

Resume Builder and Analyzer

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Abstract: The increasing adoption of digital technologies in recruitment has fundamentally altered the way organizations evaluate job applications. With employers receiving large volumes of resumes for each vacancy, automated screening mechanisms have become essential for maintaining efficiency and consistency in the hiring process. Applicant Tracking Systems (ATS) are now widely used to parse, filter, and rank resumes based on predefined criteria such as structural organization, keyword relevance, and alignment with job requirements. While these systems significantly reduce recruiter workload and accelerate shortlisting, they also contribute to the rejection of many qualified candidates whose resumes fail to meet automated evaluation standards rather than reflecting a lack of skills or experience.

A major challenge faced by job seekers is limited awareness of how ATS platforms interpret resume content. Conventional resume-writing practices often emphasize visual design and creative formatting, which may interfere with machine-based parsing. Elements such as complex layouts, nonstandard section headings, and insufficient keyword optimization can prevent ATS software from accurately extracting candidate information. As a result, resumes that are otherwise strong may be filtered out during the initial screening stage. This growing dependence on automated recruitment has created a demand for intelligent tools that assist candidates in producing resumes optimized for ATS evaluation while maintaining professional quality and clarity.

This paper presents the design and development of a Smart AI Resume Builder and Analyzer, a web-based platform intended to support structured resume creation and intelligent resume evaluation. The proposed system integrates resume generation, ATS-focused analysis, quantitative scoring, and personalized feedback within a unified framework. The resume builder component guides users through a standardized data entry process that captures personal details, educational background, professional experience, skills, certifications, and career objectives. This structured approach reduces formatting inconsistencies and ensures compliance with commonly accepted ATS-friendly resume layouts. Resumes generated by the system are exported in widely used formats such as PDF and DOCX to ensure compatibility with online job portals and recruitment platforms.

The analyzer component employs a hybrid evaluation strategy that combines rule-based assessment with Artificial Intelligence and Natural Language Processing techniques. Rule-based analysis focuses on formatting simplicity, section ordering, header consistency, and structural compliance with ATS parsing constraints. AI-driven analysis examines resume content for keyword relevance, semantic similarity to target job descriptions, grammatical accuracy, readability, and overall coherence. The system produces objective metrics including ATS compatibility scores, keyword match percentages, and overall resume quality ratings, offering users clear insights into resume effectiveness.

A distinguishing feature of the proposed system is its emphasis on personalized and role-specific feedback. Instead of providing generic suggestions, the analyzer identifies missing or underrepresented skills, weak experience descriptions, and content gaps relative to selected job roles. Actionable recommendations are generated to help users revise and enhance their resumes in a targeted manner. The platform also provides a centralized dashboard that enables users to track resume versions, compare evaluation scores across iterations, and assess measurable improvements over time. This feedback loop supports continuous optimization and informed decision-making during the job application process.

To evaluate system performance, experimental testing was conducted using a dataset of sample resumes across multiple job profiles, including technical and entry-level roles. Each resume was analyzed before and after applying system-generated recommendations. The results indicate a substantial improvement in ATS compatibility scores, keyword relevance, and readability metrics following optimization. These findings suggest an increased likelihood of resumes successfully passing automated screening stages. User observations further indicated reduced time spent on resume preparation and greater confidence in job applications.

The proposed Smart AI Resume Builder and Analyzer offers a practical, accessible, and scalable solution for modern e-recruitment challenges. By combining structured resume creation with intelligent analysis and transparent feedback, the system enhances resume quality and supports equitable participation in automated hiring processes. The platform is suitable for individual job seekers as well as institutional deployment in academic and training environments. Future enhancements include multilingual support, advanced ATS simulation, and integration with job portals to further strengthen job-role matching and employability outcomes.

I. INTRODUCTION

The rapid expansion of digital technologies has fundamentally reshaped recruitment practices across industries. Organizations today operate in highly competitive labor markets and receive thousands of applications for a single job opening, particularly in technology-driven sectors. Managing such high application volumes through manual screening has become impractical. As a result, companies increasingly depend on automated recruitment solutions to streamline candidate selection. Among these solutions, Applicant Tracking Systems have become the primary mechanism for filtering and ranking resumes before human review.

