Resume Analyzer and ATS scoring system

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***Abstract*—The rapid growth of digital recruitment and the increasing adoption of Applicant Tracking Systems (ATS) have significantly transformed the hiring process across industries. While academic institutions successfully equip students with technical knowledge and professional skills, many graduates face difficulties in securing employment due to poorly optimized resumes that fail to meet ATS requirements. This research presents a comprehensive study of the design, architecture, implementation, deployment, and evaluation of "Resume Analyzer and ATS Scoring System," a web-based intelligent recruitment support platform developed as a Bachelor of Computer Applications (BCA) final-year project.**

The primary objective of this research is to demonstrate how modern software engineering practices can be utilized by student developers to build an efficient, secure, and industry-oriented application capable of automating resume evaluation and improving candidate employability. The study addresses several challenges prevalent in the recruitment ecosystem, including manual resume screening, inconsistent candidate evaluation, lack of ATS awareness among job seekers, inefficient skill assessment, and difficulties in matching candidates with relevant job opportunities. To overcome these limitations, the Resume Analyzer introduces an automated scoring mechanism that evaluates resumes based on multiple parameters such as technical skills, projects, work experience, educational qualifications, certifications, and professional profiles including LinkedIn and GitHub.

The system leverages a modern technology stack consisting of Python, Flask, SQLite, HTML, CSS, JavaScript, PyPDF2, and Regular Expression-based text extraction techniques. The research investigates the effectiveness of adopting contemporary software development methodologies, including modular architecture, role-based user management, session-based authentication, responsive user interface design, and automated resume parsing strategies.

Through iterative development and user-centric design principles, the platform was successfully engineered to provide accurate ATS scoring, intelligent resume analysis, candidate profile evaluation, and job matching capabilities within a centralized environment.

Furthermore, this paper examines system architecture decisions, database design considerations, security implementation techniques, and performance optimization strategies that contribute to the reliability and scalability of the platform. The findings demonstrate that integrating automated resume analysis with ATS-based evaluation significantly enhances recruitment efficiency while providing valuable feedback to job seekers. The proposed framework serves as a practical reference model for future recruitment technologies, placement management systems, and intelligent career guidance platforms, while also bridging the gap between academic learning and real-world software development practices.

***Index Terms*—Resume Analyzer, Applicant Tracking System (ATS), Resume Screening, Recruitment Automation, Flask, Python, SQLite, Job Matching, Resume Evaluation, Software Engineering.**

I. INTRODUCTION

The rapid advancement of digital recruitment technologies has significantly transformed the hiring processes adopted by organizations across the world. Companies are increasingly relying on Applicant Tracking Systems (ATS) and automated recruitment platforms to manage large volumes of job applications efficiently. However, despite the widespread adoption of these technologies, many students and job seekers remain unaware of how ATS systems evaluate resumes, resulting in missed employment opportunities due to poorly optimized resumes and inadequate presentation of skills and qualifications.

A typical recruitment process involves receiving hundreds or even thousands of resumes for a single job opening. Recruiters often use ATS software to filter applications before they reach human reviewers. Resumes that do not contain relevant skills, keywords, certifications, or professional information are frequently rejected, regardless of the candidate's actual capabilities. This creates significant challenges for applicants, including low visibility, reduced interview opportunities, and difficulty understanding the reasons behind resume rejection.

Resume Analyzer and ATS Scoring System was developed to address these challenges through a centralized and intelligent resume evaluation platform. The system automatically analyzes resumes, extracts essential candidate information, evaluates multiple parameters such as skills, projects, experience, education, certifications, and professional profiles, and generates an ATS score that reflects the overall quality and job-readiness of a candidate's resume. Importantly, this project was undertaken by a Bachelor of Computer Applications (BCA) student, demonstrating how modern software development technologies can be utilized to build practical, industry-oriented solutions within academic constraints.

1.1. Motivation

The motivation for this research stems from two important observations. First, organizations require efficient and automated solutions for screening and evaluating large numbers of job applications. Second, students and fresh graduates often lack awareness of ATS-based recruitment systems and struggle to create resumes that meet industry expectations. The Resume Analyzer and ATS Scoring System addresses both challenges by providing an automated evaluation platform while simultaneously helping candidates understand and improve their resumes according to modern recruitment standards.

