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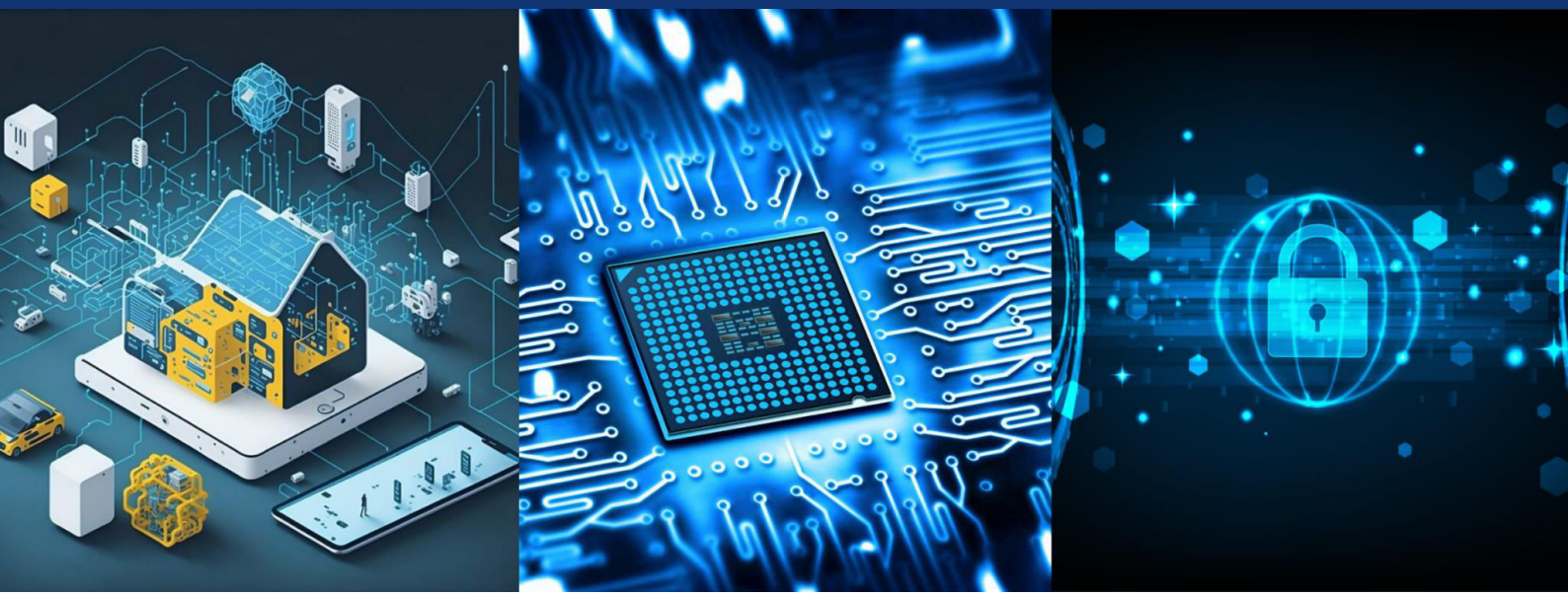

