

Screenify: AI Based Resume Analyzer

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Abstract

In the present employment landscape, the effectiveness of job applications is highly dependent on the ability of resumes to pass through Applicant Tracking Systems (ATS). Research indicates that nearly 75% of resumes are automatically rejected due to formatting errors, missing keywords, or lack of machine-readable structure. *Screenify* is an AI-powered Progressive Web Application (PWA) developed to provide intelligent, real-time feedback for resume optimization. The system integrates PDF parsing (via PDF.js), multi-dimensional scoring, feedback visualization, and secure cloud storage to evaluate resumes across categories such as content quality, structure, keyword alignment, and formatting.

Unlike existing tools, *Screenify* emphasizes accessibility through PWA features, offline readiness, Docker-based deployment, and a user-centric dashboard. Experimental validation with 20 diverse resumes across technical, managerial, and creative domains showed that ATS compatibility scores improved by an average of 23.4% after optimization. The system demonstrated 98% text extraction accuracy, an average response time of 1.8 seconds per resume, and 100% successful PWA installations across desktop and mobile platforms.

These findings establish *Screenify* as an effective and scalable solution to empower job seekers in optimizing their resumes, bridging the gap between human expectations and machine-based recruitment filtering.

Keywords: Resume Analyzer, Applicant Tracking System, AI Feedback, Progressive Web App, Resume Optimization, Employment Technology, Human-Computer

Chapter 1: Introduction to Automated Recruitment and ATS Impact

1.1 Background

The rapid evolution of digital technologies has profoundly transformed recruitment globally. Automated recruitment systems, particularly Applicant Tracking Systems (ATS), have become ubiquitous, with over 90% of Fortune 500 companies and numerous SMEs relying on such technology for initial candidate screening. ATS automate large-scale sorting and ranking of job applications by parsing resumes for content, format, and keywords before any human review occurs.

While the primary goal of ATS is operational efficiency and scalability, many job seekers remain unaware of the system's stringent input requirements. As a result, even highly qualified candidates can face automated rejection due to formatting issues, missing keywords, or non-standard resume structures. This phenomenon has created a significant barrier, especially for early-career candidates, graduates, and creative professionals, who may lack access to expert resume advice.

1.2 Problem Statement

The core challenge addressed by this research lies in bridging the gap between candidates' resume content and ever-evolving ATS filtering criteria. Traditional resume creation tools emphasize visual aesthetics or personal branding but neglect machine readability and compliance, often resulting in high rejection rates. This calls for intelligent, user-friendly tools that offer real-time, actionable feedback oriented to ATS algorithms' expectations without compromising the applicant's individuality and expression.

1.3 Research Motivation

This research aims to design, develop, and validate "Screenify," an AI-powered Progressive Web Application (PWA) capable of deconstructing, analyzing, and optimizing resumes to enhance ATS compatibility. Screenify integrates advanced text extraction, natural language processing, semantic matching, and accessibility features to provide comprehensive, user-centric resume evaluation and iterative improvement guidance. By democratizing access to ATS optimization, Screenify promises to reduce automated bias, empower diverse candidate pools, and improve employment success rates.

1.4 Research Objectives

- To analyze common ATS filtering mechanisms and identify key resume pitfalls.
- To develop a multi-layered parsing and scoring engine incorporating syntactic, semantic, and formatting features.
- To design an intuitive PWA interface ensuring offline access, multi-device compatibility, and real-time feedback.
- To empirically evaluate system accuracy, efficiency, usability, and employment impact through experimental and user studies.
- To explore ethical, fairness, and privacy implications in automated resume analysis.

1.5 Contributions

The proposed research contributes:

- A novel, publicly accessible tool supporting transparent, multi-dimensional resume analysis.
- Empirical validation on diverse resume datasets with robust quantitative and qualitative evaluations.
- Recommendations and design principles for future automated career-support systems.
- A platform for continued research integrating evolving AI methodologies with practical employability applications.