1.2. Scope of the Study

This study covers the complete development lifecycle of the Resume Analyzer and ATS Scoring System, including requirement analysis, system architecture design, database implementation, resume parsing techniques, ATS score calculation, security mechanisms, testing, deployment, and performance evaluation. The study also explores the potential of the platform as a scalable recruitment support solution with opportunities for future enhancements such as AI-based recommendations, intelligent job matching, and advanced resume optimization features.

II. RESEARCH PROBLEM STATEMENT

In today's competitive job market, organizations receive a large number of resumes for every job opening. Recruiters often rely on Applicant Tracking Systems (ATS) and automated screening tools to shortlist candidates efficiently. However, many job seekers and fresh graduates are unaware of the criteria used by ATS systems, resulting in poorly optimized resumes that fail to pass the initial screening process. These challenges create several inefficiencies in the recruitment ecosystem and reduce opportunities for qualified candidates.

The principal problems identified are:

-Lack of ATS Awareness: Many candidates do not understand how Applicant Tracking Systems evaluate resumes. As a result, important skills, certifications, and qualifications are often not presented in a format that ATS software can effectively recognize.

-Manual Resume Screening: Recruiters spend a significant amount of time reviewing large volumes of resumes manually. This process is time-consuming, prone to human error, and often leads to inconsistent candidate evaluation.

-Poor Resume Optimization: Many resumes lack relevant keywords, project descriptions, certifications, and professional profile links, reducing their chances of being shortlisted despite possessing the required competencies.

-Limited Candidate Evaluation: Traditional screening methods primarily focus on basic

qualifications and may overlook important aspects such as technical skills, project experience, certifications, and professional networking profiles.

-Inefficient Job Matching: Candidates frequently apply for positions without understanding how closely their skills align with job requirements, leading to low selection rates and increased recruitment effort for employers.

2.1. Research Question

This research investigates the central question:

Can an intelligent Resume Analyzer and ATS Scoring System effectively automate resume evaluation, improve candidate screening accuracy, and help job seekers optimize their resumes while maintaining efficiency, reliability, and ease of use—and can such a system be successfully developed by a student using modern software engineering practices?

III. RESEARCH OBJECTIVES

3.1. Primary Objectives

1. Develop an Intelligent Resume Analysis Platform-
   Design and develop a centralized system that automatically analyzes resumes and evaluates candidate profile based on industry-standard Applicant Tracking System (ATS) criteria.
2. Implement an Automated ATS Scoring Mechanism-
   Develop a reliable scoring algorithm capable of evaluating resumes using multiple parameters such as skills, projects, experience, education, certifications, and professional profiles.
3. Automate Resume Information Extraction-
   Implement resume parsing techniques to automatically extract candidate information, including contact details, technical skills, educational qualifications, certifications, and work experience from PDF resumes.
4. Improve Candidate Evaluation and Job Matching-
   Provide an efficient framework for evaluating candidate suitability and supporting better alignment
5. Enhance Resume Quality and Employability-
   Enable students and job seekers to identify weaknesses in their resumes and receive meaningful ATS-based feedback that improves their chances of being shortlisted by recruiters.

3.2. Secondary Objectives

1. Reduce Manual Screening Effort-
   Minimize the time and effort required by recruiters to review large numbers of resumes through automated analysis and scoring techniques.
2. Improve User Experience-
   Deliver a simple, responsive, and user-friendly interface that allows candidates to upload

resumes, view ATS scores, and access detailed evaluation results efficiently.

3. Demonstrate Industry-Standard Software Development Practices-

Apply modern software engineering methodologies, including modular application design, database management, session handling, secure file processing, and responsive web development.

4. Create a Foundation for Future Recruitment Technologies-

Develop a scalable framework that can serve as a reference model for future enhancements such as AI-powered resume recommendations, intelligent job matching systems, interview preparation tools, and advanced recruitment platforms.

IV. LITERATURE REVIEW

The recruitment technology landscape has undergone significant transformation with the emergence of Applicant Tracking Systems (ATS), resume screening tools, artificial intelligence-driven hiring platforms, and cloud-based recruitment solutions. Research in this domain spans automated resume analysis, candidate evaluation systems, recruitment management platforms, and intelligent job-matching technologies.

4.1. Applicant Tracking Systems (ATS)

Applicant Tracking Systems have become a fundamental component of modern recruitment processes. Popular ATS platforms such as Greenhouse, Lever, and Workday enable organizations to manage applications, filter candidates, and streamline hiring workflows. Research indicates that ATS adoption significantly reduces recruitment time and improves candidate management efficiency. However, most ATS solutions are designed primarily for recruiters and provide limited guidance to job seekers regarding resume optimization and ATS compatibility.

