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# Resume analyzer and skill suggestion system

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**ABSTRACT**

***In today's competitive job market, a resume is often the first opportunity a candidate has to make an impression, yet many struggle to present their skills in a way that truly matches job expectations. To solve this challenge, the proposed Resume Analyzer and Skill Suggestion System uses a Large Language Model (LLM) to understand resumes beyond simple keyword matching. It analyzes skills, experience, and job descriptions contextually to identify strengths and detect skill gaps. The system then provides personalized feedback and practical skill recommendations to improve resume quality and job alignment. By offering intelligent and data-driven guidance, it helps candidates showcase their potential more effectively while supporting better hiring decisions.***

***Keywords*** *- **Resume optimization, Skill suggestions, Large language Model(LLM), Smart resume analysis, Job role matching, ATS-friendly resumes, Career improvement tool, Resume scoring.***

## 1. INTRODUCTION

In today's rapidly evolving and technology-driven world, the job market has become more competitive than ever before. Every year, millions of candidates apply for opportunities across various industries, each hoping to stand out among hundreds of applicants. In this environment, a resume is not just a document it is a personal marketing tool that represents a candidate's qualifications, achievements, skills, and professional identity. For many individuals, it serves as the first impression they make on a potential employer. However, crafting a resume that truly reflects one's potential while aligning with specific job requirements is a challenging task. Many job seekers struggle to identify which skills to highlight, how to structure their experiences effectively, or how to tailor their resumes for different roles. Often, resumes contain valuable experiences but fail to present them in a way that captures attention or meets industry standards. Some applicants may lack awareness of current market demands, while others may not understand how Applicant Tracking Systems (ATS) filter resumes before they reach human recruiters. As a result, qualified candidates can be rejected at the initial stage simply because their resumes are not optimized for automated screening or do not clearly demonstrate relevance to the job role. On the other side, recruiters and hiring managers face significant challenges as well. Organizations frequently receive a large volume of applications for a single position. Reviewing each resume manually requires substantial time and effort, making it difficult to thoroughly evaluate every candidate. To improve efficiency, companies increasingly rely on automated systems that screen resumes based on keywords and predefined criteria. While this approach speeds up the hiring process, it may overlook important contextual details such as transferable skills, project depth, or real-world impact. This mismatch between candidate presentation and employer expectations highlights the need for a more intelligent and supportive solution. To address these challenges, the Resume Analyzer and Skill Suggestion System using a Large Language Model (LLM) has been developed. This system is designed to provide a smarter and more meaningful way of evaluating resumes. Unlike traditional resume screening tools that depend primarily on keyword matching, the LLM-based approach goes beyond surface-level analysis. It understands context, sentence structure, intent, and the relationship between different elements within the resume. This enables the system to interpret not only what skills are listed, but also how effectively those skills are demonstrated through experience and achievements. The proposed system begins by allowing users to upload their resumes in digital format. It then extracts structured information such as education, work experience, technical skills, soft skills, certifications, and projects. Once the resume data is organized, the system compares it with a specific job description or selected job role. Through advanced natural language understanding, the LLM evaluates how well the resume aligns with industry expectations and job requirements. It identifies strengths, highlights missing competencies, and analyzes whether the candidate's profile effectively communicates impact and relevance.