Chapter 2: Literature Survey and Theoretical Foundations

2.1 Evolution of Recruitment Practices

Historically reliant on manual resume screening and subjective judgment, recruitment has shifted towards data-driven automation for handling the exponential volume of online applications. ATS represent a key minimalist automation tool, parsing resumes for keywords, certifications, experience, and education, and ranking applicants based on algorithmic scores.

2.2 Applicant Tracking Systems: Architecture and Functionality

Popular ATS platforms like Taleo, Workday, and Greenhouse employ parsers that struggle with complex resume formats such as tables, embedded images, or infographics. Literature reveals accuracy disparities: simple text-based structured resumes report parsing accuracies upwards of 95%, while complex or creative formats fall well below 50%, leading to inequitable experiences.

2.3 Resume Optimization Tools and Gaps

Commercial software such as Jobscan and Resumeworded provides partial solutions focused mainly on

keyword matching or clarity scoring, typically behind subscription barriers. Open-source tools are either limited prototypes or non-user facing. None simultaneously address full parsing accuracy, semantic job matching, usability, accessibility, privacy, and deployment scalability.

2.4 Natural Language Processing and Semantic Matching

AI advances utilize bag-of-words, TF-IDF, and deep transformer-based models (such as BERT and GPT) to match resumes and job descriptions semantically. Academic studies validate improved ranking accuracy and candidate-job fit predictions but often sacrifice transparency and demand resource-heavy environments unsuitable for lightweight end-user applications.

2.5 User Experience and Accessibility in Career Tools

Studies in HCI emphasize that transparent, interpretable, and engaging feedback mechanisms improve candidate adoption and job search motivation. PWAs enable persistent usability on mobile and desktop platforms, especially in connectivity-limited settings, with offline-first architecture significantly enhancing uptake in underserved communities.

2.6 Ethical, Privacy, and Fairness Considerations

Automated hiring introduces potential biases—gender, race, age—and privacy risks due to résumé data automation. Researchers highlight the necessity for transparent, bias-mitigated models and privacy-centric designs aligned with regulatory frameworks such as GDPR and CCPA.

3. Literature Review The Role of ATS in Recruitment

ATS platforms now filter resumes for more than 90% of Fortune 500 companies, relying on strict parsing rules. Common rejection factors include non-standard formatting, embedded images, and missing keywords. While structured resumes perform well (95%+ parsing accuracy), creative resumes with graphical elements often see less than 50% parsing accuracy, causing inequity in hiring outcomes.

Existing Resume Optimization Tools

Commercial solutions like Jobscan (keyword matching) and Resumeworded (clarity scoring) are popular but tend to offer paywalled, limited scope and lack adaptability or research validation. Most tools emphasize keywords to the detriment of structural and formatting analysis, leaving critical ATS compatibility factors unaddressed.

AI and ML for Resume Analysis

Recent academic studies employ NLP and machine learning for semantic alignment and candidate ranking, yet these approaches require extensive resources and labeled datasets. Lightweight, end-user applications remain rare. HCI research further highlights the need for actionable, interpretable feedback, which is lacking in most automated tools. Screenify was explicitly designed to fill this shortfall, combining multi-category scoring with implementable suggestions.

Accessibility and PWA Integration

PWAs have emerged as a solution for career platforms, offering up to 40% improved adoption rates in low-connectivity regions. Docker-based deployment ensures consistent results, reproducibility, and scalability in research and production use cases.

Research Gaps Addressed by Screenify

Screenify tackles the key gaps—free access, comprehensive evaluation (structure, formatting, keywords), actionable feedback, and validation capacity—unlike closed, proprietary systems.

3.1 Overall System Architecture

Screenify employs a modular, layered architecture encompassing Presentation, Application, and Data la-

yers. This design ensures separation of concerns, ease of maintenance, scalability, and security throughout the software lifecycle.

- **Presentation Layer:** Developed using React 19, TypeScript, and Tailwind CSS for responsive, accessible UI across desktops, tablets, and mobile devices. It features drag-and-drop resume upload, instant ATS score visualization, and actionable feedback cards.
- **Application Layer:** Core parsing and AI logic implemented in JavaScript and TypeScript. PDF.js handles robust PDF text extraction; customized NLP pipelines segment resumes into recognized sections; ATS compliance rules applied via heuristic algorithms generate multi-category scoring.
- **Data Layer:** Resume data and session states are securely stored using Puter's KV store with AES encryption. Version control enables iterative improvements and historical comparisons. User authentication powered by Puter Auth ensures privacy and access control.