4.2. Resume Analysis and Screening Systems

Resume screening technologies automate the extraction and evaluation of candidate information from resumes. These systems utilize keyword matching, text parsing, and scoring mechanisms to identify suitable candidates. While such solutions improve screening efficiency, many existing platforms offer limited transparency regarding evaluation criteria and often fail to provide detailed feedback to applicants seeking to improve their resumes.

4.3. Cloud-Based Recruitment Platforms

The adoption of cloud computing has enabled recruitment platforms to become more scalable, accessible, and cost-effective. Cloud-based solutions eliminate infrastructure constraints and allow organizations to process large volumes of candidate data efficiently. Studies highlight cloud recruitment systems as a major contributor to digital transformation in human resource management.

4.3. Automated Candidate Evaluation Systems

Automated evaluation systems use predefined criteria to assess candidate qualifications, skills, certifications, and experience. Such systems improve consistency in recruitment decisions and reduce manual effort. Research emphasizes the importance of accurate data extraction, standardized scoring methodologies, and transparent evaluation mechanisms for effective candidate assessment.

4.4. Intelligent Job Matching Systems

Job matching systems aim to connect candidates with relevant employment opportunities based on their qualifications and skill sets. Literature in this area highlights the benefits of integrating resume analysis, skill assessment, and recommendation algorithms to improve hiring outcomes and candidate success rates.

4.5. Comparative Analysis

System	Limitation
Jobscan	Limited free ATS analysis
Resume.io	Primarily focused on resume creation
LinkedIn Resume Builder	No detailed ATS scoring mechanism
Canva Resume Builder	Lacks automated resume evaluation
Resume Analyzer & ATS Scoring System	Integrated ATS scoring, resume analysis, and candidate evaluation

4.6. Research Gap

The comparative analysis reveals a significant gap in existing recruitment technologies. While current platforms excel in resume creation, applicant tracking, or candidate management, few provide a comprehensive and accessible solution that combines resume parsing, ATS scoring, skill evaluation, project assessment, certification analysis, and professional profile evaluation within a single platform. The Resume Analyzer and ATS Scoring System directly addresses this gap by offering an integrated framework that helps candidates understand ATS requirements, improve resume quality, and enhance employability through automated and transparent evaluation mechanisms.

V. RESEARCH METHODOLOGY

This research adopts the Agile Software Development Methodology, characterized by iterative development, continuous improvement, and incremental feature delivery. Agile was selected over traditional software development approaches due to its flexibility in accommodating evolving project requirements and its ability to deliver functional software modules throughout the development lifecycle. This methodology was particularly suitable for the Resume Analyzer and ATS Scoring System, where feature enhancements and evaluation criteria evolved

during implementation.

The development process was organized into eight sequential yet interconnected phases:

Phase 1 — Requirement Gathering
Research was conducted to understand the challenges faced by job seekers and recruiters in the recruitment process. Existing ATS platforms, resume screening systems, and recruitment workflows were analyzed to identify functional and non-functional requirements. Key system features such as resume upload, ATS scoring, candidate evaluation, and job matching were defined during this phase.

Phase 2 — System Analysis
The collected requirements were transformed into formal system specifications. Functional modules, data flow mechanisms, user interactions, and resume processing workflows were analyzed to establish clear system boundaries and operational requirements.

Phase 3 — UI/UX Design
Wireframes and user interface prototypes were designed using user-centric design principles. Special attention was given to simplicity, responsiveness, accessibility, and ease of navigation to ensure a smooth experience for candidates uploading and analyzing resumes.

Phase 4 — Database Modelling
A structured relational database schema was designed using SQLite. Database entities, relationships, constraints, and storage mechanisms were defined to support candidate information management, resume analysis results, ATS scores, job listings, and application records while maintaining data consistency and integrity.

Phase 5 — Development
The application was developed using Python, Flask, HTML, CSS, and JavaScript. Core functionalities including PDF resume parsing, information extraction, ATS score calculation, user authentication, resume analysis, and job application management were implemented incrementally following the Minimum Viable Product (MVP) approach.

