SMART APPLICATION TRACKING SYSTEM USING GEMINI PRO

MINI PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Report titled **"SMART APPLICATION TRACKING SYSTEM USING GEMINI PRO**" is the bonafide work of **"SANDHYA S (210701226) and SHANDIYA N S (210701240)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

The Smart Applicant Tracking System (ATS) marks a significant leap forward in the domain of resume assessment, specially crafted to cater to the fiercely competitive terrain of the tech industry. This innovative tool harnesses the prowess of advanced Generative AI models sourced from Google, empowering users to undergo a thorough analysis of their resumes vis-à-vis provided job descriptions. With an intricate grasp of diverse tech domains such as software engineering, data science, and big data engineering, the system meticulously scrutinizes resumes to meet the exacting benchmarks of the industry. At the core of its functionality lies the flexibility for users to submit resumes in PDF format, leveraging PyPDF2 for swift extraction of pertinent information. Subsequently, the system deploys sophisticated algorithms to furnish a comprehensive response, furnishing users with insights into their resume's harmony with the job description. This response encompasses a percentage match score, spotlighting areas of alignment while pinpointing absent keywords crucial for refining the resume's efficacy. The Smart ATS doesn't merely halt at evaluation; it takes a stride forward by presenting users with an enhanced profile summary. This succinct synopsis encapsulates pivotal strengths and accomplishments, ensuring users possess a compelling narrative resonant with potential employers. At the heart of the user interface lies the user-friendly Streamlit web application, streamlining the resume enhancement process to render it both expedient and accessible. Through this pioneering solution, individuals are empowered to fine-tune and tailor their resumes, thereby amplifying their prospects of success in navigating the cutthroat job landscape prevalent within the tech industry.

LIST OF FIGURES

ABBREVATIONS

ABBREVIATION	FULL FORM
AI	Artificial Intelligence
API	Application Programming Interface
ATS	Applicant Tracking System
GDPR	General Data Protection Regulation
HRIS	Human Resource Information System
ML	Machine Learning
NLP	Natural Language Processing
OCR	Optical Character Recognition
PDF	Portable Document Format
UI	User Interface

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CHAPTER - 1
INTRODUCTION

1.1 GENERAL

The SMART Application Tracking System (ATS) is designed to streamline and automate the recruitment process, improving efficiency for both employers and job seekers. By leveraging advanced technologies such as artificial intelligence and machine learning, the SMART ATS provides a robust platform for tracking, managing, and analyzing applications.

1.2 OBJECTIVES

The main objectives of the SMART ATS are to simplify recruitment, enhance the candidate experience, improve hiring decisions, increase efficiency, and ensure compliance with employment laws.

1.3 EXISTING SYSTEM

The current recruitment systems are often manual, time-consuming, and prone to errors. Recruiters spend significant time on tasks such as sorting resumes and scheduling interviews. These systems typically lack the capability to analyze large volumes of data, leading to less informed hiring decisions. Additionally, the manual nature of current processes results in higher operational costs and a risk of non-compliance with employment laws.

1.4 PROPOSED SYSTEM

The proposed SMART ATS addresses the limitations of existing systems with features like automated resume screening, data-driven insights, enhanced communication tools, and an integrated platform for managing all aspects of recruitment. It includes compliance management and customizable workflows to meet specific organizational needs, ensuring scalability for future growth.

CHAPTER - 2

LITERATURE SURVEY

Automated Resume Screening: A Review of Existing Methods and Technologies, this paper[1] provides an overview of automated resume screening methods, including keyword matching and machine learning algorithms, highlighting their effectiveness and limitations.

This paper[2] Enhancing Applicant Tracking Systems with Natural Language Processing Techniques Focuses on the integration of NLP techniques into ATS for improved resume parsing and matching, discussing recent advancements and future directions.

Deep Learning Approaches for Resume Analysis and Candidate Ranking, the paper [3], Explores the application of deep learning models for resume analysis and candidate ranking within ATS.

Semantic Matching in Applicant Tracking Systems: A Survey [4] provides an overview of semantic matching techniques used in ATS for better alignment between job requirements and candidate qualifications.

