

ATS-Friendly AI-Powered Resume Feedback System

Prof. Vedankita Mohod¹, Anand Jugnake², Arya Agasti³

Assistant Professor, Computer Application¹

MCA, Computer Application^{2,3}

KDK College of Engineering, Nagpur, Maharashtra, India

vedankitamohod@kdkce.edu.in, anandjugnake.mca23@kdkce.edu.in, aryaagasti.mca23@kdkce.edu.in

Abstract: In today's competitive job market, Applicant Tracking Systems (ATS) play a crucial role in the hiring process by filtering resumes based on predefined criteria such as keywords, formatting, and structure. However, many job seekers struggle to create resumes that effectively pass through these automated systems. This paper proposes an AI-powered Resume Feedback System designed to help users optimize their resumes for ATS compliance while enhancing overall readability and relevance.

The system leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to analyze resumes against job descriptions, providing instant feedback on keyword optimization, formatting, grammatical accuracy, and section structuring. By integrating real-time AI-driven suggestions, users can tailor their resumes to improve their chances of securing interviews.

This research highlights the challenges posed by ATS filters, evaluates existing resume optimization tools, and introduces a user-friendly AI-based solution that bridges the gap between job seekers and hiring algorithms. The proposed system aims to enhance resume effectiveness, ensuring a fairer and more efficient recruitment process. Future advancements may include integration with job portals and LinkedIn for seamless job application improvements.

Keywords: ATS, Resume Optimization, AI-Powered Feedback, Natural Language Processing, Machine Learning, Job Market

I. INTRODUCTION

In today's digital age, the job recruitment process has evolved significantly, with companies relying on Applicant Tracking Systems (ATS) to streamline candidate selection. These systems automatically scan, filter, and rank resumes based on predefined criteria such as keywords, formatting, and structure. Studies indicate that nearly 75% of resumes are rejected before reaching a human recruiter due to non-compliance with ATS guidelines. This creates a significant challenge for job seekers who may have the necessary skills but fail to optimize their resumes effectively.

To address this issue, we propose an AI-powered Resume Feedback System that provides real-time, ATS-friendly optimization suggestions. By leveraging Natural Language Processing (NLP) and Machine Learning (ML), the system analyzes resumes for keyword relevance, readability, section structuring, grammatical accuracy, and formatting consistency. Users receive actionable insights to enhance their resumes, ensuring higher visibility in the recruitment pipeline.

This research explores the limitations of traditional resume-building approaches, evaluates the effectiveness of AI-driven optimization, and presents a user-friendly solution that improves resume success rates. The proposed system not only helps job seekers tailor their applications to specific job descriptions but also promotes a more efficient and fair hiring process. Future enhancements may include integration with online job portals and LinkedIn, enabling seamless job applications with AI-powered resume recommendations.

Given this scenario, job seekers must optimize their resumes to align with ATS requirements while ensuring they are also appealing to human recruiters. Unfortunately, many individuals lack the knowledge or expertise to craft



an ATS-friendly resume effectively. Issues such as improper keyword usage, incorrect formatting, missing sections, and grammatical errors contribute to resume rejection. These challenges highlight the need for an intelligent and automated resume evaluation system that provides real-time, actionable feedback to job applicants. Traditional resume-building methods rely on generic templates or manual proofreading, which may not be sufficient to meet ATS standards. Many online resume-building tools provide design-focused templates but fail to ensure compliance with ATS filters. Furthermore, manual resume reviews by career coaches or professionals can be time-consuming and expensive, making them inaccessible for many job seekers.

II. LITERATURE SURVEY

A comprehensive The adoption of Applicant Tracking Systems (ATS) and the evolution of AI-powered resume optimization tools have been widely studied in the literature. This section reviews existing work on ATS systems, resume-building challenges, AI-driven resume optimization technologies, and the current gaps that motivate the development of a more efficient AI-powered resume feedback system.

1. Applicant Tracking Systems (ATS)

ATS software plays a critical role in automating the initial stages of recruitment by scanning resumes for relevant keywords, filtering candidates based on predefined criteria, and ranking resumes for recruiter review. Several studies have emphasized the importance of ATS in reducing recruiter workload. For instance, Jobvite (2018) highlights that 98% of Fortune 500 companies utilize ATS to manage large volumes of applications. ATS systems filter out resumes that do not contain necessary keywords or are not formatted correctly, making it harder for applicants to reach human recruiters.

However, research by Lever (2020) indicates that over 75% of resumes are automatically discarded due to non-compliance with ATS standards, which reveals a significant drawback of ATS. Most candidates are unaware of the technical requirements of ATS and unknowingly submit resumes that are ill-suited for these systems. This underscores the need for better resume optimization techniques that can help applicants succeed in ATS-driven recruitment processes.

