Resume Builder, Analyzer and Job Recommender using Generative AI and ML

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***Abstract*—The AI-Powered Resume Builder and Job Recommender System leverages Generative AI, Natural Language Processing (NLP), and Machine Learning (ML) to automate resume creation, analysis, and job matching. The system includes three modules: a Resume Builder that generates professional, ATS-compliant resumes using AI; a Resume Analyzer that evaluates and optimizes resumes through ATS scoring and improvement suggestions; and a Job Recommender that identifies and ranks suitable job opportunities using semantic similarity and API integration. This integrated approach minimizes manual effort, enhances resume visibility, and delivers personalized job recommendations, improving the overall efficiency of the recruitment process.**

***Index Terms*—Artificial Intelligence (AI), Generative AI, Natural Language Processing (NLP), Machine Learning (ML), Applicant Tracking System (ATS), Resume Optimization, Job Recommendation System, Semantic Matching, Text Analytics, API Integration.**

I. INTRODUCTION

In today's rapidly evolving digital world, employment processes have become increasingly dependent on technology-driven recruitment systems. Organizations now rely heavily on Applicant Tracking Systems (ATS) and AI-based recruitment tools to manage large volumes of job applications. While this has streamlined hiring for employers, it has also introduced new challenges for job seekers, many of whom struggle to create professional, ATS-compliant resumes that stand out in a competitive job market.

Traditional resume-building methods are often manual, time-consuming, and prone to formatting or keyword errors that reduce visibility in automated screening systems. Additionally, searching for suitable job opportunities across multiple platforms requires significant effort and often results in irrelevant matches. As a result, even skilled and qualified candidates fail to progress through the initial stages of recruitment due to inadequate resume optimization and inefficient job discovery mechanisms.

To address these challenges, the AI-Powered Resume Builder and Job Recommender System introduces an innovative solution that integrates Generative Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML) to assist job seekers throughout the employment preparation process. The proposed system automates the creation of resumes, analyzes their effectiveness through ATS-based scoring, and provides intelligent job recommendations that align with the user's skills, experience, and career goals.

II. RELATED WORKS

The advancement of Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML) has significantly transformed recruitment processes in recent years. Researchers and developers have made notable progress in automating resume parsing, optimizing content for Applicant Tracking Systems (ATS), and improving job recommendation mechanisms. This chapter reviews key related studies, systems, and technologies that serve as the foundation for the proposed AI-Powered Resume Builder and Job Recommender System.

AI-Based Resume Analysis and Optimization Systems

Traditional resume-screening tools often rely on rule-based methods or simple keyword matching, which fail to understand the semantic meaning of text. Recent studies, such as "A Survey on Resume Screening Mechanisms" (2022), emphasized the use of NLP techniques to extract and classify resume information such as skills, experience, and education. Similarly, Jobscan (2021) introduced an AI- driven resume analyzer that compares resumes with job descriptions to identify missing keywords, providing a foundation for ATS optimization.

In Resume2Vec (MDPI, 2024), vector representations of resumes and job descriptions were used to compute semantic similarity scores. This model demonstrated improved correlation with recruiter judgments compared to traditional keyword-based systems. Such works inspired the Resume

Analyzer component of this project, which uses NLP and ML algorithms to generate ATS scores and identify optimization opportunities.

III. LITERATURE REVIEW

The review of existing literature reveals the following major trends and insights:

AI Integration in Recruitment:

Most studies show the increasing use of AI and ML for improving recruitment efficiency. However, these systems typically focus on individual functions — either resume analysis or job recommendation — rather than a unified approach.

Adoption of NLP Techniques:

NLP methods such as tokenization, named-entity recognition, and keyword extraction have improved resume parsing. However, few systems utilize deep learning-based semantic similarity models for contextual understanding.

Machine Learning in Recommendation:

ML algorithms, including logistic regression, random forest, and deep neural networks, have been widely used to recommend jobs. However, they depend heavily on historical data and do not dynamically update based on user-specific resume improvements.

Use of Generative AI:

Generative AI models, such as GPT and Gemini APIs, have shown great potential in producing coherent, human-like text. Despite this, their use in resume creation remains limited in most research, leaving a gap for integrated AI-driven content generation systems.

ATS Optimization Gap:

Studies confirm that many resumes fail to pass ATS filters due to poor formatting and lack of relevant keywords. Few existing tools provide real-time ATS analysis with actionable feedback.

IV. ALGORITHM AND METHODOLOGY

Together, these algorithms make the system intelligent, efficient, and capable of recognizing human movement accurately in real time.

Methodology Overview

- System integrates Generative AI, NLP, and ML.
- Three core modules:

Resume Builder – Generates ATS compliant resumes.

Resume Analyzer – Scores and optimizes resumes.

