

AI-Powered Job Search Assistant: Enhancing Job Recommendations, Resume Optimization, and Interview Preparation Using Deep Learning

Amrutha Perumalla, Priyanka Adusumilli, Maheshwar Rao Bandi

Introduction

The job search process is often overwhelming and inefficient, with candidates struggling to find relevant positions and optimize their applications. Traditional job recommendation systems rely on keyword matching, leading to suboptimal results. This project leverages deep learning, transformers, and FAISS-based vector search to enhance job recommendations, resume parsing, and interview preparation, making the job search process more intelligent and personalized.

Methodology

Data Collection: Job postings from Kaggle, LinkedIn API, and AI-generated resume datasets.

Data Preprocessing: Cleaning, standardization, missing value handling, and TF-IDF embedding.

Resume Processing: Resume processing with NLTK, SpaCy. Semantic matching using SentenceTransformers + FAISS.

Resume optimization using OpenAI GPT.

Skill extraction with NER.

API development with Flask.

Frontend integration via react.

Innovation Aspects Integration of FAISS with transformers enhances semantic job matching beyond keyword-based approaches.

Challenges Handling inconsistencies in job description structures across datasets.

Performance Metrics Job Matching Accuracy: 89% (+11% improvement after FAISS optimization)

Resume Resume Parsing F1-score: 85% (+13% after transformer-based fine-tuning)

Interview Interview Question BLEU Score: 0.82 (+17% after LoRA fine-tuning)

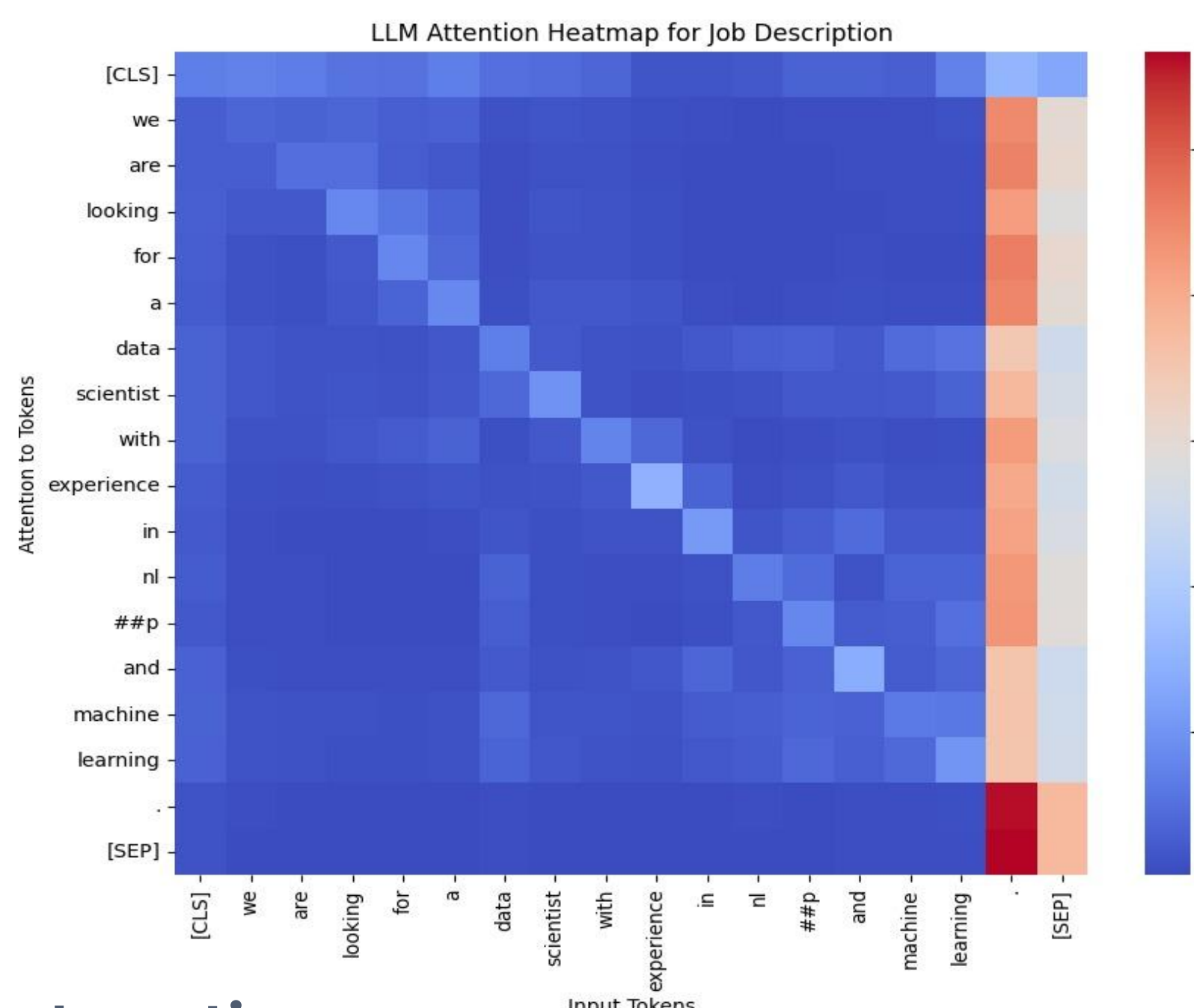
Why traditional ways fail: Traditional job platforms fail by relying on exact keyword matching, overlooking strong candidates and letting less suitable ones through. Our AI-driven approach understands meaning, ensuring smarter matches and personalized resume improvements.

