



RESUME RANKER POWERED BY LLM

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Abstract : In the market of employment today, it is a very competitive scene, and a competitive resume forms the root of the interview process for any job applicant. Many applicants fail to reflect their entire spectrum of skills and experiences rightly, and this often becomes a lost opportunity. The Resume Ranker project employs advanced technologies like Large Language Models (LLMs) and Machine Learning (ML) in order to make this process simpler. The main drive behind our service is to assist applicants in writing personalized resumes that may closely mirror specific job descriptions, while relieving recruiters from the tedium of work through the quality of candidate submissions. Thus, we set out to analyze the subtleties in each job posting and candidates' backgrounds to make the resumes more relevant and effective. Therefore, using complex algorithms that break down relevant skills and experiences desirable by employers, we help enhance a candidate's chances of getting shortlisted. In this paper, we outline our goals, methodologies, and findings and their implications on the improvement of the recruitment process for applicants as well as recruiters. Our research strives to create an efficient and effective hiring space for all parties at play.

IndexTerms - Natural Language Processing ,Language Models, Job Descriptions, Data Processing Frameworks, Document Processing.

I. INTRODUCTION

The ability of a job applicant to present his or her resume well-written, matching a specific job posting today is very important in the job market. In the wake of increased competition for jobs, most applicants find it difficult to present the best skills and experiences for each role on their resume. Fine-tuning resumes is very time-consuming and at times error-prone. It may even miss the potential interviews and diminish the chances of getting an interview.

All these technological advances and, more precisely, LLMs and ML, make it now possible to automate and improve the tailoring process of a resume. The Resume Ranker project will, using advanced technologies, such as LLMGemini, make the creation and matching of a resume much more accessible and efficient. This project shall help me to easily, quickly and effectively produce a customized resume suitable for the job description specified in a posting, using LLM capabilities.

Our approach is based on all the research done so far that explains how LLMs can be applied to help in making targeted resumes for different people. We also looked into some automated classification systems that help in using ML methods to ease screening for recruiters and make hiring easier. From these concepts, we ensured that the Resume Ranker helps the job applicant overcome his troubles while helping to uplift experience by the recruiter through high-quality, highly relevant resumes.

In this report, we shall discuss goals, procedures, results, and implications of the findings. Ultimately, the Resume Ranker aims at streamlining the task of job application since it will make qualification presentation much easier as well as the employer's candidate selection process less cumbersome for applicants.

II. NEED OF THE STUDY.

The increasing volume of job applications has made it difficult for recruiters to efficiently match candidates with job roles, while applicants often struggle to tailor resumes to specific job descriptions. This mismatch leads to lost opportunities and inefficient hiring. With the rise of AI technologies like Large Language Models and Machine Learning, there is a growing need for intelligent systems that can automate resume analysis and improve candidate-job matching. This study addresses that need by proposing a smart, scalable solution that benefits both recruiters and job seekers.

III. RELATED WORK

1. Resume Flow: An LLM-facilitated Pipeline for Personalized Resume Generation and Refinement
Publication Year: 2024 Authors: Saurabh Bhausaheb Zinjad, Amey Bhilegaonkar, AmritaBhattacharjee, and Huan Liu. Key Findings: This demo paper introduces ResumeFlow: An LLM-aided tool to quickly customize job-specific resumes with the power of advanced language models, such as GPT-4 and Google's Gemini, tapped for the extraction of key information from a job posting and a user-supplied resume. The tool produces high-quality outputs without pain, owing to no fine-tuning; effectiveness is demonstrated using a video demo, as well as novel evaluation metrics.

2. Password-based authentication and the experiences of end users
Publication Year:2023 Authors: Assumpta Ezugwua, Elochukwu Ukwandub,*, Celestine Ugwua, Modesta Ezemaa, Comfort Olebarac, Juliana Ndunagud, Lizzy Ofusori and Uchenna Omea Key Findings: This paper analyzed password-based authentication experiences of the university communities in southeastern Nigeria with age, education, and gender factors on 291 respondents. The analysis showed that account compromise is rarely witnessed, with good experiences concerning user accounts; it does not correlate with age or qualifications in education, though. The call for better password hygiene and exploration of the passwordless solution approaches stands necessary.

