations or numerous navigation steps. Resumes in PDF format are accepted by the system and processed by the backend using parsing methods based on Python.The resume is swiftly processed by the system after it is uploaded, and the user is then taken to the results page.

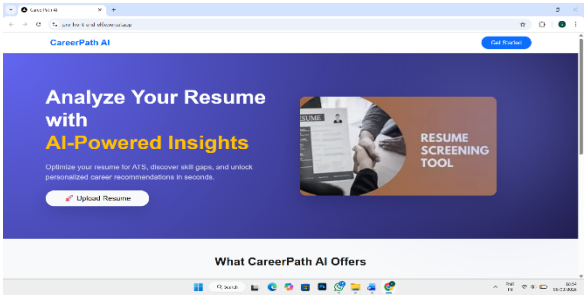


Fig. 5.The home page you see when you enter the website

In the second phase, customers upload their resumes in PDF format to the Resume Upload Page. After uploading the document, users can click the Analyze option to start the analysis process. After processing the document via the backend pipeline, the system automatically reroutes the user to the results interface.

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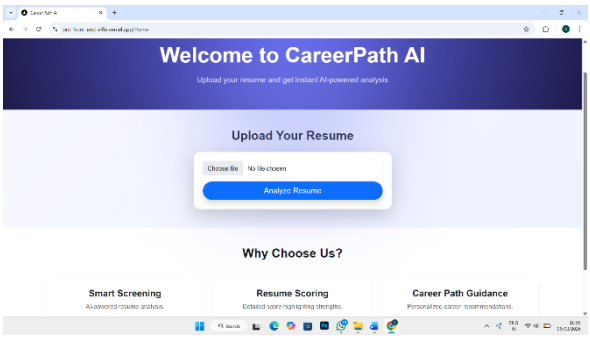


Fig. 6.The resume pdf upload page

B. Resume Processing and Career Prediction Performance

A Python-based backend module that parses PDFs to extract text from submitted documents powers the resume analyzing process. The system preprocesses the text once it has been extracted in order to determine important details like skills and the total length of the content. Word count (50%) and the number of detected abilities (50%) are the two main components of the weighted evaluation method used to determine the ATS compatibility score.



Fig.7.The resumePDF is valid auth

The collected skills are then contrasted with predetermined skill sets linked to various professional positions, such as data analyst and AI engineer. The Logistic Regression model forecasts the candidate's best career paths based on this comparison. The top three suggested career alternatives are produced by the system, and each is linked to a probability score that indicates the model's level of confidence.

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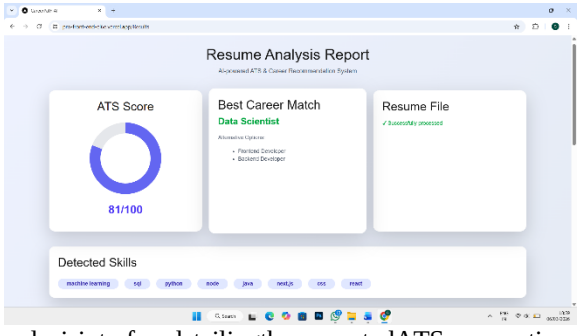


Fig.8.ThefinalanalysisinterfacedetailingthecomputedATSscore,actionablerecommendations.

C. Results Visualization and Insight Generation

To enhance the interpretability of the system's predictions, the results are presented using a structured visual layout. After processing a resume, the results page displays the ATS score and the most suitable career path side by side at the top of the interface.

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This provides an immediate summary of the evaluation outcome. Below this section, the system lists the detected skills extracted from the resume, enabling users to understand which competencies were recognized during the analysis process.

The platform then visualizes the predicted career options using a doughnut/bar confidence chart implemented with Chart.js. This graph illustrates the probability scores of the top three recommended career paths, helping users clearly compare their potential career directions.