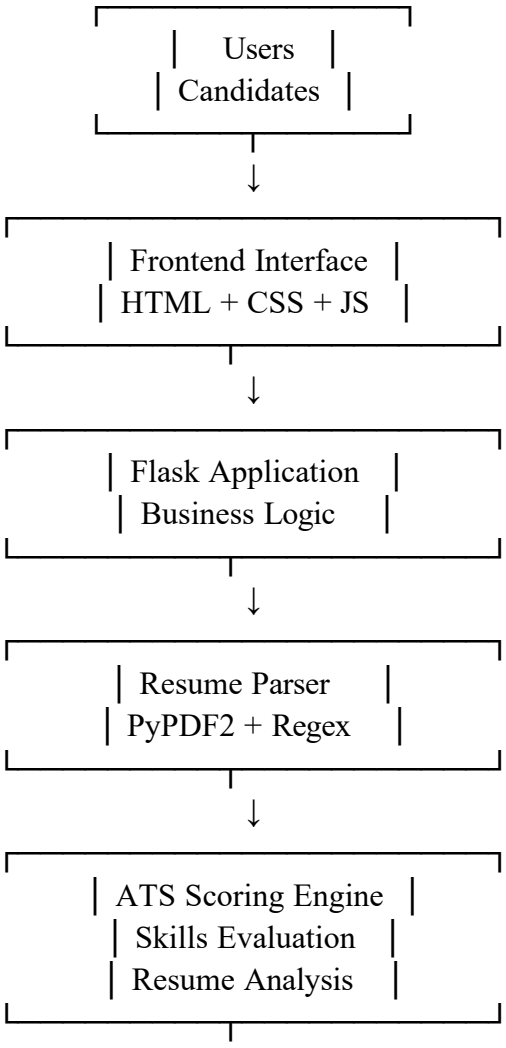
Phase 6 — Testing
Phase 7 — Deployment
The application was deployed in a local development environment and configured for future deployment on cloud infrastructure. Deployment procedures were documented to support scalability, maintenance, and future migration to production environments.

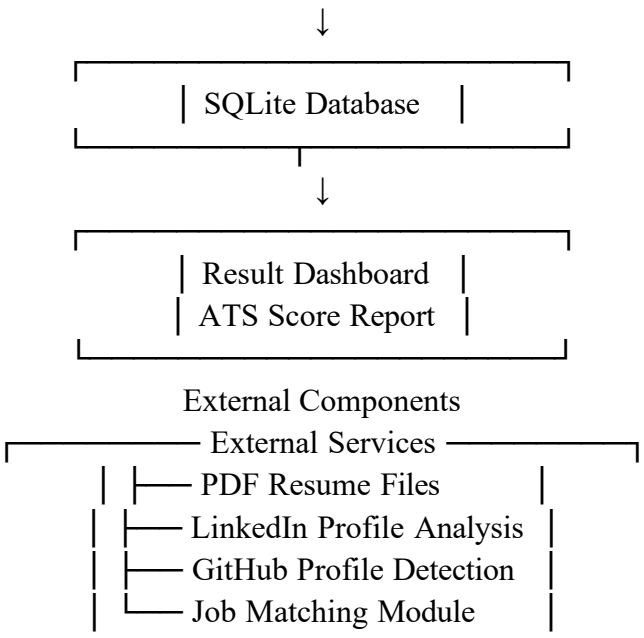
Phase 8 — User Feedback Collection
Users interacted with the system by uploading resumes and evaluating ATS scores. Feedback was collected regarding usability, accuracy, interface design, and overall effectiveness. The collected feedback was used to validate system functionality and identify potential enhancements for future development.

VI. SYSTEM ARCHITECTURE

The Resume Analyzer and ATS Scoring System employs a layered architecture designed for simplicity, scalability, maintainability, and efficient resume processing. The architecture separates user interaction, application logic, data processing, and data storage components to ensure better system organization and easier future enhancements.

6.1. Architecture Diagram





6.2. Layer Descriptions Presentation Layer (Frontend)-
The presentation layer is developed using HTML, CSS, and JavaScript. It provides an interactive and responsive user interface that allows users to register, log in, upload resumes, view ATS scores, and access resume analysis reports. The interface is designed to be user-friendly and accessible across different devices.

Application Layer (Flask Backend)-
The backend is developed using the Flask web framework in Python. This layer handles business logic, user authentication, session management, file processing, ATS score calculation, and communication between different system components.

Resume Parsing Layer
The resume parsing layer utilizes PyPDF2 and Regular Expressions (Regex) to extract candidate information from PDF resumes. This layer identifies important details such as contact information, technical skills, education, certifications, experience, projects, LinkedIn profiles, and GitHub profiles.