3.2 Functional Workflow

1. **User Authentication and Session Management:** Ensures secure login, session persistence, and multi-device synchronization.
2. **Resume Upload and Extraction:** Users upload PDF resumes via the UI. PDF.js extracts textual content, preserving formatting where possible.
3. **Parsing and Segmentation:** NLP and regex techniques identify key resume sections such as Education, Experience, Skills, Certifications, and Contact Details.
4. **Scoring Engine:** Multi-faceted ATS scoring evaluates structure, keyword presence/weight, consistency, and formatting adherence. Scores are presented numerically and visually.
5. **Feedback and Suggestions:** Based on low-scoring categories, Screenify provides targeted suggestions to improve ATS compatibility, including keyword recommendations linked to job descriptions.
6. **Job Matching:** Users optionally upload job descriptions; cosine similarity and TF-IDF analyses calculate semantic alignment scores.
7. **Versioning and History:** Users can save multiple resume versions, compare scores, and track improvements over time.
8. **PWA and Offline Support:** Full progressive web app support permits resume checks and feedback generation offline after initial sync.

3.3 System Components and Technologies

- **Frontend:** React 19, TypeScript, Tailwind CSS, React Router, Zustand state management.
- **AI and NLP Libraries:** PDF.js for PDF extraction, custom heuristic parsers, TF-IDF vectorizer.
- **Storage and Backend:** Puter KV store with encrypted client-side storage; Puter Auth for authentication.
- **Packaging and Deployment:** Docker containers for ease of deployment, scaling, and environment reproducibility.
- **PWA Features:** Service Workers, IndexedDB caching, installability across platforms.

3.4 Detailed Parsing Algorithms

- **Section Detection:** Uses regex for common headers (Education, Experience), coupled with token frequency analysis to adapt to non-standard headers.
- **Keyword Extraction:** TF-IDF calculated against training corpus of job descriptions; trait weighting adjusts recommendation impact.
- **Formatting Rules Checks:** Style enforcement algorithms flag non-standard fonts, presence of images

or tables, inconsistent bullet points, and improper section organization, all of which reduce ATS compatibility.

3.5 Security and Privacy

- **Data Handling:** All parsing occurs on client side; sensitive data never sent unencrypted.
- **Encryption:** Resume content encrypted before storage using AES-256 symmetric keys.
- **Authentication:** Token-based authentication with OAuth 2.0 compatibility ensures secure user sessions.
- **Compliance:** Designed in accordance with GDPR and CCPA principles to protect user privacy.

3.6 Deployment and Scalability

- Docker enables consistent deployment for cloud or on-premises scenarios, with continuous integration and continuous delivery (CI/CD) pipelines for regular updates.
- PWA architecture supports offline use cases critical for users in low-bandwidth settings.
- The modular design allows incremental feature extension such as adding DOCX parsing or incorporating advanced AI models.

Chapter 4: Experimental Setup and Dataset

4.1 Hardware and Software Environment

Experiments were conducted on a high-end test workstation and across multiple platforms to validate performance, compatibility, and robustness.

- **Hardware:** Intel Core i7 11th Gen, 16 GB RAM, 512 GB SSD, NVIDIA GTX 1650 GPU.
- **Software:** Node.js v18, Docker v24.0, Chrome v121, React 19, TypeScript, PDF.js.
- **Platforms:** Windows 11, macOS Sonoma, Ubuntu Linux; browsers including Chrome, Firefox, Safari.

4.2 Dataset Description

- **Resume Collection:** 20 anonymized resumes spanning multiple domains: technical, managerial, creative, and academic.
- **Job Descriptions:** 50 real-world job descriptions sourced from online portals, covering diverse industries.
- **Preprocessing:** Text normalization, anonymization, and verification to ensure high-quality evaluation.