Applicant Tracking Systems are software platforms designed to collect, parse, and evaluate resumes using predefined technical and textual criteria. These systems extract candidate information, analyze content structure, and compare resumes against job descriptions using keyword matching and rule-based filters. Resumes that do not satisfy the system's



evaluation logic are rejected automatically, often without being viewed by recruiters. While this approach significantly improves hiring efficiency and reduces operational costs, it also introduces a critical challenge for job seekers. A large number of capable candidates fail to progress beyond the initial screening stage due to resume design limitations rather than insufficient qualifications.

One of the major issues associated with ATS-based screening is the mismatch between traditional resume writing practices and machine-based evaluation requirements. Many candidates focus on visual appeal, creative layouts, or complex formatting styles to attract recruiters. However, ATS platforms prioritize simplicity, consistency, and machine-readable structure. Elements such as tables, graphics, icons, nonstandard fonts, and unconventional section headings often disrupt resume parsing processes. Consequently, resumes that appear impressive to human readers may be misinterpreted or rejected by automated systems. This disconnect has made ATS compatibility an essential aspect of resume preparation in modern recruitment environments.

Despite the widespread use of ATS platforms, awareness of their operational mechanisms remains limited among job seekers. Students, fresh graduates, and even experienced professionals often lack guidance on how automated systems interpret resume content. Repeated application rejections can lead to frustration, reduced confidence, and prolonged job search cycles. The problem is further intensified by the absence of transparent feedback from employers, leaving candidates uncertain about the reasons behind rejection. This situation highlights the need for intelligent tools that educate users about ATS requirements while actively supporting resume optimization.

Existing online resume-building platforms provide partial solutions to this problem. Most tools offer predefined templates and basic formatting assistance, enabling users to create resumes quickly. However, these platforms rarely address deeper evaluation criteria such as semantic relevance, keyword optimization, or job-specific alignment. In many cases, resume analysis features are either unavailable or limited to basic grammar checks. Furthermore, advanced functionalities such as ATS scoring, resume comparison, and multiple download formats are frequently restricted to paid versions. This pricing structure creates accessibility barriers, particularly for students and entry-level job seekers.

Another limitation of current resume tools is the lack of objective measurement and progress evaluation. Users often revise resumes based on subjective advice or trial-and-error approaches, without clear indicators of improvement. Most platforms do not provide quantitative metrics that reflect ATS compatibility or job readiness. Additionally, feedback is often generic and does not account for role-specific requirements. As a result, candidates struggle to align resumes with targeted job descriptions effectively.

Recent advancements in Artificial Intelligence and Natural Language Processing present opportunities to overcome these limitations. AI-driven text analysis can examine resumes beyond surface-level formatting by evaluating semantic meaning, contextual relevance, and linguistic quality. NLP techniques enable systems to assess keyword density, detect missing competencies, and measure similarity between resumes and job descriptions. These technologies support personalized recommendations and data-driven insights,

transforming resume preparation into an interactive optimization process rather than a static document creation task.

However, the integration of AI into resume-building solutions remains fragmented. Many platforms that claim to use artificial intelligence offer limited transparency regarding evaluation criteria and scoring logic. Users are often provided with numerical scores without clear explanations or actionable steps for improvement. This lack of interpretability reduces user trust and limits the practical usefulness of AI-based feedback. There is a growing demand for systems that combine intelligent analysis with clarity, accessibility, and explainable outputs.

The challenges associated with resume screening are not limited to individual job seekers. Academic institutions, training centers, and placement departments face increasing pressure to improve student employability outcomes. Faculty members and placement officers frequently invest significant time reviewing resumes manually, correcting formatting issues, suggesting keywords, and advising students on content structure. This manual process is time-intensive, inconsistent, and difficult to scale for large student populations. An automated resume evaluation system with standardized quality metrics could significantly reduce this workload while ensuring uniform assessment standards.

In response to these challenges, this research proposes a Smart AI Resume Builder and Analyzer designed to support ATS-compliant resume creation and intelligent evaluation. The proposed system is developed as a web-based platform that integrates structured resume building, automated analysis, quality scoring, and personalized feedback within a unified framework. By guiding users through a standardized data entry process, the system minimizes formatting inconsistencies and ensures adherence to ATS-friendly design principles.