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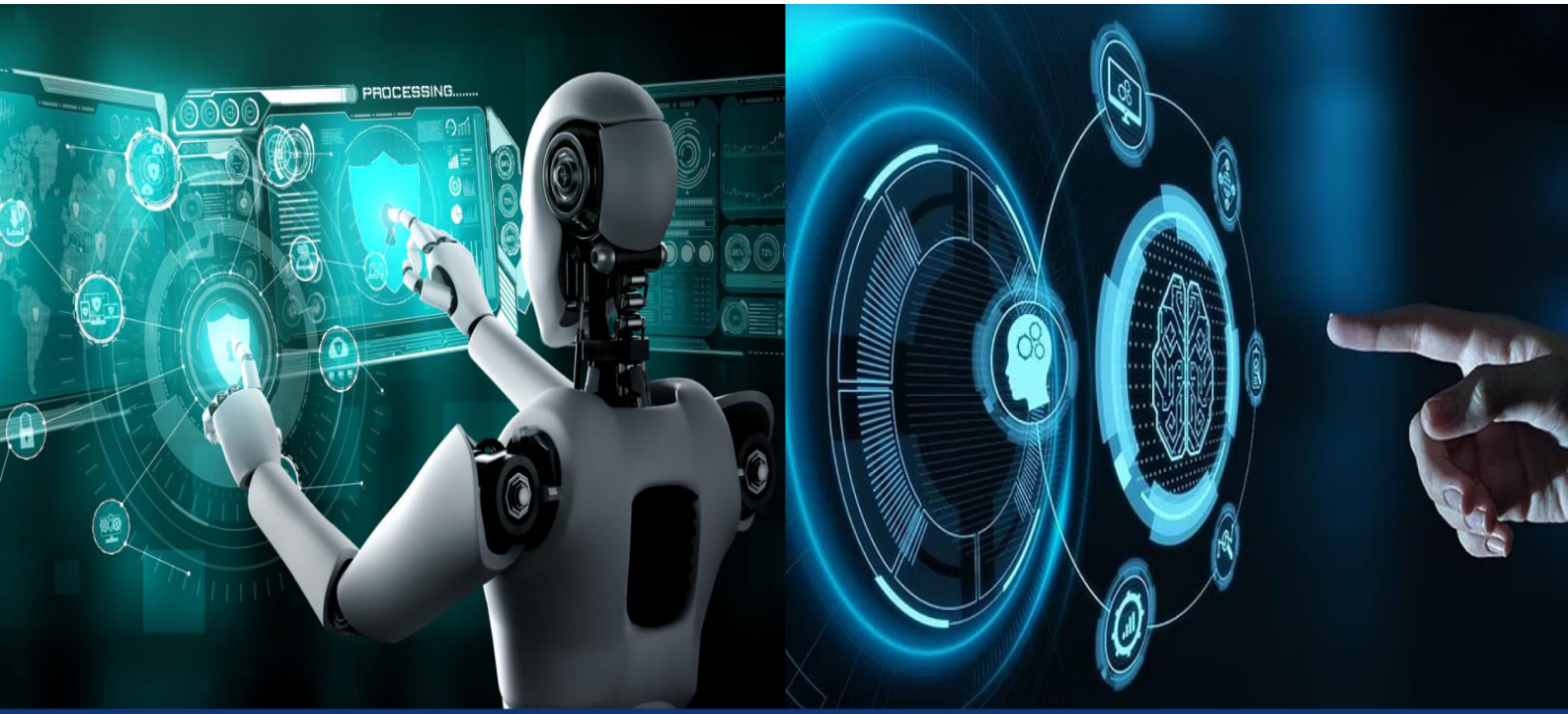

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AI-Powered Resume Screening and Job Matching

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ABSTRACT: The growing volume of job applications has increased the need for automated resume screening systems that can efficiently evaluate candidate profiles. This paper presents an intelligent Resume Screening Application that integrates Natural Language Processing (NLP), Machine Learning (ML), and Groq Llama-based Large Language Models (LLMs) to automate resume analysis. The system achieves 95% accuracy in job category prediction across 33+ domains and provides ATS compatibility scoring.

Using TF-IDF vectorization, cosine similarity, and AI-driven analysis, the application improves screening speed and accuracy while addressing challenges such as skill extraction, keyword matching, and resume format variations. The proposed system helps reduce recruitment time, minimize bias, and enhance candidate-job matching.

KEYWORDS- Resume Screening, Natural Language Processing (NLP), Machine Learning (ML), Large Language Models (LLMs), Groq Llama, Applicant Tracking System (ATS), Text Classification, TF-IDF, Job Category Prediction, Skill Extraction.

I. INTRODUCTION

Recruitment is a critical process that requires significant time and effort to identify suitable candidates. Traditional manual resume screening becomes inefficient when organizations receive a large number of applications, often leading to delays and inconsistent evaluations. Recent advancements in Artificial Intelligence (AI), Natural Language Processing (NLP), and Generative AI (Gen AI) have enabled automated and intelligent recruitment solutions.

The proposed Smart Resume Analyzer and Job Matcher is designed to analyze resumes, classify candidates into relevant job domains, and recommend suitable job roles. The system extracts structured information from resumes in multiple formats and applies NLP techniques to understand candidate profiles beyond simple keyword matching. Additionally, Gen AI is used for resume summarization and feedback generation, enhancing the overall evaluation process.

By automating resume analysis and job matching, the system reduces recruiter workload, improves hiring efficiency, and supports fair and accurate candidate selection.

II. LITERATURE REVIEW

Several studies have explored the use of Artificial Intelligence (AI) and Natural Language Processing (NLP) in automated recruitment systems. Resume screening using NLP and LSTM networks was introduced to extract candidate information and improve matching between resumes and job requirements, reducing manual screening effort [1]. Deep learning–based resume classification systems further enhanced recruitment by automatically categorizing resumes according to job profiles and improving screening efficiency [2].

Researchers also compared traditional rule-based methods with AI-driven approaches and found that intelligent systems provide better contextual understanding and more accurate candidate evaluation [3]. Text mining techniques were later applied to analyze large collections of resumes, enabling efficient extraction of qualifications, skills, and professional experience [4]. In addition, Named Entity Recognition (NER) methods were used to identify and organize important resume information such as education, skills, and work history from unstructured documents [5].