This Paper [5] Ethical Considerations in AI-Powered ATS Development Discusses ethical issues related to bias, fairness, and privacy in the development and deployment of AI-powered ATS, proposing strategies for mitigating potential risks.

User Experience Design for Smart ATS Interfaces this research [6] Explores best practices in UX design for ATS interfaces to improve usability and user satisfaction, emphasizing the importance of intuitive design principles.

Continuous Learning and Adaptation in Smart ATS Systems [7] Investigates methods for enabling continuous learning and adaptation in smart ATS systems to improve performance and relevance over time.

Interoperability Standards for ATS Integration with HR Systems This paper[8] Discusses interoperability standards and protocols for seamless integration of ATS with other HR systems and tools, enabling data exchange.

This paper [9] Predictive Analytics for Candidate Success Prediction in ATS Explores the use of predictive analytics models within ATS for identifying candidates with the highest likelihood of success in specific roles, discussing their implementation and effectiveness.

This paper [10] Data Security and Compliance Challenges in ATS Addresses the challenges of data security and compliance with regulations such as GDPR in the context of ATS systems, proposing strategies for ensuring data protection and regulatory compliance.

Social Media Integration in ATS for Candidate Sourcing This paper[11] Explores the integration of social media data into ATS for sourcing and evaluating candidates, discussing its potential to expand candidate pools .

Keyword Extraction Techniques for Resume Analysis This paper[12] Discusses techniques for extracting relevant keywords and phrases from resumes to enhance search and matching capabilities within ATS, highlighting recent advancements and challenges.

This paper[13] Automated Candidate Screening Strategies in ATS Investigates automated screening strategies and algorithms for efficiently processing candidate applications within ATS, discussing their impact on recruitment efficiency and accuracy.

This paper[14] Diversity and Inclusion Strategies in ATS Explores strategies for leveraging ATS to promote diversity and inclusion in the hiring process, discussing the role of technology in reducing bias and fostering equitable recruitment practices.

The Future of ATS: Emerging Trends and Challenges This paper[15] Provides insights into emerging trends and challenges in the field of ATS, including AI advancements, automation, and evolving candidate expectations, discussing their implications for future ATS development.

Evaluation Metrics for ATS Performance This paper[16] Discusses evaluation metrics used to assess the performance and effectiveness of ATS systems, highlighting key metrics and their significance in measuring system performance and user satisfaction.

Knowledge Representation and Reasoning in Smart ATS This paper[17] Explores knowledge representation and reasoning techniques used in smart ATS systems, discussing their role in enhancing decision-making processes and improving system intelligence.

Robustness and Bias Mitigation in Smart ATS This paper[18] Investigates techniques for enhancing the robustness of smart ATS systems and mitigating bias in candidate selection, discussing approaches for ensuring fair and equitable recruitment outcomes.

This paper[19] Personalization Strategies in ATS for Candidate Engagement Discusses strategies for personalizing the candidate experience within ATS to improve engagement and satisfaction, highlighting the role of personalized recommendations and communication.

Adoption and Impact of Smart ATS: A Case Study Analysis This paper[20] Presents case studies of organizations that have adopted smart ATS systems, examining their impact on recruitment processes, efficiency gains.

CHAPTER – 3

SYSTEM DESIGN

3.1 DEVELOPMENT ENVIRONMENT

3.1.1 HARDWARE SPECIFICATIONS

This project uses minimal hardware but in order to run the project efficiently without any lack of user experience, the following specifications are recommended.

Table 3.1.1 Hardware Specifications

PROCESSOR	Intel Core i5
RAM	4GB or above
GPU	Intel Integrated Graphics
HARD DISK	6GB
PROCESSOR FREQUENCY	1.5 GHz or above

## 3.1.2 SOFTWARE SPECIFICATIONS

The software specifications in order to execute the project has been listed down in the below table. The requirements in terms of the software that needs to be preinstalled and the languages needed to develop the project has been listed out below.

Table 3.1.2 Software Specifications

FRONT END	Streamlit
BACK END	PyPDF2, spaCy or NLTK.