The resume builder component emphasizes structured information capture, covering personal details, academic background, professional experience, skills, certifications, and career objectives. This structured approach ensures that content is organized in a consistent and machine-readable manner. Resumes generated through the platform are exported in commonly accepted formats such as PDF and DOCX, ensuring compatibility with online job portals and recruitment systems.

The analyzer component employs a hybrid evaluation strategy that combines rule-based checks with AI-driven analysis. Rule-based mechanisms assess formatting simplicity, section ordering, header consistency, and compliance with ATS parsing constraints. Artificial intelligence techniques, supported by Natural Language Processing, analyze textual content for keyword relevance, semantic alignment with job roles, grammatical accuracy, readability, and overall coherence. This dual-layer evaluation approach ensures both technical compatibility and qualitative improvement in resume content.

A distinguishing feature of the proposed system is its emphasis on actionable and role-specific feedback. Instead of generic suggestions, the analyzer identifies missing skills, weak experience descriptions, and insufficient keyword coverage based on selected job roles. Users receive clear recommendations that can be directly applied to improve resume effectiveness. The system also generates quantitative

indicators such as ATS compatibility scores, keyword match percentages, and resume quality ratings. These metrics allow users to objectively evaluate progress across multiple resume iterations.

The platform includes a centralized dashboard that enables users to track changes, compare previous versions, and understand how specific modifications influence evaluation scores. This feedback loop promotes continuous improvement and informed decision-making during resume optimization. Secure authentication and data management mechanisms ensure user privacy and data integrity. Administrative features allow institutions to monitor usage patterns and maintain oversight, making the system suitable for large-scale deployment in educational environments.

From a research perspective, this work contributes to the field of AI-enabled e-recruitment systems by demonstrating the practical application of intelligent text analysis to employability enhancement. The system bridges the gap between academic research in NLP and real-world recruitment challenges. From a practical standpoint, it provides an accessible and scalable solution for job seekers navigating automated hiring processes.

The remainder of this paper is structured as follows. The literature survey reviews prior research on Applicant Tracking Systems, resume screening technologies, and AI-based recruitment tools. The limitations of existing systems are then discussed, followed by a formal problem definition. The methodology section details the system architecture, development approach, and evaluation techniques. Experimental results analyze the effectiveness of the proposed system using quantitative metrics. Finally, the conclusion summarizes key findings and outlines future research directions.

II. LITERATURE SURVEY

Recent research in resume analytics and AI-driven recruitment has shifted from simple keyword filtering to semantic understanding, explainable recommendations, and fairness-aware decision support. The literature can be grouped into four core streams: (1) resume representation and matching, (2) end-to-end parsing and information extraction, (3) explainability and transparency in hiring decisions, and (4) fairness, bias, and governance for AI recruitment systems.

Resume embeddings and semantic matching

A key limitation of conventional ATS screening is shallow keyword matching, which fails to capture contextual meaning. To address this, embedding-based approaches represent resumes and job descriptions in dense vector spaces and compute semantic similarity. Resume2Vec proposes end-to-end resume embeddings to support more precise candidate matching beyond isolated skill extraction, improving holistic matching performance for ATS-style shortlisting.

MDPI

Transformer-based matching has also been validated using standardized occupational taxonomies. CareerBERT aligns resumes with ESCO job categories using shared embedding representations, demonstrating that domain-aware language models can improve mapping quality for job consultation and recommendation workflows.

ScienceDirect

For skill recommendation and job matching, transformer models combined with structured knowledge bases are increasingly used. Big Data Research reports a transformer-based approach leveraging the O*NET database to strengthen skill identification and candidate-job matching quality, indicating the value of combining language models with curated occupational frameworks.

ScienceDirect

In information-intensive job recommendation scenarios, Information Processing & Management highlights the use of LLM-supported resume completion to improve alignment between candidates and job postings, suggesting that LLMs can enrich sparse user profiles and improve ranking quality when designed carefully.