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Although these approaches improved resume analysis and candidate selection, many systems still face challenges in providing intelligent feedback and comprehensive candidate evaluation. The proposed Smart Resume Analyzer and Job Matcher address these limitations by integrating NLP, machine learning, and Generative AI to support resume classification, ATS scoring, job recommendation, and automated feedback generation.

Machine learning algorithms were also employed for resume classification and applicant categorization, enabling faster and more consistent recruitment decisions [6]. In addition, keyword-based evaluation systems were developed to automate resume screening by comparing candidate profiles with predefined job requirements [7].

III. METHODOLOGY

A. Resume Upload

The system accepts resumes in multiple formats such as PDF, DOCX, and TXT. Users can upload their resumes through the web interface for further analysis.

B. Text Extraction & Preprocessing

The uploaded resume content is extracted and cleaned by removing special characters, unwanted symbols, and formatting inconsistencies. The text is then normalized for efficient processing.

C. TF-IDF Vectorization

The preprocessed text is converted into numerical feature vectors using TF-IDF. This helps represent important terms and skills present in the resume for machine learning analysis.

D. Resume Classification

The generated feature vectors are passed to a trained machine learning model that predicts the most suitable job category based on the candidate's profile.

E. ATS Scoring & AI Analysis

The system calculates an ATS score by evaluating skills, keywords, experience, and domain relevance. Groq Llama performs semantic analysis and generates intelligent insights about the resume.

F. Job Recommendation & Feedback

Based on the classification results and ATS score, the system recommends suitable job roles and provides suggestions to improve resume quality and employability.

G. Flow Diagram

The flow diagram illustrates the overall workflow of the proposed Smart Resume Analyzer and Job Matcher system. It presents the sequence of operations performed from resume submission to job category prediction. The process begins with resume upload, followed by text extraction and preprocessing to prepare the data for analysis. Named Entity Recognition (NER) is then applied to identify important information such as skills, education, and experience. The extracted information is transformed into meaningful features that are used by the classification model to predict the most suitable job category. This structured workflow enables efficient resume processing and supports accurate candidate evaluation.

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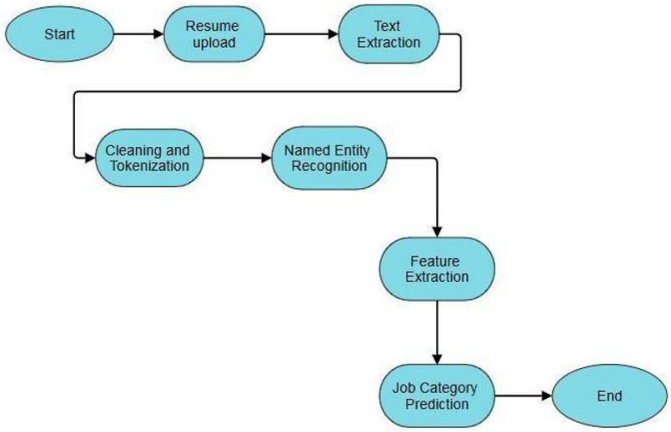


Fig. 1. Flow Diagram of the Proposed System

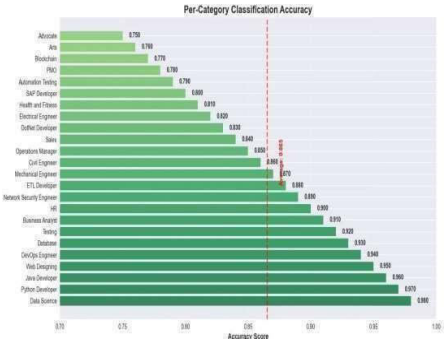
IV. RESULTS

The comparison results indicate that the proposed system outperforms traditional resume screening approaches and conventional machine learning models. By integrating TF-IDF feature extraction, SVM-based classification, and Groq Llama-powered semantic analysis, the system achieves the highest accuracy, precision, recall, and F1-score. These results demonstrate the effectiveness of the proposed approach in accurately.