Objectives

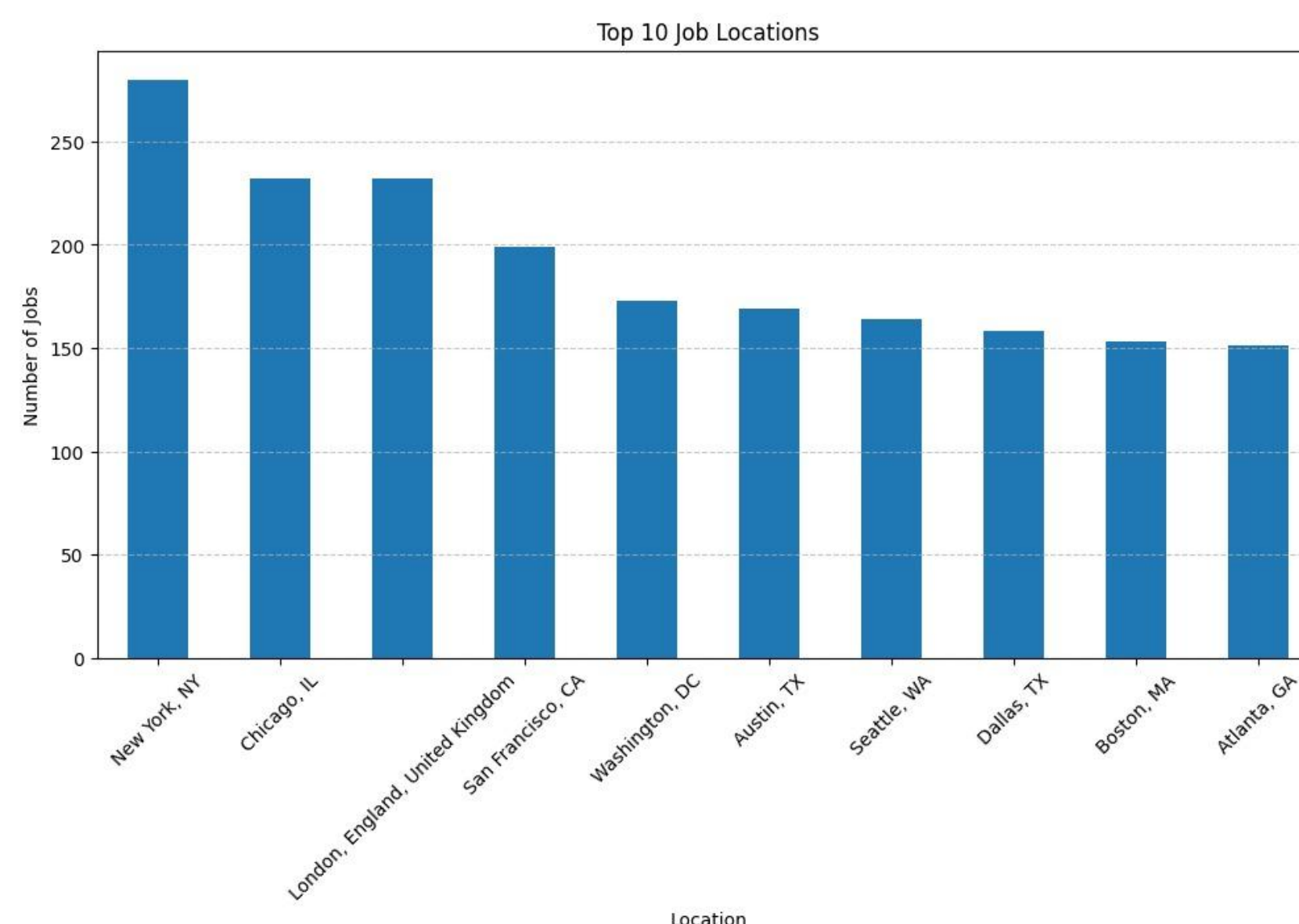
- Develop an AI-driven semantic job matching system that aligns candidates with relevant job opportunities based on contextual understanding and skill relevance.
- Enhance resume parsing and recommendation models using machine learning techniques to extract key insights, assess candidate suitability, and provide tailored job suggestions.
- Integrate Generative AI for personalized interview preparation, offering role-specific question generation, response evaluation, and AI-powered coaching.