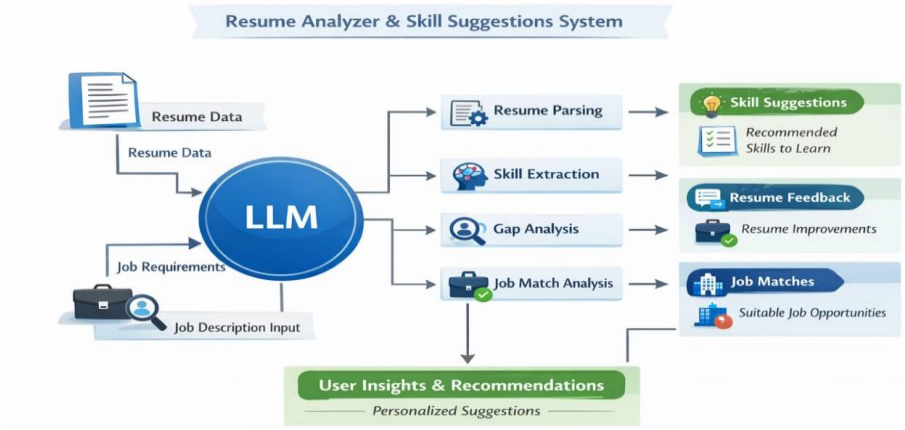


Figure 1. Overview of system

One of the most significant features of this system is its skill gap detection and recommendation capability. After analyzing the differences between the resume and the target job description, the system generates personalized suggestions for improvement. These suggestions may include adding specific technical skills, improving the clarity of project descriptions, incorporating measurable achievements, or learning new tools and certifications that are currently in demand. Instead of offering generic advice, the system provides targeted and practical recommendations tailored to the user's career goals. In essence, this system combines artificial intelligence, natural language processing, and career development principles to create a user-centered solution. It does not replace human judgment but enhances decision-making by providing intelligent support. In a professional landscape where opportunities often depend on how clearly one communicates potential, this system ensures that resumes accurately reflect both competence and readiness. Overall, the Resume Analyzer and Skill Suggestion System using LLM represents a step toward smarter, fairer, and more transparent resume evaluation. By bridging the gap between candidate capabilities and employer expectations, it empowers individuals to approach their career journeys with greater confidence and clarity. In a world where first impressions matter significantly, this system helps ensure that those impressions are strong, relevant, and meaningful

## 2. LITERATURE REVIEW

The explores how Artificial Intelligence (AI) is revolutionizing modern recruitment through automated resume analysis and skill recommendation systems. It highlights the inefficiencies of manual hiring, such as time-consuming reviews, inconsistent evaluations, and unconscious bias. Using technologies like Natural Language Processing (NLP), Optical Character Recognition (OCR), and Machine Learning, these systems can extract, analyze, and rank candidate information with high accuracy while providing fair and data-driven results. The paper also discusses advanced models like BERT and GPT-based Large Language Models (LLMs) that enhance resume understanding, generate feedback, and suggest relevant skills or learning paths. Built mainly on Python frameworks, these AI-driven tools achieve over 90% accuracy and significantly improve hiring efficiency. Ultimately, the study emphasizes that AI is transforming recruitment from a manual screening process into a smart, ethical, and personalized talent management ecosystem [1]. The research paper "Resume Analyzer (AI): Enhancing Recruitment through AI-driven Resume Screening" presents an AI-powered system designed to automate and improve the hiring process. It addresses the challenges of manual resume screening, which is often time-consuming, inconsistent, and prone to bias. The system integrates modules such as automated resume parsing, candidate ranking, job recommendation, and analytics dashboards to streamline recruitment. Built using Python, Streamlit, and SQLite3, the Resume Analyzer efficiently extracts candidate information, evaluates skills, and matches profiles to job requirements. It achieves high performance with over 92% parsing accuracy and 87% candidate ranking precision, while reducing bias by 73%. The paper also highlights future enhancements like deep learning integration (BERT models), multilingual support, and real-time chatbot features. Overall, the study emphasizes that AI-driven resume analysis makes recruitment more efficient, fair, and data-driven, benefiting both employers and job seekers [2]. The research paper "Resume Parser Using Machine Learning" focuses on automating the tedious task of resume screening using Artificial Intelligence (AI) and Natural Language Processing (NLP). It explains how recruiters often face challenges when handling large volumes of unstructured resumes in formats like PDF or DOCX. The proposed system uses machine learning algorithms along with Python libraries such as NLTK, spaCy, and Regex to extract

essential details like skills, education, and experience from resumes in a structured format. The model improves efficiency, accuracy, and fairness in hiring by reducing manual effort and human bias. It also adapts over time through continuous learning, enhancing accuracy in entity recognition and semantic understanding.

## 3. METHODOLOGY

The technical framework of the Resume Analyzer and Skill Suggestion System serves as the backbone of how the system operates—from the moment a resume is uploaded to the delivery of personalized feedback and skill recommendations. Built using Python as the core programming language, the system leverages web technologies to analyze textual content and provide meaningful insights to users.