The final section of the results page provides insights about the resume, summarizing key information such as extracted skills and the predicted job roles. These insights help users better understand how their resume aligns with different career opportunities and highlight areas where their skill profiles may influence career recommendations. Overall, the evaluation results demonstrate that the proposed system can efficiently analyze resumes, calculate ATS compatibility scores, and generate meaningful career path predictions through an intuitive web-based interface.

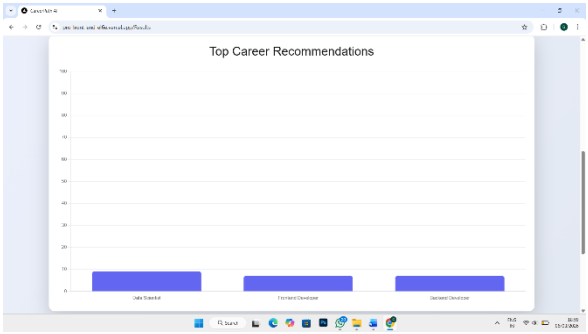


Fig. 9.The final confidence graph of best 3 professions

V. DISCUSSION

A. *DesignValidationandKeyObservations*

Evaluating the implemented architecture reveals several practical advantages to using a deterministic web framework. The decision to construct the backend with Python and FastAPI, paired with next.js provided a highly stable environment for concurrent data processing.

The suggested AI-based resume screening and career suggestion system functions effectively inside a lightweight web architecture, according to the experimental evaluation. Smooth communication between the resume analysis pipeline and the user interface was made possible by the integration of a Python backend and a Next.js frontend. The system effectively handled PDF resumes during testing and used the PDF parsing module to extract useful textual content. A clear metric for assessing resume quality was supplied by the ATS score calculation, which was based on word count and identified competencies. By combining candidate talents with predetermined job role requirements, the Logistic Regression model successfully found appropriate career paths. By displaying confidence levels for the top three suggested jobs, the Chart.js presentation of prediction results enhanced interpretability.

B. *LimitationsandConstraints*

Even though the system was successfully implemented, testing revealed a number of shortcomings. The completeness and clarity of the material in the submitted resume have a significant impact on how accurate career forecasts are. The system may produce recommendations that are less trustworthy if a resume has few skills or little descriptive material. Data Scientist, Software Developer, Web Developer, AI Engineer, and Data Analyst are only a few of the specified job titles that the model presently covers, which is another drawback. A somewhat small sample of 10 test resumes was used for the evaluation, which limits the capacity to thoroughly evaluate system performance across a range of candidate profiles. Additionally, the accuracy of the PDF parsing module's text extraction may occasionally be impacted by differences in resume formatting.

C. *AlignmentwithLiteratureFindings*

The project's results align with previous studies that demonstrate the efficacy of AI-based solutions in contemporary recruitment processes. Research indicates that candidate profiles can be effectively classified using machine learning models like Logistic Regression based on skill trends. Similar to this, career recommendation systems frequently employ skill-based matching techniques to find appropriate work roles. Current developments in intelligent recruitment platforms are also reflected in the integration of web-based interfaces with AI-driven analysis.

VI. CONCLUSION

The suggested platform combines a Supabase database, a Python backend, and a Next.js frontend to produce a scalable and intuitive web application. Important details like abilities and content length are extracted from uploaded resumes by the system using PDF parsing algorithms. Word count and identified abilities are used to produce an ATS compatibility score that gives consumers a sense of how effective their resumes are. The best career pathways from predetermined professions, such as data scientist, software developer, and web developer, are predicted using the logistic regression model. The outcomes are presented via an easy-to-use interface that uses Chart.js to visualize confidence, identify skills, and suggest careers.