Job Recommender – Suggests jobs using similarity matching.

- Developed using Agile SDLC model (Iterative + Incremental).

System Architecture

- Frontend: User Interface for input & display
- Backend: AI/NLP processing, API integration
- Database: Stores user data, resumes, and job info
- External APIs: Gemini (AI) + Job Portals (LinkedIn/Indeed)

Algorithm 1: Resume Builder

Objective: Auto-generate professional resume using AI

Steps:

1. Collect user details
2. Send to Gemini API → Generate resume text
3. Format with predefined templates
4. Output: Downloadable PDF/DOCX

Algorithm 2: Resume Analyzer

Objective: Evaluate ATS compatibility

Steps:

1. Parse resume using NLP
2. Extract keywords (skills, education, experience)
3. Compare with job description
4. Compute ATS Score = (Matched Keywords / Total Keywords) × 100
5. Display improvement suggestions

Algorithm 3: Job Recommender

Objective: Match user profile with job listings

Steps:

1. Extract skills from resume
2. Fetch jobs via API
3. Vectorize texts using TF-IDF / BERT
4. Compute Cosine Similarity
5. Display Top-N relevant jobs

Tools and Technologies

- Frontend: HTML5, CSS3, React.js
- Backend: Python (Flask/Django)
- AI/NLP: Gemini API, spaCy, Scikit-learn
- Database: MySQL / MongoDB
- Deployment: AWS / Google Cloud

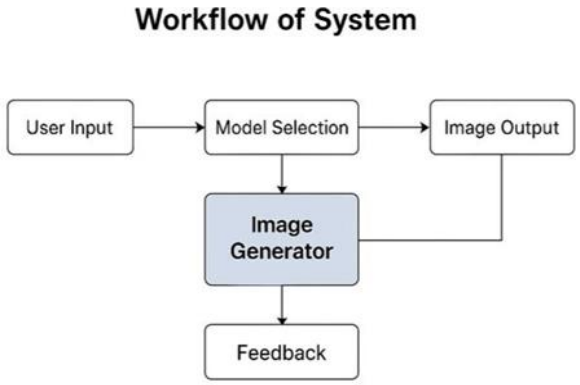

Fig. 1.2: Workflow of System

Fig: Workflow od System

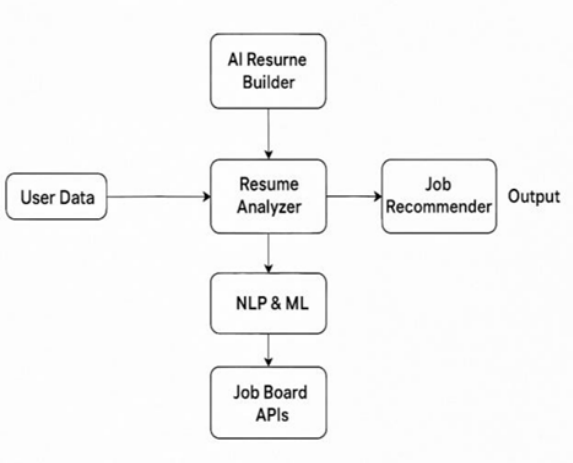

Fig: Block Diagram of System

V. FUTURE SCOPE

The proposed system has strong potential for future enhancement and scalability. Some possible extensions include:

1. Integration with Multiple Job Portals:
Expanding the system to connect with additional job APIs like Naukri, Monster, and Glassdoor.
2. Multilingual Resume Support:
Enabling resume creation and analysis in different languages to cater to global audiences.
3. AI-Based Interview Assistant:
Adding a chatbot module to provide mock interviews and skill assessments.
4. Mobile Application Version:
Developing an Android/iOS app for greater accessibility and convenience.
5. Deep Learning Integration:
Incorporating fine-tuned transformer models (BERT/GPT) for higher accuracy in job matching.
6. Data Analytics Dashboard:
Introducing visual insights for users to track career growth, ATS score trends, and job search metrics.
7. Collaborative Features:
Allowing users to share and get feedback from mentors, recruiters, or placement officers in real-time.

VI. CONCLUSION

The AI-Powered Resume Builder and Job Recommender System successfully automates one of the most essential aspects of modern job seeking — resume creation and job discovery. By leveraging Generative AI, NLP, and ML, the system provides a complete, intelligent, and user-friendly platform for job seekers.

The project efficiently bridges the gap between applicants and recruiters by ensuring that resumes are ATS-compliant, professionally structured, and aligned with job requirements. Through its integrated modules — *Resume Builder*, *Resume Analyzer*, and *Job Recommender* — the system simplifies career preparation and improves shortlisting rates. In conclusion, this AI-driven solution represents a step forward in transforming traditional job application processes into smart, automated, and data-driven experiences that benefit both candidates and employers.

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