3. Resume ranking system using machine learning and NLP
Publication Year:2023 Authors: Huang,Prof..C.S. WaghHarmanpreet Singh2, Ketan Mishra3, ParameswarDas4 , Anupam Sagar5. Key Findings: This study identifies the challenges in selecting apt applicants in HR and describes an automated system using NLP and ML techniques with a view to screening and ranking resumes. MaLSTM has been applied for the selection of matching candidates against job descriptions, given a resume similarity assessment process.

4. Resume Parser Analysis Using Machine Learning and Natural Language Processing
Publication Year: 2023 Authors: Pratham Rasal1, Yashashri Balwaik2, Mahesh Rayate3, Rohit Shinde4, Prof. A. S. Shinde5 Key Findings: For the quantum increase in numbers along with diversities in resumes, online job applications proved to be just what was demanded as more traditional HR departments have found it increasingly tougher to manually sort through the increasing numbers, all due to not making use of natural language processing techniques for resume parsing. Natural language processing, using techniques in the resume parser, provides keyword-based matching for candidate analysis, hence streamlining recruitment processes and allowing for better candidate selection.

5. A Hybrid Resume Parser and Matcher using RegEx and NER
Publication Year:2023Authors:Gurushantha Murthy G R Shinu Abhi ,Rashmi Agarwal Key Findings: The innovation proposed here is using the solution of machine learning and deep learning in efficient candidate selection through the scoring of resumes based on extracted information and relevance to job descriptions. It would incorporate NLP techniques such as Named Entity Recognition and SBERT for vectorization purposes up to

a reaching 70% parsing accuracy on the selected data, which would streamline the candidate selection process while saving recruiters' time.

6. Resume Classification System using Natural Language Processing and Learning Techniques\Publication Year:2022\Authors: Irfan Ali^{1a}, Nimra Mughal^{1b}, Zahid Hussain Khand^{1c}, Javed Ahmed^{1d}, Ghulam Mujtaba^{1e}\Key Findings: In this paper, we develop an Automatic Resume Classification System (RCS) by applying natural language processing and machine learning techniques to automatically classify resumes.

IV. PROPOSED SYSTEM DESIGN

The suggested resume ranking system utilizes the strength of large language models (LLMs) and machine learning (ML) algorithms to facilitate the recruitment process. With the inclusion of Natural Language Processing (NLP) features, the system effectively processes resumes and job descriptions, detecting important skills, experience levels, and field-specific expertise to achieve accurate candidate-job matching. The system is designed to maximize recruitment by minimizing manual labor, increasing candidate selection accuracy, and generating informative recommendations for both candidates and recruiters.

The system architecture has a number of major components. The frontend, developed using React.js, is an interactive platform for recruiters and candidates to upload, edit, and manage resumes and job postings. The backend is a Django REST API, which handles requests, user authentication, and integrates with a MySQL database for secure storage and retrieval of profiles, resumes, and job descriptions. LLMs and NLP models process text data, distilling out critical insights and giving suggestions for alignment. Machine learning algorithms rank the candidates against the suitability for a job, whereas integrations from external job boards retrieve current job postings to enable improved job-matching features. Security features like encryption, role-based access control, and GDPR compliance provide data protection and confidentiality.

In addition, the system provides AI-based insights and suggestions, enabling candidates to edit their resumes and recruiters to shortlist the best candidates in a streamlined manner. Scalability is enabled through cloud deployment, microservices architecture, and asynchronous job processing. The future additions are generative AI for resume summary generation, blockchain-based verification of credentials, and multi-language support for international recruitment. Through the integration of cutting-edge ML algorithms, real-time job market intelligence, and AI-based analysis, this system overhauls the recruitment process, making candidate-job matching more efficient and accurate.



V. SYSTEM ARCHITECTURE

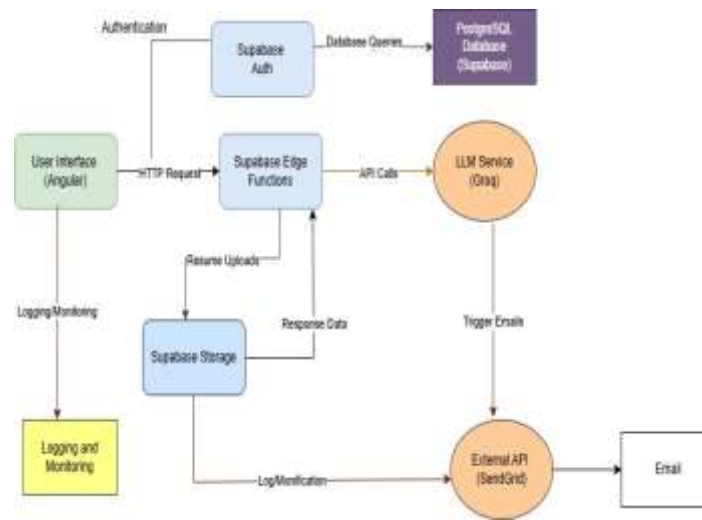


Figure 1: System Architecture

The proposed system comprises three major modules:

A. User Interface and API Module

This module offers an interactive interface for recruiters and candidates and ensures hassle-free data communication between the frontend and the backend.