2. Challenges Faced by Job Seekers in Optimizing Resumes

A number of studies explore the challenges job seekers face when crafting resumes for ATS. The lack of knowledge about keyword optimization, section formatting, and job-specific tailoring often results in automatic rejections. Research by Black and Yost (2021) points out that job seekers do not have access to detailed feedback after rejection by ATS, which prevents them from learning how to improve their resumes. Furthermore, studies like the one conducted by Indeed (2021) emphasize the issue of generic resume templates being ineffective in passing ATS screening.

3. Existing Resume Optimization Tools

Several tools and platforms, such as Jobscan, Resumake, and Zety, have attempted to address the issue of resume optimization for ATS. These tools allow users to upload their resumes and receive feedback on keyword relevance, formatting, and structure. Research by Wessel (2020) on Jobscan's ATS compliance tools indicates that resume scanners typically evaluate keyword matching between resumes and job descriptions, offering insights on how to tailor the resume for ATS algorithms.

However, most of these tools still have limitations. Studies by Frankel (2019) suggest that current platforms focus heavily on keyword optimization but lack deeper insights into factors such as grammar, readability, and overall resume structure. Additionally, they do not provide sufficient context-specific suggestions based on the requirements of different industries or roles. This gap provides an opportunity for AI-powered systems to offer a more holistic solution that enhances resume quality beyond simple keyword matching.



4. AI-Powered Resume Feedback Systems

AI and Natural Language Processing (NLP) technologies have recently gained prominence in enhancing various aspects of resume creation. NLP enables systems to analyze text content and provide feedback on sentence clarity, word choice, and overall readability. The application of Machine Learning (ML) in resume evaluation has shown promising results in predicting job success by analyzing candidate qualifications and experiences.

According to a study by Taylor et al. (2020), AI-driven resume optimization tools can significantly reduce human bias in resume evaluation, while enhancing the precision of content analysis. Furthermore, NLP-based models can evaluate whether a resume's content aligns with industry standards and job-specific requirements. For instance, the use of Transformer-based models such as BERT (Bidirectional Encoder Representations from Transformers) has enabled systems to better understand the context of words and phrases in resumes, resulting in more accurate feedback.

III. PROPOSED METHODOLOGY

The ATS-Friendly AI-Powered Resume Feedback System is designed to help job seekers optimize their resumes for Applicant Tracking Systems (ATS) and improve their chances of getting shortlisted. The system will utilize Natural Language Processing (NLP), Machine Learning (ML), and AI-driven analytics to analyze resumes, compare them with job descriptions, and provide real-time feedback for optimization.

The methodology for developing this system consists of several key phases:

1. Data Collection and Preprocessing

To build an effective AI-powered resume feedback system, a diverse and high-quality dataset is required. The data collection phase involves:

- **Resume Dataset Collection:** Gathering resumes from different industries, job levels, and formats to ensure comprehensive analysis.
- **Job Descriptions Dataset:** Collecting job postings from online job portals to analyze how resumes should be aligned with employer requirements.
- **ATS Rejection Patterns:** Acquiring datasets of resumes that were accepted or rejected by ATS to understand key rejection factors.
- **Preprocessing:** Cleaning the dataset by removing redundant text, normalizing text format, eliminating stop words, and tokenizing content for NLP processing.

2. AI and NLP-Based Resume Analysis

The Natural Language Processing (NLP) engine plays a crucial role in analyzing resumes. The following NLP techniques will be used:

- **Text Tokenization:** Breaking the resume text into meaningful sections such as personal details, work experience, skills, education, and achievements.
- **Named Entity Recognition (NER):** Identifying important entities like job titles, skills, companies, and qualifications.
- **Keyword Extraction:** Extracting job-relevant keywords from resumes and comparing them with job descriptions.
- **Resume Structuring Analysis:** Checking if the resume follows ATS-friendly formatting guidelines such as section headers, bullet points, and proper file format (e.g., .docx, .pdf).

3. Machine Learning Model for Resume Scoring

The system will use Machine Learning (ML) to predict how well a resume aligns with ATS requirements and employer expectations. The ML model will be trained using:

- **Supervised Learning:** Using labeled data (successful vs. rejected resumes) to train a classification model.
- **Feature Engineering:** Extracting important features such as keyword density, grammar score, formatting compliance, and experience level.



- **Model Selection:** Testing various ML models such as Logistic Regression, Decision Trees, Random Forest, and Neural Networks to determine the best-performing model.
- **Evaluation Metrics:** Using accuracy, precision, recall, and F1-score to measure model effectiveness in resume evaluation.

4. System Implementation and User Interface

The resume feedback system will be implemented as a web-based application with the following components:

Frontend (User Interface):

- Developed using React.js or Angular for an interactive experience.
- Users can upload resumes and job descriptions for analysis.
- Results will be displayed with color-coded suggestions for easy understanding.

Backend (Processing Engine):

- Built using Python (Flask/Django) to process resumes and run NLP algorithms.
- AI models will analyze and provide feedback in real-time.