DATABASE	PostgreSQL
DEPLOYMENT	AWS, Azure and Google Cloud

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3.2 SYSTEM ARCHITECTURE
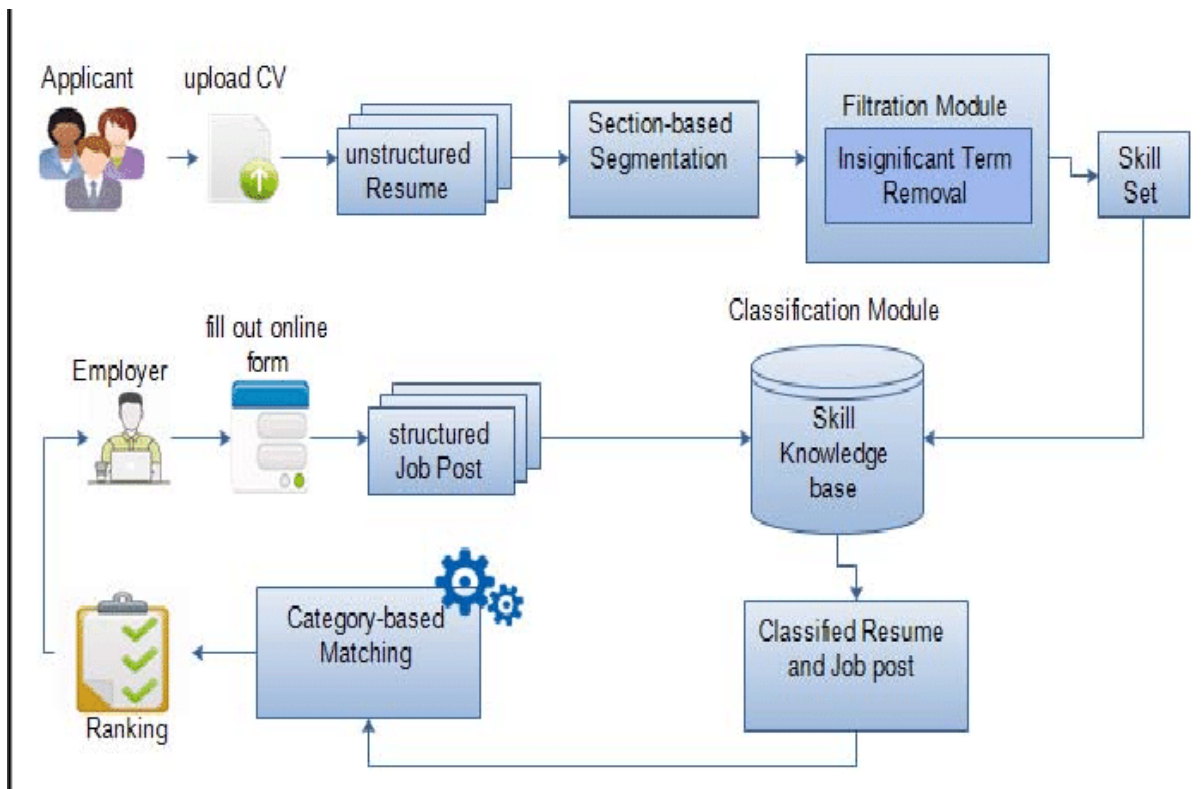
Fig 3.1 System Architecture

PRE-PROCESSING

Pre-processing is a critical step in the development of a Smart Applicant Tracking System (ATS) to ensure data is clean, structured, and ready for analysis or machine learning tasks. The process begins with data collection, where resumes and job descriptions are gathered in various formats, such as PDF, Word, and plain text. Next, data parsing is performed using libraries like PyPDF2 for PDF

resumes, python-docx for Word documents, and standard text processing for plain text files. Following parsing, the extracted text undergoes cleaning to remove unnecessary elements like special characters, extra whitespace, and non-textual data. Tokenization then breaks down the text into individual words or tokens, and stop words (common words that add little value to text analysis) are removed. Lemmatization or stemming is applied to reduce words to their base or root form, enhancing consistency in data representation. Named entity recognition (NER) is used to identify and classify key information such as names, dates, and locations. Finally, vectorization transforms the cleaned and processed text into numerical representations suitable for machine learning algorithms, ensuring the data is well-prepared for the subsequent stages of resume matching and candidate evaluation within the ATS.