4.3 Evaluation Metrics

- **Parsing Accuracy:** Percentage of correctly detected entities and sections against manual annotations.
- **Response Time:** Average latency from resume upload to feedback generation.
- **ATS Score Metrics:** Baseline versus improved ATS compatibility scores.
- **Semantic Match:** Cosine similarity and TF-IDF keyword coverage between resume and job description.
- **User Feedback:** Qualitative usability assessments through structured interviews and surveys.

Chapter 5: Results

5.1 Parsing Accuracy

The system achieved over 93% accuracy in detecting and extracting relevant resume sections in structured resumes. Parsing accuracy declined to 79% in highly graphical creative resumes due to PDF extraction difficulties.

5.2 ATS Score Improvement

ATS scores improved on average by 23.4% post-optimization suggestions. Technical resumes showed highest improvements (up to 58%), with managerial and academic resumes benefiting by 29-51%.

5.3 Performance Metrics

Response times averaged 1.42 seconds locally and 1.83 seconds in Dockerized deployments, well under the 3-second usability threshold for web apps.

5.4 Semantic Resume-Job Matching

Resume-job description matching procedures recorded average alignment improvements of 44%, indicating enhanced keyword coverage and domain relevance.

5.5 User Feedback

Participants highlighted the clarity and usefulness of actionable feedback and seamless multi-device accessibility due to PWA support. Offline usage in low-connectivity areas was deemed a vital enhancement.

Evaluation Metrics

- Parsing accuracy (% entities correctly extracted)
- Average system response time (seconds)
- ATS compatibility score (%)
- Optimization improvement rate (%)

Table 1. Parsing Accuracy by Resume Type

Resume Type	Avg. Entities	Correctly Extracted	Accuracy (%)
Technical	12	11.7	97.5
Managerial	11	10.3	93.6
Academic	15	14	93.3
Creative	10	7.9	79.0

Table 2. Response Times by Deployment

Mode	Avg (s)	Min (s)	Max (s)	Std. Dev
Local	1.42	1.1	2.0	0.25
Dockerized	1.83	1.4	2.4	0.31

Table 3. ATS Score Improvements

Resume ID	Domain	Initial Score	Optimized Score	Improvement (%)
R1	Software Eng.	48	76	+58.3
R4	HR Executive	45	68	+51.1
R7	Data Analyst	55	72	+30.9
R12	Academic CV	62	80	+29.0
R18	Graphic Design	50	65	+30.0

Across all resumes, the mean improvement rate was 23.4%. PWA installation succeeded on every tested device, enabling offline re-analysis.

Chapter 6. Discussion

The experimental results and user feedback collectively validate the effectiveness and practicality of Screenify as an AI-driven tool engineered to enhance resume compatibility with Applicant Tracking Systems (ATS). This section elaborates on the implications, strengths, limitations, and future improvement avenues highlighted by the study.

6.1 Parsing Accuracy and Resume Types

Screenify demonstrated impressive parsing accuracies exceeding 93% for structured technical and managerial resumes, reflecting the robustness of the employed NLP and rule-based heuristics for typical resume formats. This high accuracy is crucial as parsing fidelity directly impacts downstream ATS scoring and feedback relevance.

However, parsing accuracy dropped to approximately 79% for creative resumes incorporating graphical elements, complex layouts, or multimedia content. This outcome aligns with prevailing challenges documented in academic and industrial research, where OCR failures and layout irregularities limit text extraction reliability. This observation underscores the need for integrating advanced document layout understanding models, such as transformers trained for document segmentation, into future Screenify iterations. Addressing this gap is critical to ensure equitable access to optimization tools across diverse fields like design, multimedia, and marketing where non-traditional resumes prevail.

6.2 ATS Score Improvement and User Impact

Significant average ATS compatibility score improvements (23.4% overall, with peaks above 50% in technical categories) indicate that the feedback given by Screenify effectively guides candidates toward more compliant resumes. The multi-category scoring approach—evaluating structure, keyword presence, and formatting—provides users with clear priorities and actionable guidance, a factor appreciated in qualitative user feedback.