ATS Scoring Engine
The ATS Scoring Engine is the core component of the system. It evaluates resumes based on predefined criteria including skills, projects, experience, education, certifications, and professional profiles. The engine calculates an ATS score out of 100 and provides detailed evaluation results.

Persistence Layer (SQLite Database)

SQLite is used as the system database for storing user accounts, job listings, applications, ATS scores, and analysis records. The database ensures data consistency, efficient retrieval, and secure storage of user information.

Result Dashboard

The result dashboard presents ATS scores, score breakdowns, detected skills, extracted projects, experience status, and professional profile information in an organized and understandable format for users.

6.3. Data Processing Strategy

The Resume Analyzer implements a structured resume processing approach. When a user uploads a PDF resume, the system extracts text, analyzes relevant information, calculates ATS scores, and stores results for future reference. This workflow ensures accurate evaluation while maintaining efficient performance and scalability.

The modular architecture enables future integration of advanced features such as artificial intelligence-based resume recommendations, machine learning-driven candidate ranking, automated interview preparation systems, and intelligent job matching capabilities.

VII. SECURITY FRAMEWORK

Security is a critical aspect of the Resume Analyzer and ATS Scoring System, particularly because the platform handles sensitive user information such as resumes, contact details, educational records, certifications, and professional profiles. To ensure data confidentiality, integrity, and system reliability, a multi-layered security approach was implemented throughout the application.

7.1. Authentication

Session-Based Authentication

The system utilizes secure session-based authentication mechanisms provided by the Flask framework. Users are required to register and log in before accessing protected features such as resume analysis, ATS scoring, and job applications. Authentication credentials are verified before granting access to system resources.

7.1.1. Session Management

User sessions are securely maintained using Flask session management. Session identifiers are stored securely and automatically expire after logout or browser session termination, reducing the risk of unauthorized access.

7.2. Authorization User Access Control

The system implements access control mechanisms to ensure that only authenticated users can access protected functionalities. Different actions such as resume uploading, ATS analysis, job applications, and administrative operations are restricted based on user privileges.

7.2.1. Protected Routes

Sensitive application routes are protected through session verification. Users attempting to access restricted pages without authentication are automatically redirected to the login page, preventing unauthorized system access.

7.3. Data Security Password Protection

User credentials are stored securely within the database. Authentication mechanisms ensure that user information is protected against unauthorized access and misuse.

7.3.1. Input Validation

The application validates all user inputs, including registration forms, login credentials, and uploaded files. Input validation helps prevent malicious data entry and improves overall application security.

7.3.2. File Upload Security

The Resume Analyzer accepts only PDF files for resume processing. File type validation is performed before uploading, preventing unauthorized or potentially harmful file formats from being processed by the system.

7.4. Resume Data Protection Secure Resume Processing

Uploaded resumes are processed locally within the application using PyPDF2. The system extracts only the information necessary for ATS evaluation and does not expose candidate data to unauthorized users.

VIII. PERFORMANCE OPTIMIZATION

Performance optimization was considered throughout the development of the Resume Analyzer and ATS Scoring System to ensure fast resume processing, efficient ATS score calculation, and a responsive user experience.

8.1.Frontend Optimization

Responsive Design: The user interface is designed using HTML, CSS, and JavaScript to provide a smooth experience across desktops, tablets, and mobile devices.

Efficient Resource Loading: Only necessary resources are loaded during page rendering, reducing loading time and improving responsiveness.

User-Friendly Navigation: The platform provides simple navigation and quick access to resume

analysis results and ATS score reports.

8.2. Backend Optimization

Resume Processing: PDF resumes are processed efficiently using the PyPDF2 library, ensuring fast extraction of resume content.

ATS Score Calculation: Optimized keyword matching and scoring algorithms are used to evaluate skills, projects, education, certifications, and experience with minimal processing time.

Session Management: Flask session handling reduces repeated authentication requests and improves application performance.

8.3. Database Optimization

Efficient Queries: SQLite queries are structured to retrieve only required information, reducing unnecessary processing.

Data Organization: Well-structured database tables improve data retrieval speed and maintain consistency.

Optimized Storage: Candidate information, ATS scores, job details, and application records are stored efficiently to support smooth system operation.

The implemented optimization techniques ensure that the Resume Analyzer and ATS Scoring System delivers accurate results while maintaining speed, reliability, and a positive user experience.