1. **User Interface:** Implemented with Angular, building an intuitive platform on which candidates and recruiters can upload resumes and job descriptions and retrieve all relevant job data.
2. **HTTP Requests:** Tracks user activity and sends it as HTTP requests to the Supabase Edge Functions.
3. **Data Handling:** Requests are handled by the Edge Function, with storing and retrieving required data from a Supabase database.

4. **External Calls:** The module incorporates third-party APIs, such as LLM services, to enhance resume-job matching accuracy.

B. Supabase Edge Functions & Backend Services Module

This module handles one flow of data, business logic, third-party integration, and intelligent capabilities with LLMs.

1. **Supabase Edge Functions:**
Serves as a serverless backend wherein the logic runs securely and scalably.
Primes data validation, transformation, database operations, and integration calls.
2. **PostgreSQL Database (Supabase):**
Stores user data, resumes, job descriptions, matching results, and communication logs.
Provides real-time updates and security via Supabase's internal authentication and RLS (Row Level Security).
3. **LLM Service (Grog):**
Integrated through API calls from Edge Functions to carry out NLP-based job description and resume

analysis.

Returns structured data with match percentage, missing skills, and suggestions.

4. Data Handling:

Response data from LLMs is parsed and cached for future use or displayed directly on the frontend.

C. External Integration and Notification

This module provides AI-powered enhancement and real-time communication features.

1. External APIs (e.g., SendGrid):

For email notification sending. Also can integrate job board APIs to pull live job information (optional future development).

2. Email Notification:

Invoked through Supabase Edge Functions upon system events such as resume uploads, job application success, or matching success.

VI. RESULTS AND DISCUSSION

The Large Language Model-powered resume matching system produces a number of important outputs that refine the recruitment process for both recruiters and candidates. A key output includes a match score, which measures the degree of similarity between a candidate's resume and job postings. This score enables recruiters to rank candidates in an effective manner such that the most suitable candidates are given top priority. Moreover, the system emphasizes the most important skills and keywords that are common between resumes and job postings, as well as gaps that candidates might need to fill.

One of the most important aspects of the system is the recommendation summary, which gives candidates personalized recommendations for enhancing their resumes. The recommendations can range from filling in missing skills, enhancing descriptions of past jobs, or customizing resumes to fit particular job listings better. Aside from resume analysis on an individual basis, the system offers extensive candidate profiles, such as education, work history, and skill assessments, assisting recruiters in making informed choices based on thorough candidate information.

The system further includes interactive visual analytics dashboards, which allow for important hiring metrics, trends, and analysis of recruitment patterns. This is a feature through which recruiters are able to monitor candidate pools, observe hiring success rates, and adjust job postings according to data-driven analysis. To increase user engagement, the system utilizes automated email notifications to candidates, whereby they are made aware of matching results and get real-time tips on how to improve their resumes. These reminders keep the applicants informed about the status of their applications and constantly enhance their profiles to secure improved job opportunities.

In total, the system not only enables effective candidate-job matching but also empowers recruiters and job seekers with actionable insights, rendering the recruitment process more efficient, data-driven, and effective.

VII. CONCLUSION

The proposed large language model-based resume ranking system represents a significant advancement in hiring technology. By incorporating advanced natural language processing methods, the system enhances the accuracy and efficiency of candidate-job matching. The seamless integration of AI-powered features, real-time job board data, and automated notifications ensures a dynamic and user-centric recruitment platform. The system not only optimizes the hiring process for recruiters but also empowers job seekers with valuable insights and recommendations for career growth. Future work will focus on expanding AI capabilities, refining matching algorithms, and incorporating real-time labor market analytics to further enhance its adaptability. This system sets a new benchmark in intelligent hiring solutions, bridging the gap between employers and job seekers with unprecedented efficiency and precision.

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