The semantic match improvement between resumes and job descriptions further confirms that Screenify not only improves formatting compliance but also enhances content relevance—key to successful recruitment outcomes. By measuring alignment with TF-IDF and cosine similarity, the system ensures that users understand which skills or experiences to highlight in alignment with their target job market.

6.3 Performance, Usability, and Accessibility

Screenify's response times averaged well under 2 seconds across deployment models, affirming suitability for real-time user interaction. The seamless Progressive Web App (PWA) support ensures broad accessibility across device platforms and network conditions, amplifying its utility in diverse environments, including low-connectivity regions.

User survey responses emphasized the empowering nature of clear, interpretable feedback combined with the flexibility offered by offline analysis capabilities. These usability dimensions are often overlooked in resume enhancement tools yet critically influence adoption and sustained engagement.

6.4 Limitations and Challenges

Despite its strengths, Screenify faces notable limitations. As discussed, graphically complex resumes remain a challenge for accurate parsing. Further, semantic analysis currently relies primarily on TF-IDF, which, while effective, lacks deeper contextual understanding offered by more advanced transformer-

based models. However, the computational resource demands and implementation complexity of such models pose hurdles for deployment in lightweight, client-facing applications.

Moreover, although the study included a balanced variety of resumes, larger and more diverse datasets involving a wider range of job sectors, languages, and cultural contexts would be beneficial to rigorously validate Screenify's generalizability.

6.5 Ethical and Privacy Considerations

Screenify's privacy-first design, involving local client-side parsing and encrypted remote storage, aligns with modern regulatory frameworks like GDPR. Nonetheless, as automated resume evaluation tools scale, continuous assessments of potential algorithmic biases are warranted, especially as semantic models evolve.

Ensuring transparency in scoring and feedback mechanisms is also essential to maintain candidate trust and mitigate inadvertent perpetuation of biases, a topic earmarked for future work.

6.6 Future Directions

Building on the findings, future enhancements include:

- Integration of state-of-the-art document layout transformers to robustly parse creative or multimedia-rich resumes.
- Incorporating large language models to support more nuanced semantic understanding, resume summarization, and recruiter-like evaluation.
- Expanding multilingual support to cater to global job markets.
- Deploying fairness and audit frameworks to detect and correct bias in ATS scoring.
- Extending study scope through larger-scale user trials for comprehensive usability, impact, and fairness evaluations.

Chapter 7: Conclusion and Future Work

7.1 Conclusion

This research developed and validated Screenify, an AI-powered Progressive Web Application designed to enhance resume compatibility with Applicant Tracking Systems (ATS) and improve employment success for job seekers. Screenify seamlessly integrates robust PDF text extraction, natural language processing, heuristic and semantic scoring, and actionable feedback mechanisms within an accessible, secure, and scalable user interface.

The system demonstrated high precision in resume parsing, particularly for structured technical and managerial domain resumes, achieving an average parsing accuracy above 93%. Experimental evaluations showed significant ATS score improvements averaging 23.4%, with some candidates experiencing gains exceeding 50%. Semantic matching between resumes and job descriptions was enhanced, bolstering content relevance aligned with target roles—an important factor in recruiter screening.

Screenify's adoption of Progressive Web Application technologies ensured broad, multi-device accessibility, including offline capabilities essential for users in connectivity-limited environments. The employment of Docker-based containerization simplified deployment, fostering reproducibility and scalability within diverse operational contexts.

User feedback underscored the utility of clear and specific feedback, helping candidates iteratively refine their resumes toward ATS expectations while balancing the need for personal expression. Privacy and security design choices aligned well with GDPR principles, enhancing user trust.

Overall, Screenify exemplifies a practical, transparent, and empirically grounded approach to bridging human and automated hiring processes. It advances the state of resume optimization tools by balancing technical rigor, usability, accessibility, and ethical considerations.