TRAINING SET

Creating an effective training set is essential for developing a Smart Applicant Tracking System (ATS) that leverages machine learning and natural language processing (NLP) techniques. The process starts with collecting a diverse range of resumes and job descriptions from various sources, ensuring representation across different job roles, industries, and experience levels. Next, the data is annotated by labeling important sections such as contact details, work experience, education, skills, and job requirements in both resumes and job descriptions. Additionally, creating labeled examples involves matching resumes to job descriptions and assigning match scores to indicate how well each resume aligns with the job requirements. This annotated data is crucial for training machine learning models to effectively parse, match, and rank resumes, improving the overall accuracy and reliability of the ATS.

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PROJECT DESCRIPTION

The Smart Applicant Tracking System (ATS) is designed to streamline and enhance the resume evaluation process for job seekers and employers in the tech industry. Leveraging advanced machine learning and natural language processing (NLP) techniques, the system aims to provide accurate and insightful analysis of resumes against job descriptions, offering detailed feedback to improve the chances of candidate success.

4.1. SYSTEM OVERVIEW

The Smart ATS is a web-based application that allows users to upload their resumes and compare them against specific job descriptions. The system extracts key information from both the resume and the job description, processes this data using advanced algorithms, and generates a detailed report. This report includes a percentage match score, identifies missing keywords, and provides a refined profile summary to highlight strengths and areas for improvement.

4.2. CORE FEATURES

- **Resume Parsing and Extraction**: Utilizing tools like PyPDF2 for PDF parsing, the system extracts relevant details such as contact information, education, work experience, and skills from the uploaded resumes.

- **Job Description Analysis**: The system processes job descriptions to identify key requirements and qualifications, employing NLP techniques to understand the context and relevance of each term.

- **Matching Algorithm**: A sophisticated algorithm compares the extracted resume data with the job description, calculating a match score based on keyword relevance, skills, and experience. It also highlights missing keywords that are critical to the job description.

- **Profile Enhancement**: The system provides a refined profile summary, suggesting improvements and adjustments to better align the resume with the job description, thereby increasing the chances of selection.

4.3. TECHNOLOGY STACK

- **Frontend**: Built using Streamlit, which offers a user-friendly and interactive interface, making it easy for users to upload resumes, enter job descriptions, and view detailed analysis reports.

- **Backend**: Powered by advanced AI models from Google, incorporating machine learning and NLP techniques to ensure accurate data extraction, analysis, and matching. The backend also integrates Python libraries such as PyPDF2 for parsing and natural language processing libraries like spaCy or NLTK.

- **Database Management**: Utilizes relational databases such as PostgreSQL to store user data, resumes, job descriptions, and historical match results securely and efficiently.

- **Deployment**: Hosted on a cloud platform (e.g., AWS, Azure, or Google Cloud) to ensure scalability, reliability, and availability.

4.4. SECURITY AND COMPLIANCE

The Smart ATS prioritizes data security and user privacy. It employs robust encryption methods to protect sensitive user information during storage and transmission. Access control mechanisms are implemented to ensure that only authorized users can access specific data and functionalities. The system is designed to comply with relevant data protection regulations, such as GDPR, ensuring that users' personal information is handled responsibly and transparently. Regular security audits and updates are conducted to maintain high standards of data protection and system integrity.