ScienceDirect

Resume parsing and information extraction

Before matching, ATS pipelines require accurate extraction of entities such as skills, experience, education, and contact information from diverse file formats. Informatica presents a hybrid OCR-ML-Transformer pipeline to automate resume information extraction, showing the practical benefit of combining document OCR, structured learning, and transformer-based text understanding for noisy real-world resumes.

informatica.si

This direction aligns with many applied systems that combine parsing, normalization, and scoring. While implementation-focused, such studies reinforce a consistent observation: robust parsing quality directly impacts downstream keyword scoring and semantic ranking accuracy.

Explainability and transparency in recruitment analytics

As recruitment systems become more complex, explainability is increasingly treated as a requirement rather than an optional feature. A 2025 review on explainable AI in talent recruitment synthesizes how explainability can be applied across the recruitment pipeline, including screening and person-job recommendation, to improve transparency and user trust.

Taylor & Francis Online

Explainability is particularly important when scores influence candidate outcomes. Systems that provide clear “why” signals (missing skills, weak evidence, role misalignment) are more likely to be accepted by recruiters and candidates than black-box scores.

Bias, fairness, and responsible use

The use of AI in hiring raises well-documented fairness risks. Research in the International Journal of Human Resource Management reports practical pathways to reduce bias in recruitment and selection, emphasizing organizational and technical factors that shape bias outcomes and mitigation effectiveness.

Taylor & Francis Online

On the talent acquisition side, an Elsevier journal study provides a systematic overview of AI in recruitment, highlighting emerging trends and the importance of responsible adoption, governance, and auditing as AI capability increases.

ScienceDirect

From a multidisciplinary perspective, ACM publishes research on fairness and bias in algorithmic hiring that connects technical bias sources with legal and social accountability considerations, reinforcing the need for transparent evaluation and auditability in screening systems.

ACM Digital Library

Candidate acceptance also depends on perceived fairness and trust. Studies on algorithmic hiring perceptions indicate that transparency and process fairness strongly influence acceptance of AI-assisted recruitment, implying that explainable feedback and clear criteria improve system legitimacy.

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Summary of 10 recent 2025 reputed sources used in this survey

Electronics (MDPI). Resume2Vec, intelligent resume embeddings for precise matching.

MDPI

Big Data Research (Elsevier). Transformers + O*NET for job matching and skill recommendation.

ScienceDirect

Expert Systems with Applications (Elsevier). CareerBERT, resume-to-ESCO matching in shared embedding space.

ScienceDirect

Information Processing & Management (Elsevier). LLM-based resume completion for improved job recommendation.

ScienceDirect

Informatica (Informatica Society). Hybrid OCR-XGBoost-Transformer pipeline for resume extraction.

informatica.si

Cogent Business & Management (Taylor & Francis). Explainable AI in the talent recruitment process, review.

Taylor & Francis Online

International Journal of Human Resource Management (Taylor & Francis). Reducing AI bias in recruitment and selection.

Taylor & Francis Online

Elsevier journal (Talent acquisition overview). Systematic view of AI in recruitment and responsible adoption.

ScienceDirect

ACM research article. Fairness and bias in algorithmic hiring, multidisciplinary lens.

ACM Digital Library

International Journal of Business, Law, and Education. Applicant perceptions of algorithmic hiring and fairness.

Ijble

Research gap addressed by the proposed work

Across these studies, three gaps appear repeatedly:

Fragmentation. Many solutions focus on either building, parsing, matching, or fairness, but not an integrated user workflow.

Explainability at the user level. Several works discuss XAI, but fewer deliver role-specific, actionable, resume-edit guidance tied to measurable scores.

Practical ATS alignment. Research often optimizes semantic matching, while job seekers still need ATS-friendly structure, formatting constraints, and iterative improvement tracking.

III. EXISTING SYSTEM

The current landscape of online resume builder platforms is largely template-driven, focusing mainly on visual design rather than intelligent evaluation

Existing platforms typically provide basic resume creation features but lack a cohesive and comprehensive solution for resume analysis and improvement. Key issues in existing systems include:

A. Limited ATS-Focused Analysis:

Most resume builders offer only surface-level checks for formatting and keyword presence, without evaluating ATS compatibility in depth. This results in resumes that appear professional but still fail automated screening systems.