7.2 Future Work

The promising outcomes documented here suggest multiple avenues for extending Screenify's capabilities and impact:

Advanced Parsing and AI Integration

- Integrate cutting-edge transformer-based document understanding models, such as LayoutLM and Donut, to improve parsing accuracy for creative and multimedia-rich resumes.
- Incorporate large language models (LLMs) like GPT for enhanced semantic analysis, enabling recruiter-like resume summarization, context-aware keyword prioritization, and sentiment analysis.
- Explore multimodal resume evaluation incorporating images, video, or portfolio links prevalent in creative professions.

Multilingual and Cross-Cultural Support

- Extend support to non-English resumes, facilitating job seekers in global markets by adapting parsing and scoring models to diverse languages and cultural resume conventions.
- Develop culturally sensitive scoring systems to accommodate regional hiring practices and reduced linguistic biases.

Fairness, Transparency, and Bias Mitigation

- Implement algorithmic fairness audits to detect and mitigate gender, ethnicity, age, or disability biases in ATS scoring.
- Enhance transparency by providing detailed explanations of scoring decisions, fostering candidate trust and enabling informed improvements.
- Collaborate with policymakers and advocacy groups to align with emerging legal frameworks governing AI in hiring.

Scaling and Enterprise Adoption

- Design and deploy recruiter-facing dashboards enabling batch resume screening, hiring pipeline analytics, and candidate ranking powered by Screenify's AI models.
- Integrate with popular Applicant Tracking Systems and job portals for seamless workflow incorporation.
- Explore partnerships with educational institutions and career services for broad-based employability enhancement.

Longitudinal and Large-Scale Evaluations

- Conduct large-scale field studies involving diverse user populations to validate long-term usability, efficacy, and impact on employment outcomes.
- Use mixed-method research designs combining quantitative performance metrics with qualitative user experience insights.

Enhanced User Experience and Accessibility

- Develop mobile-native applications complementing the PWA for enhanced offline performance and device integrations (camera scanning, voice input).
- Implement personalized learning modules educating users about ATS mechanisms and effective resume practices.

In summary, this research lays a strong foundation for AI-driven, transparent, and accessible resume optimization. Future developments promise to make Screenify a comprehensive platform that adapts dynamically to evolving recruitment landscapes, fosters equitable employment opportunities, and aligns seamlessly with both candidate needs and recruiter expectations.

References

1. Smith, J., "The Rise of Applicant Tracking Systems in Global Recruitment," International Journal of HR Technology, vol. 12, no. 3, pp. 45–59, 2021.
2. Gupta, A., and Rao, P., "Automated Resume Filtering and Its Pitfalls," IEEE Transactions on Computational Social Systems, vol. 7, no. 2, pp. 123–131, 2020.
3. Patel, S., et al., "ATS Compatibility of Creative Resumes: An Empirical Study," ACM CHI Proceedings, 2019.
4. Jobscan, "Resume Optimization for ATS," [Online]. Available: <https://www.jobscan.co/>
5. Resumeworded, "Resume Scoring Tool," [Online]. Available: <https://resumeworded.co/>
6. Brown, T., "Template-Based Resume Builders and Their ATS Limitations," Career Development Quarterly, vol. 68, no. 4, 2020.
7. Chen, L., and Zhou, X., "Semantic Resume Matching with BERT Models," Proceedings of ACL, 2020.
8. Kumar, R., "Transformers-based Ranking in Recruitment Systems," Journal of AI in HR, vol. 3, no. 1, 2021.
9. Park, H., and Lee, M., "Clustering Job Applications for Domain-Specific Hiring," Expert Systems with Applications, vol. 145, 2020.
10. Nielsen Norman Group, "User-Centered Design in Career Tools," 2019.
11. Silva, P., et al., "Progressive Web Applications in Education and Career Systems," Journal of Web Engineering, vol. 17, no. 2, pp. 85–104, 2021.
12. Docker Inc., "Docker in Research and Development," 2023.
13. ReactJS, "React Documentation," [Online]. Available: <https://react.dev/>
14. Tailwind CSS, "Tailwind CSS Documentation," [Online]. Available: <https://tailwindcss.com/>
15. Puter, "Puter Auth & KV Store," [Online]. Available: <https://puter.com/>