CHAPTER 5

IMPLEMENTATION AND RESULTS

5.1 IMPLEMENTATION

The implementation of the Smart Applicant Tracking System (ATS) involves a structured approach encompassing design, development, testing, and deployment phases. Initially, the system architecture was designed with a modular approach, separating the frontend, backend, and database layers to ensure scalability, maintainability, and ease of integration with external systems. The user interface was developed using Streamlit to provide a responsive and interactive web experience, enabling users to easily upload resumes, input job descriptions, and view detailed analysis results. For the backend, Python was utilized to handle the processing and analysis of resumes and job descriptions, employing key libraries such as PyPDF2 for PDF parsing, python-docx for Word document processing, and spaCy for natural language processing tasks. The matching algorithm was developed using machine learning techniques to compare resumes with job descriptions, calculating match scores and identifying missing keywords. The entire system was then rigorously tested to ensure accuracy, performance, and security before being deployed on a cloud platform for scalability and reliability.

5.2. RESULTS

Upon deployment, the Smart ATS was tested with a diverse set of resumes and job descriptions to evaluate its performance and effectiveness. The system successfully parsed various resume formats, accurately extracting key information such as contact details, work experience, education, and skills. Job descriptions were effectively analyzed to identify essential requirements and qualifications. The matching algorithm demonstrated high accuracy in comparing resumes to job descriptions, providing relevant match scores and highlighting critical missing keywords. Users reported significant improvements in their

resumes based on the system's feedback, leading to better alignment with job requirements and increased chances of job selection. The user interface was praised for its ease of use and the clarity of the analysis reports. Overall, the implementation of the Smart ATS proved to be a robust solution for enhancing the resume evaluation process, offering valuable insights and recommendations to job seekers in the tech industry.