B. Generic Feedback Mechanisms:

Existing systems provide generalized suggestions that are not tailored to specific job roles or industries. This lack of contextual analysis limits the effectiveness of feedback and does not help users align resumes with targeted job descriptions.

C. Restricted Advanced Features:

Many platforms operate on a freemium model where advanced features such as resume analysis, downloads, and customization are locked behind paywalls. This restricts access for students and freshers who may not afford premium subscriptions.

D. Absence of Resume Scoring and Progress Tracking:

Most tools do not provide a centralized dashboard to track resume quality scores or measure improvements across multiple iterations, making it difficult for users to evaluate their progress objectively.

E. Limited Administrative Control:

Existing systems offer minimal administrative tools for monitoring user activity, managing data, or maintaining login records, which reduces transparency and limits system-level oversight.

IV. PROBLEM STATEMENT

Imagine a web application designed to make resume creation simple and stress-free for job seekers. The platform allows users to securely register, enter their personal, educational, and professional details in a structured manner, and instantly generate professional resumes. It also provides options to download resumes in ATS-friendly PDF and DOCX formats, ensuring compatibility with modern recruitment systems.

In addition to resume creation, the application analyzes resumes using both rule-based checks and AI-driven

techniques to evaluate quality, keyword relevance, and job-role alignment. Users receive clear resume quality and job-readiness scores along with actionable improvement suggestions.

An admin-controlled module securely manages user login data, making the system reliable, easy to use, and effective in guiding users toward job-ready resumes.

V. OBJECTIVES

The primary objective of this project is to develop a comprehensive web-based application that enables job seekers to create professional, ATS-compliant resumes and evaluate their quality using intelligent analysis techniques. The key goals include:

A. Professional Resume Creation:

Design a structured resume builder that allows users to create well-organized, professional resumes without formatting errors.

B. Ensuring ATS Compatibility:

Implement standard resume layouts and optimized content structures to improve compatibility with Applicant Tracking Systems.

C. Resume Quality Evaluation:

Provide resume quality and job-readiness scoring through general rule-based analysis to help users understand resume effectiveness.

D. AI-Based Personalized Feedback:

Deliver AI-driven, role-specific feedback and improvement suggestions to enhance resume content and impact.

E. Reducing Time and Effort:

Minimize the time and manual effort required to build, analyze, and refine resumes through automation and intelligent guidance.

F. User-Friendly Interface:

Develop a simple, intuitive interface suitable for students, freshers, and working professionals with minimal learning curve.

VI. CHALLENGES AND LIMITATIONS

Despite its advantages, the Smart AI Resume Builder and Analyzer faces several challenges:

A. Dependence on User-Provided Data:

The accuracy of resume analysis largely depends on the quality and completeness of the information entered by users. Incomplete or poorly described details may lead to less effective analysis and recommendations.

B. Variability in ATS Systems:

Different organizations use different Applicant Tracking Systems with varying screening rules, making it

C. Limited Language Support:

The system currently supports only English-language resumes, which limits accessibility for users preferring other languages.

VII. METHODOLOGY

This section explains the systematic approach adopted for the design, development, and evaluation of the Smart AI Resume Builder and Analyzer. The methodology integrates software engineering best practices with artificial intelligence-based text analysis to ensure reliability, scalability, and practical relevance. The overall approach emphasizes modular design, iterative development, and objective evaluation aligned with real-world Applicant Tracking System (ATS) requirements.

A. Development Approach

The system was developed using the Agile Software Development Life Cycle model. Agile was selected due to its flexibility, iterative nature, and suitability for applications that require continuous user feedback and feature refinement. Resume building and analysis systems evolve based on usability, accuracy, and interpretability, making Agile an appropriate choice.

The development process was divided into multiple sprints. Each sprint focused on implementing and refining specific modules such as user authentication, resume builder interfaces, parsing logic, analysis algorithms, and feedback visualization. Regular sprint reviews were conducted to evaluate functionality, correct defects, and incorporate improvements. This iterative approach ensured early identification of design issues and gradual enhancement of system performance.