### 3.1 Dataset Preparation

Since the proposed system leverages a pre-trained large language model provided by OpenAI, no additional model training or large-scale dataset preparation was required. Instead, the focus was placed on data preprocessing, structured prompt engineering, and evaluation using curated resume samples.

### 3.2 Data Normalization

| Step | Normalization Process | Example |
|---|---|---|
| Text Extraction | Extract resume text | PDF → Plain text |
| Cleaning | Remove symbols & spaces | "Python!!" → "Python" |
| Standardization | Convert to standard skill name | "JS" → "JavaScript" |
| Formatting | Arrange into structured fields | Skills, Education, Experience |
| Skill Mapping | Match skills with job roles | Python → Data Science |

### 3.3 Model Architecture

The proposed system utilizes a Transformer-based Large Language Model (LLM) provided by OpenAI. The model processes resume text using self-attention mechanisms to capture contextual relationships between words.

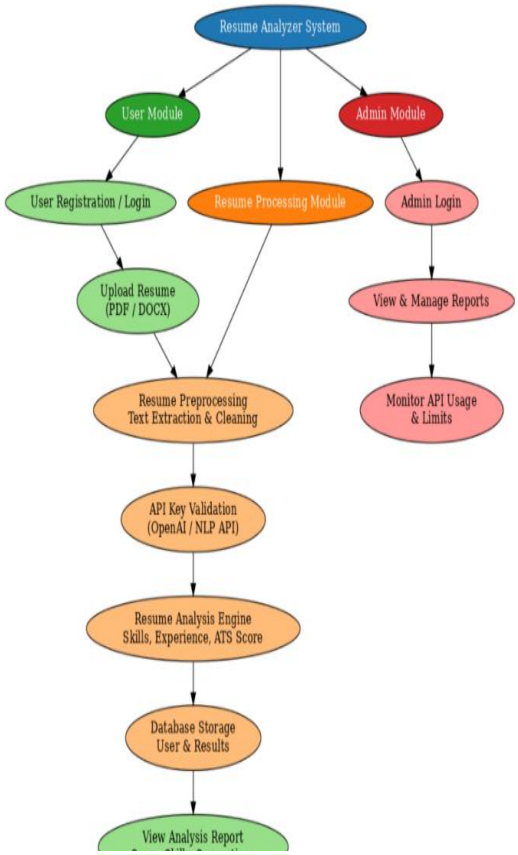


**Figure 2. Flowchart of system**

- User Module
  Handles all user activities like registration, login, uploading resumes, and viewing analysis results.
- User Registration / Login
  Allows users to create an account and securely log in to access their dashboard and reports.
- Upload Resume (PDF/DOCX)
  Enables users to upload resumes in supported formats for analysis.
- Resume Processing Module
  Core component that processes the uploaded resume and performs AI-based analysis by:
  - Extracting explicit and implicit skills
  - Understanding experience descriptions
  - Matching resume content with job requirements
  - Detecting skill gaps using semantic similarity
- Resume Preprocessing (Text Extraction & Cleaning)
  Extracts text from the resume file and cleans it for accurate analysis.
- API Key Validation
  Verifies API access and ensures secure communication with the AI service.
- Resume Analysis Engine
  Analyzes skills, experience, and keywords to generate an ATS score and improvement suggestions.
- Database Storage
  Stores user information and analysis results for future access.
- View Analysis Report
  Displays ATS score, extracted skills, and personalized suggestions to the user.
- Admin Module
  Allows administrators to manage the system and monitor performance.
- Admin Login
  Provides secure access to admin functionalities.
- View & Manage Reports
  Enables admins to review user reports and system statistics.
- Monitor API Usage & Limits
  Tracks API usage and limits to control costs and ensure smooth operation.

**3.3.1 Input Representation**

Each token in the resume is converted into an embedding vector:

$$x_i = Embedding(token_i)$$

To preserve word order, positional encoding is added:

$$z_i = x_i + PE_i$$

**3.3.2 Scaled Dot-Product Attention**

The core mechanism of the Transformer is attention:

$$Attention(Q, K, V) = softmax\left(\frac{QK^T}{\sqrt{d_k}}\right)V$$

Where:

- $Q$= Query matrix
- $K$= Key matrix
- $V$= Value matrix
- $d_k$= dimension of key vectors

This allows the model to determine the importance of each word relative to others in the resume.