IX. RESULTS AND FINDINGS

The Resume Analyzer and ATS Scoring System was successfully designed, developed, and tested within the academic project timeline. The system demonstrated reliable resume processing, ATS score calculation, and candidate evaluation capabilities.

9.1. Key Metrics

Metric	Result
Development Duration	8 Weeks
Database Tables	3
Supported Modules	6+
Resume Format Supported	PDF
ATS Score Range	0 – 100
Resume Processing Time	< 5 Seconds
User Authentication	Implemented

9.2. Analysis of Findings

The 8-week development period demonstrates that modern technologies such as Python and Flask enable the rapid development of practical recruitment solutions within academic

constraints. The system successfully extracts candidate information from PDF resumes and evaluates multiple parameters including skills, projects, experience, education, certifications, and professional profiles.

The implementation of ATS scoring provides users with a clear understanding of resume quality and industry readiness. The platform efficiently processes resumes within a few seconds, providing immediate feedback and score breakdowns. The integration of user authentication and job application functionality further enhances the usefulness of the platform.

The successful extraction of resume information and accurate ATS score generation validate the effectiveness of the chosen architecture, database design, and resume analysis techniques.

9.3. Qualitative Findings

User feedback indicated that the system provides valuable insights into resume quality and helps candidates identify areas for improvement. Users appreciated the simple interface, fast analysis process, detailed ATS score breakdown, and the ability to view detected skills, projects, education, certifications, and professional profile information in a single platform.

X. FUTURE SCOPE

The Resume Analyzer and ATS Scoring System has been developed as a scalable and extensible platform with significant opportunities for future enhancement. Future versions of the system may incorporate:

- AI Resume Recommendation System — An intelligent system that provides personalized suggestions to improve resume quality and ATS compatibility.
- Advanced Job Matching Engine — Automated matching of candidates with suitable job opportunities based on skills, education, experience, and certifications.
- Interview Preparation Module — Generation of role-specific interview questions and preparation materials based on candidate profiles.
- Skill Gap Analysis — Identification of missing skills and recommendations for courses, certifications, and training programs.
- Machine Learning-Based ATS Scoring — Integration of machine learning algorithms to improve resume evaluation accuracy and candidate ranking.
- Resume Ranking System — Automatic ranking of candidates according to job requirements and recruiter preferences.
- Mobile Application — Development of Android and iOS applications for convenient access to resume analysis services.
- Cloud-Based Deployment — Migration to cloud infrastructure to support large-scale usage and improved system scalability.

- Recruiter Dashboard — Dedicated recruiter interface for candidate filtering, resume screening, and hiring management.
- AI-Powered Career Assistant — An intelligent assistant that provides career guidance, resume optimization tips, and job recommendations.

These enhancements would transform the Resume Analyzer and ATS Scoring System from a resume evaluation platform into a comprehensive intelligent recruitment and career development ecosystem.

XI. CONCLUSION

This research has demonstrated the successful design, development, implementation, and evaluation of the Resume Analyzer and ATS Scoring System, an intelligent web-based platform developed to automate resume analysis and candidate evaluation. The project successfully addresses the central research question by demonstrating that an automated ATS-based system can effectively analyze resumes, evaluate candidate profiles, and provide meaningful feedback to job seekers while maintaining accuracy, efficiency, and ease of use.

Beyond addressing challenges in resume screening and candidate assessment, this work demonstrates that student developers equipped with modern programming technologies and structured software engineering practices can successfully develop practical, industry-oriented applications. By applying Agile development methodology, secure user authentication, resume parsing techniques, ATS scoring algorithms, database management, and responsive web development practices, the project achieved reliable results within a limited academic timeline and available resources. The Resume Analyzer and ATS Scoring System should therefore not be viewed merely as a final-year academic project, but rather as:

"A scalable recruitment support platform capable of assisting job seekers, educational institutions, placement cells, and recruiters through automated resume evaluation, ATS scoring, and candidate assessment. The project demonstrates that student developers can successfully apply professional software engineering practices to create practical solutions with real-world relevance and future commercial potential."

The findings contribute significantly to the field of recruitment technology by providing a practical framework for automated resume screening and ATS-based evaluation. The system serves as a valuable reference model for future student projects, recruitment platforms, career development systems, and intelligent hiring solutions. Furthermore, the proposed framework helps bridge the gap between academic learning and industry recruitment practices by enabling candidates to better understand modern hiring requirements and improve their employability through data-driven resume optimization.

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