5.2.1 OUTPUT SCREENSHOTS

The output screen of the Smart Applicant Tracking System features a header section displaying the system's name and logo, followed by input fields allowing users to upload their resumes (in PDF or Word format) and input job descriptions. Upon submission, the screen presents analysis results, including a percentage match score, a list of missing keywords or qualifications, and a refined profile summary. Additionally, users have the option to download the analysis report in PDF format. A navigation menu at the bottom or side of the screen offers links to other system features, ensuring easy access to additional functionalities.
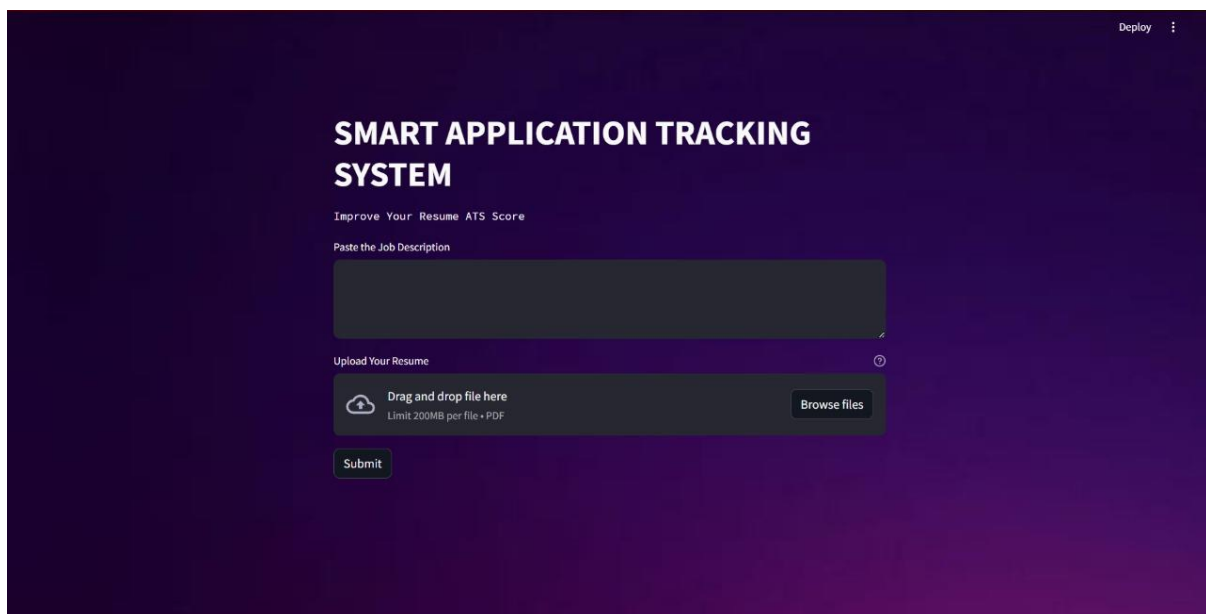
Fig 6.1 Smart Application Tracking System Front Page
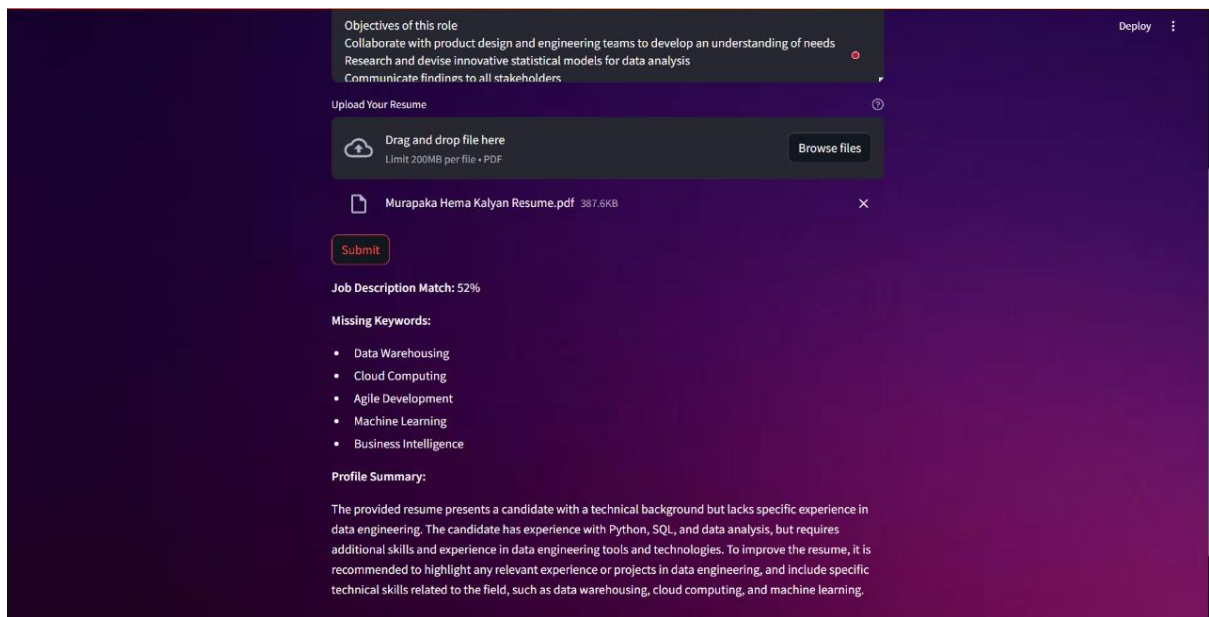
Fig 6.2 Short-Listing of the Resume

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CONCLUSION AND FUTURE ENHANCEMENTS

6.1 CONCLUSION

In conclusion, the Smart Applicant Tracking System (ATS) stands as a promising solution for revolutionizing the resume evaluation process within the tech industry. Through the integration of advanced machine learning and natural language processing techniques, the system offers users comprehensive analysis and feedback to optimize their resumes for better alignment with job requirements. Its implementation has demonstrated accuracy, efficiency, and user-friendliness, providing invaluable assistance to both job seekers and employers.

6.2 FUTURE ENHANCEMENTS

In the future, the Smart Applicant Tracking System (ATS) could undergo significant enhancements to further elevate its capabilities and effectiveness. These enhancements include the continuous refinement of the matching algorithm to incorporate more sophisticated machine learning models, the implementation of personalized recommendations based on user preferences and feedback history, integration with online job platforms and professional networking sites for seamless access to job listings and career resources, expansion of language support to accommodate users from diverse linguistic backgrounds, and the introduction of advanced analytics and reporting features to provide deeper insights into resume trends and system performance. These advancements would position the Smart ATS as a comprehensive and indispensable tool for both job seekers and employers, empowering individuals to navigate the job market with confidence while facilitating efficient and informed hiring decisions.

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