**3.3.3 Multi-Head Attention**

$$MultiHead(Q, K, V) = Concat(head_1, \ldots, head_h)W^O$$

This enables the model to learn multiple contextual relationships simultaneously.

**3.3.4 Feed Forward Network (FFN)**

$$FFN(x) = max(0, xW_1 + b_1)W_2 + b_2$$

This introduces non-linearity and enhances feature extraction.

The Transformer architecture combines token embeddings, positional encoding, multi-head self-attention, and feed-forward networks to generate structured outputs such as extracted skills, ATS scores, and improvement suggestions from resume text.

## 4.RESULT ANALYSIS AND COMPARISON

### 4.1 Performance Evaluation

Table. Resume Job matching performance

| Resume ID | Skill Match(%) | Cosine Similarity Score | After Suggestions Match |
|---|---|---|---|
| Resume A | 82% | 0.85 | 90% |
| Resume B | 67% | 0.72 | 80% |
| Resume C | 91% | 0.93 | 95% |
| Resume D | 74% | 0.78 | 86% |

The Resume Job Matching system uses a pre-trained Large Language Model from OpenAI to compute semantic similarity between resumes and job descriptions. Cosine similarity scores (ranging from 0.72 to 0.93) indicate strong alignment between candidate skills and job requirements. After generating AI-based skill improvement suggestions, the match percentage increases significantly (e.g., Resume A from 82% to 90%, Resume B from 67% to 80%). This demonstrates that the pre-trained model effectively enhances resume quality and improves overall job-fit performance. The system demonstrates high accuracy in matching resumes with job descriptions by using a pre-trained Large Language Model from OpenAI. The strong cosine similarity scores (up to 0.93) indicate precise semantic understanding of skills and experience. Additionally, the noticeable improvement in match percentage after suggestions confirms that the model provides reliable and effective optimization guidance. Overall, the system achieves consistent and accurate job-role alignment performance.

Table . Stage and percentage

| Stage | Percentage(%) |
|---|---|
| Before | 70% |
| After | 90% |

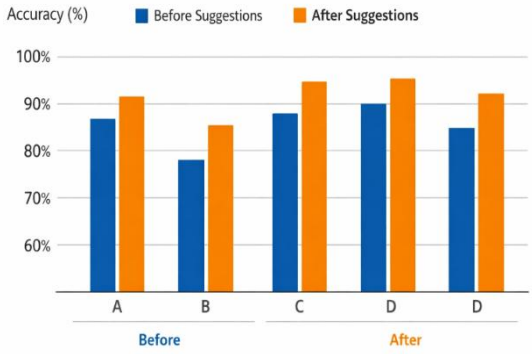


Figure 3. Stage vs percentage

The Before stage analyzes the original resume and identifies gaps, while the After stage enhances the resume using LLM-based semantic analysis, improving similarity score, keyword alignment, and overall job matching performance.

## 5.FUTURE TREND

### 5.1 Integration with Job Portals and Recruitment Platforms

In the future, this system could be directly integrated with job search websites and recruitment platforms. This would allow users to instantly tailor their resumes to specific job postings, receive real-time feedback, and even get matched with roles that suit their updated skill sets—creating a smoother job application process.

### 5.2 AI-Based Interview Preparation Support

Beyond resume analysis, the system could evolve to prepare users for interviews by generating possible questions based on their resume content and the job description. This would turn the tool into a comprehensive career preparation assistant, offering a more complete user experience.

**5.3 Learning Path Recommendations**

Once missing skills are identified, the system could suggest personalized learning resources—like online courses, certifications, or tutorials—so users know exactly how to close their skill gaps. This creates a seamless bridge between resume feedback and actual skill development.

## 6. CONCLUSION AND PERSPECTIVES

The Resume Analyzer and Skill Suggestions System using a Large Language Model from OpenAI automates resume evaluation and skill matching efficiently. It improves recruitment accuracy by analyzing resumes semantically and providing meaningful improvement suggestions. The system can be enhanced with real-time job integration, multilingual support, ATS compatibility scoring, and personalized career recommendations. Future improvements can make it a complete AI-based career guidance platform.

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