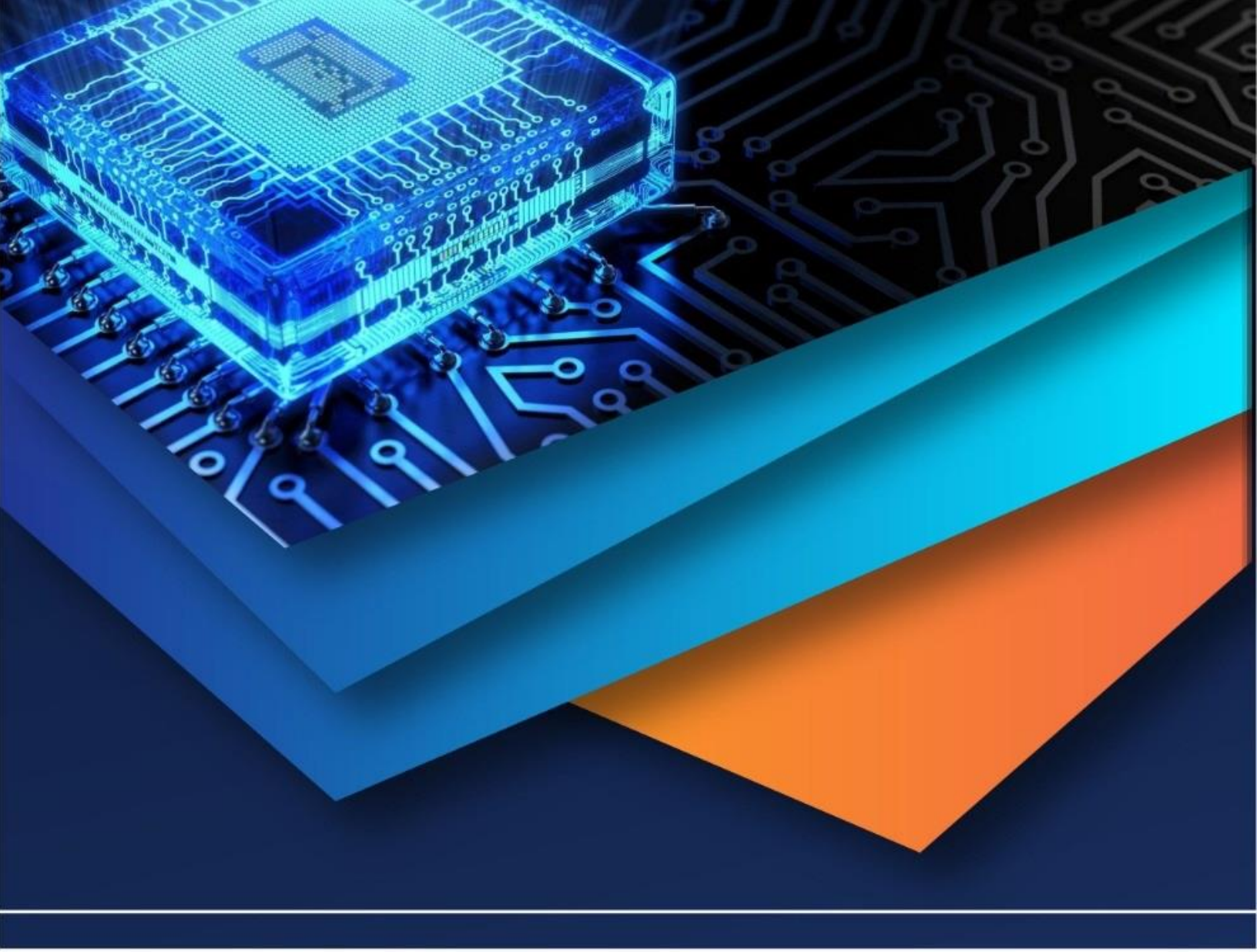
The system can effectively analyze candidate profiles and produce insightful results, according to experimental testing using example resumes. All things considered, the suggested solution offers job seekers a useful tool that helps with resume evaluation and career counseling

VII. ACKNOWLEDGMENT

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