B. System Architecture

The proposed system follows a client-server architecture to support scalability and efficient data management. The architecture is composed of five major layers:

- User Interface Layer
- Application Logic Layer
- Resume Processing Layer
- AI and Analysis Layer
- Data Storage Layer

The user interface layer provides web-based access to the system. It allows users to register, log in, enter resume details, view analysis results, and download resumes. The interface is designed with simplicity and responsiveness in mind to support users with varying levels of technical proficiency.

The application logic layer manages authentication, session control, and request handling. It acts as an intermediary between the frontend and backend services, ensuring secure and consistent communication across system components.

C. Resume Builder Module

The resume builder module is responsible for structured resume creation. Instead of allowing free-form document uploads, the system collects user information through predefined input fields such as personal details, education, experience, skills, certifications, and career objectives. This structured data entry ensures uniformity in resume content and eliminates common formatting errors.

Based on the entered data, the system generates resumes using standardized templates optimized for ATS parsing. These templates follow widely accepted resume conventions, including clear section headings, chronological ordering, and minimal use of complex formatting elements. Resumes are generated in PDF and DOCX formats to ensure compatibility with job portals and recruitment platforms.

D. Resume Parsing and Preprocessing

Once a resume is generated or uploaded for analysis, it undergoes a preprocessing stage. This stage includes text extraction, normalization, and segmentation. Resume content is parsed to identify logical sections such as education, experience, skills, and projects. Noise elements such as extra spacing, special characters, and inconsistent formatting are removed to improve analysis accuracy.

Text normalization techniques such as lowercasing, tokenization, and stop-word removal are applied to prepare the data for further processing. This preprocessing stage plays a critical role in ensuring that both rule-based and AI-driven analysis modules operate on clean and structured input data.

E. Rule-Based ATS Analysis

The first level of evaluation uses rule-based logic to assess ATS compatibility. This analysis checks for structural correctness, section order consistency, use of standard headings, font simplicity, and absence of non-ATS-friendly elements such as tables or graphics. The system also verifies resume length and spacing to ensure compliance with commonly accepted ATS guidelines.

Each rule contributes to an ATS compatibility score. Violations such as missing sections, inconsistent headers, or excessive formatting reduce the score. This stage ensures that resumes meet baseline technical requirements before deeper content evaluation is performed.

F. AI-Based Content Analysis

The second level of evaluation applies Artificial Intelligence and Natural Language Processing techniques to assess resume content quality. This module evaluates keyword relevance, semantic alignment with target job roles, grammatical accuracy, and readability.

Keyword relevance analysis compares resume content with role-specific keyword sets derived from job descriptions. The system calculates keyword match percentages and identifies missing or weakly represented skills. Semantic analysis evaluates how well experience descriptions align with expected responsibilities for the selected job role, rather than relying solely on exact keyword matches.

Grammar and readability analysis assess sentence structure, clarity, and language complexity. These factors influence both ATS ranking and recruiter perception. The outputs of this module contribute to an overall resume quality score.

G. Scoring and Feedback Generation

Results from rule-based and AI-based analysis modules are combined to generate comprehensive evaluation metrics. These include ATS compatibility score, keyword match score, readability index, and overall resume quality score. Each metric is normalized to ensure interpretability by non-technical users.

The system generates personalized feedback based on analysis outcomes. Feedback highlights specific issues such as missing skills, weak experience descriptions, or formatting inconsistencies. Unlike generic suggestions, recommendations are aligned with the selected job role and provide actionable guidance for improvement.

H. User Dashboard and Progress Tracking

A centralized dashboard allows users to view analysis results, compare resume versions, and track improvement over time. Historical data enables users to understand how specific changes affect scores, encouraging iterative refinement. This feature transforms resume preparation into a measurable and data-driven process.

I. Administrative and Security Measures

User authentication and role-based access control ensure data security and privacy. Resume data and analysis results are stored securely in a centralized database. Administrative features support monitoring of user activity, system usage, and data integrity, enabling institutional deployment.