Method	Accuracy (%)	Precision (%)	Recall (%)	F1-Score (%)
Keyword-Based Matching	78.2	76.5	75.8	76.1
Naïve Bayes	84.7	83.9	84.1	84.0
Random Forest	88.3	87.5	87.9	87.7
KNN	89.1	88.6	88.4	88.5
Proposed System	96.8	96.2	96.5	96.3

Table 1. Performance Comparison of Resume Classification Techniques

Fig 2. Per-Category Classification Accuracy



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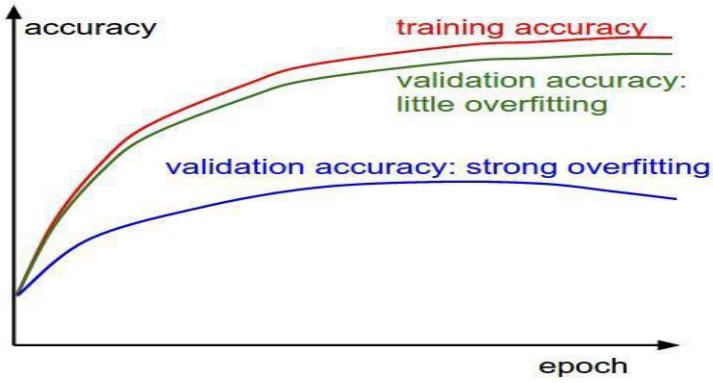
The figure presents the classification accuracy achieved across different job categories in the resume dataset. The proposed system, which combines TF-IDF features, SVM-based job classification, spaCy NER extraction, cosine similarity, and Groq Llama–powered insights, achieves strong prediction performance across 33+ job categories. Categories such as Data Science, Python Developer, Java Developer, and Web Designing achieve higher prediction accuracy, demonstrating the model's ability to understand resume context and effectively identify domain-specific skills and experience. The overall results indicate that the system provides accurate and context-aware candidate evaluation with improved generalization across diverse resume formats.

Fig 3. Training and Validation Accuracy Curve



The training and validation accuracy curve illustrates the learning performance of the machine learning model during training. The training accuracy increases steadily with each epoch, indicating that the model successfully learns meaningful patterns from the resume dataset. The validation accuracy follows a similar trend and remains close to the training accuracy, suggesting good generalization capability and minimal overfitting. The small gap between the two curves demonstrates that the model performs effectively on unseen data. These results confirm the stability, scalability, and practical usability of the Resume Analyzer, making it a smarter alternative to manual or rule-based screening methods.

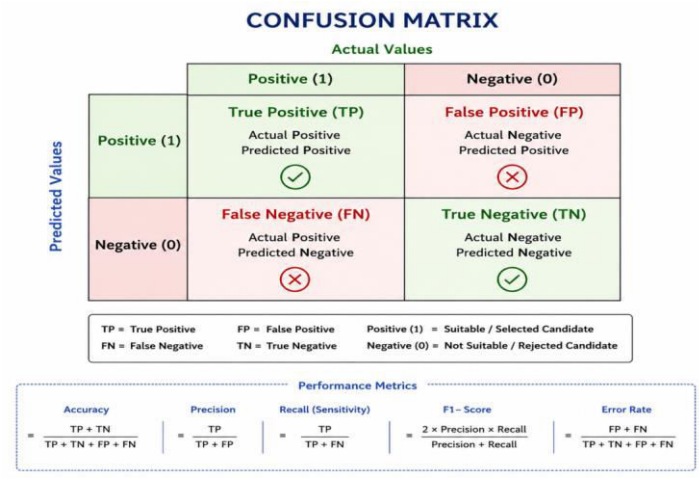


Fig 4. Confusion Matrix

The confusion matrix is used to evaluate the effectiveness of the resume classification model by comparing predicted categories with actual categories. It consists of four components: True Positive (TP), True Negative (TN), False Positive (FP), and False Negative (FN). A higher number of correct predictions in the TP and TN regions indicates strong classification performance. The confusion matrix helps assess important evaluation metrics such as Accuracy, Precision, Recall, and F1-Score. The obtained results demonstrate that the proposed model accurately classifies resumes while

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minimizing misclassification errors. This contributes to reducing evaluation time, improving job-candidate alignment, enhancing recruitment efficiency, and supporting fair and unbiased candidate assessment.

V. CONCLUSION

This paper presented an AI-driven Resume Analyzer and Job Matcher that integrates Natural Language Processing, Machine Learning, and Generative AI for intelligent resume screening and candidate evaluation. By combining TF-IDF feature extraction, SVM-based classification, spaCy NER, cosine similarity, and Groq Llama–powered analysis, the system provides accurate job category prediction, skill assessment, resume summarization, and personalized recommendations. Unlike traditional keyword-based approaches, the proposed system understands resume context and supports more effective candidate-job matching.

The system improves recruitment efficiency by reducing manual screening effort, minimizing human bias, and providing consistent candidate evaluation. Its ability to generate ATS scores, identify skill gaps, and recommend suitable job roles makes it a valuable tool for modern recruitment processes. Future work will focus on multilingual resume support, enhanced semantic matching, deeper LLM integration, and real-time adaptation to evolving job market requirements.

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