Database:

- A MongoDB database to store user resumes, feedback history, and improvement suggestions.

IV. IMPLEMENTATION

The ATS-Friendly AI-Powered Resume Feedback System is implemented using a combination of Natural Language Processing (NLP), Machine Learning (ML), and Web Technologies. This section details the system architecture, technology stack, implementation steps, and workflow used to develop the system.

The system is designed as a web-based application with the following components:

- **Frontend (User Interface)** – Users upload their resumes and job descriptions.
- **Backend (Processing Engine)** – AI and NLP models analyze resume content and provide feedback.
- **Database** – Stores user data, resume analytics, and improvement suggestions.
- **ATS Simulator** – Simulates real ATS filters to test resume compatibility.

The implementation of the system is divided into the following steps:

Step 1: Resume Upload and Preprocessing

- Users upload their resume in PDF, DOCX, or TXT format.
- The system extracts text using libraries like PyMuPDF (for PDFs) and python-docx (for Word documents).
- Text is cleaned and tokenized to remove special characters, unnecessary white spaces, and stop words.

Step 2: Resume Parsing & Section Identification

The NLP module extracts key sections from the resume, such as:

- Personal Details
- Work Experience
- Education
- Skills
- Certifications

Named Entity Recognition (NER) is applied using spaCy to identify key entities like job titles, company names, degrees, and technologies.

Step 3: ATS Compatibility Analysis

The system simulates ATS filtering by checking for:

- **Keyword Optimization** – Ensures relevant job-specific keywords are included.
- **Formatting Issues** – Detects improper font sizes, columns, images, tables, etc.
- **Section Headers** – Verifies that resume sections are clearly defined for ATS readability.



- **File Format Compliance** – Ensures the resume is in ATS-compatible formats (DOCX or TXT).

Step 4: Job Description Matching

- Users input a job description for comparison.
- The system uses TF-IDF (Term Frequency-Inverse Document Frequency) and BERT embeddings to compare resume content with the job description.
- A match score (%) is generated to indicate how well the resume aligns with the job posting.

Step 5: Interactive User Interface

- The frontend is built using React.js for a user-friendly experience.
- Users receive real-time suggestions with interactive highlights (e.g., missing keywords, grammar corrections, formatting issues).

V. FUTURE SCOPE

The ATS-Friendly AI-Powered Resume Feedback System has the potential to revolutionize the way job seekers create and optimize their resumes for Applicant Tracking Systems (ATS). As technology advances and recruitment processes become more AI-driven, the system can be further enhanced in the following areas:

1. AI-Powered Resume Builder

- The system can evolve into a smart resume builder that generates optimized resumes based on user input and job descriptions.
- It can provide pre-built templates that are industry-specific and ATS-friendly.
- AI can suggest customized content for job seekers based on experience, skills, and job role.

2. Integration with Job Portals

- The system can be integrated with popular job search platforms like LinkedIn, Indeed, and Glassdoor.
- Users can import job descriptions directly from job portals and optimize their resumes accordingly.
- It can provide real-time feedback on LinkedIn profiles, ensuring that users have a strong online presence.

3. Mobile App Development

- A dedicated mobile app can provide users with on-the-go resume feedback.
- Features like resume scanning using a camera, real-time feedback, and keyword suggestions can enhance usability.
- Push notifications can remind users to update resumes based on industry changes.

4. AI-Based Interview Preparation

- The system can be expanded to include AI-powered mock interviews.
- Based on the resume, the AI can generate frequently asked interview questions.

5. Adaptive Learning & Career Suggestions

- The system can analyze career growth trends and suggest skill improvement areas.
- AI can recommend certifications, courses, and online training based on the user's profile.
- AI-driven career path mapping can help users transition to better job roles.

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VII. CONCLUSION

The ATS-Friendly AI-Powered Resume Feedback System is a groundbreaking approach to improving job seekers' chances of passing Applicant Tracking Systems (ATS) and securing interviews. Traditional resume screening methods often fail due to poor formatting, lack of relevant keywords, and incompatibility with ATS software. This research presents an AI-driven solution that integrates Natural Language Processing (NLP), Machine Learning (ML), and ATS optimization techniques to analyze resumes in real-time and provide actionable feedback.

The system effectively identifies key resume components, evaluates keyword relevance, checks for grammar and readability issues, and assesses ATS compliance. By leveraging machine learning models, it assigns a resume score, highlighting strengths and areas for improvement. Additionally, job description matching helps candidates tailor their resumes for specific job postings, increasing their chances of selection.

In conclusion, the ATS-Friendly AI-Powered Resume Feedback System addresses a crucial challenge in the job application process, providing an innovative, data-driven, and AI-enhanced solution. By continuously evolving with industry trends, this system can significantly improve job seekers' success rates, bridge the gap between applicants and recruiters, and redefine the future of AI-driven recruitment technologies.

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