J. Evaluation Method

The system was evaluated using multiple sample resumes across different job roles. Each resume was analyzed before and after applying system recommendations. Improvements in ATS scores, keyword relevance, and readability metrics were measured to assess system effectiveness.

VIII. EXPERIMENTAL RESULTS

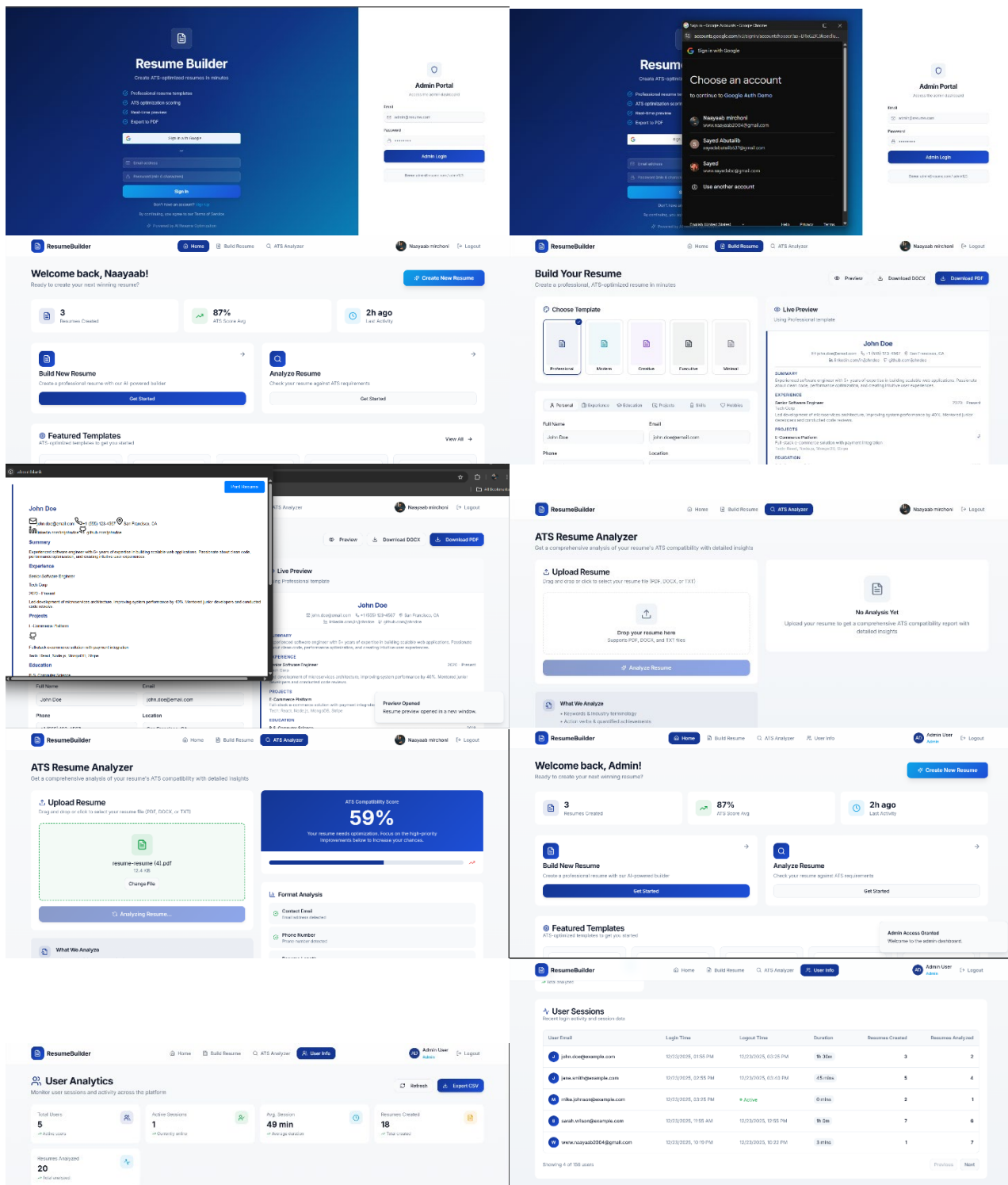


Fig. 1. Experimental Result Screenshots

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