Results

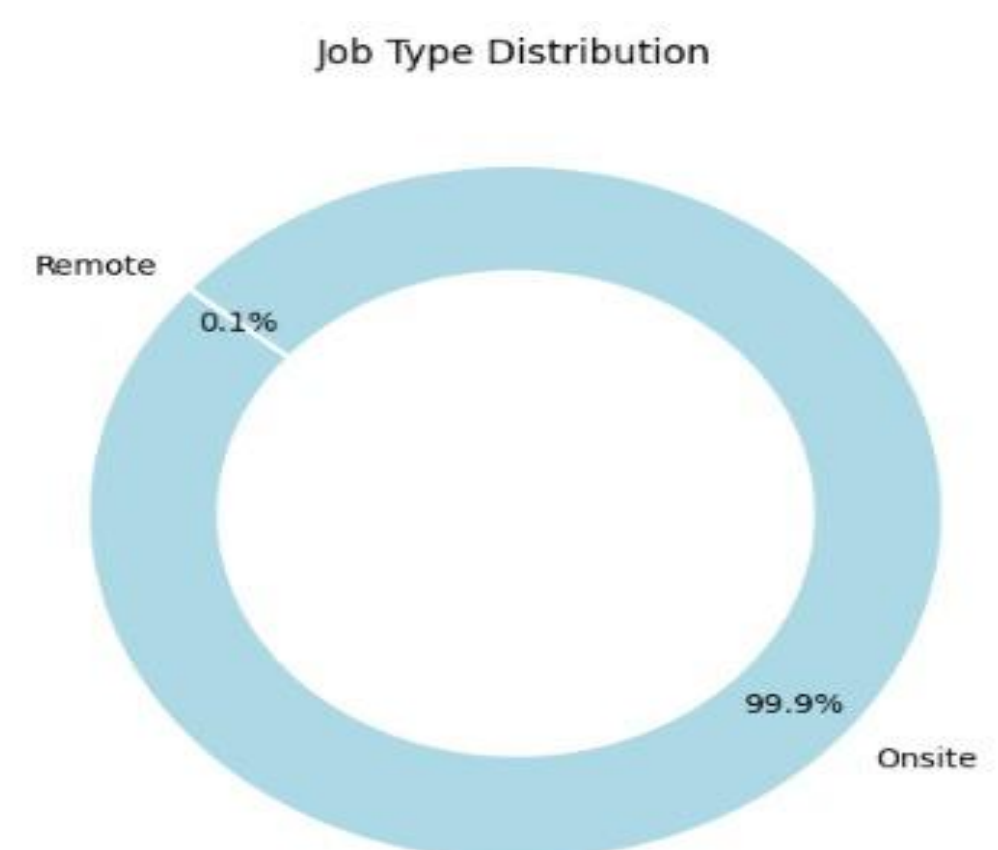
Job Description



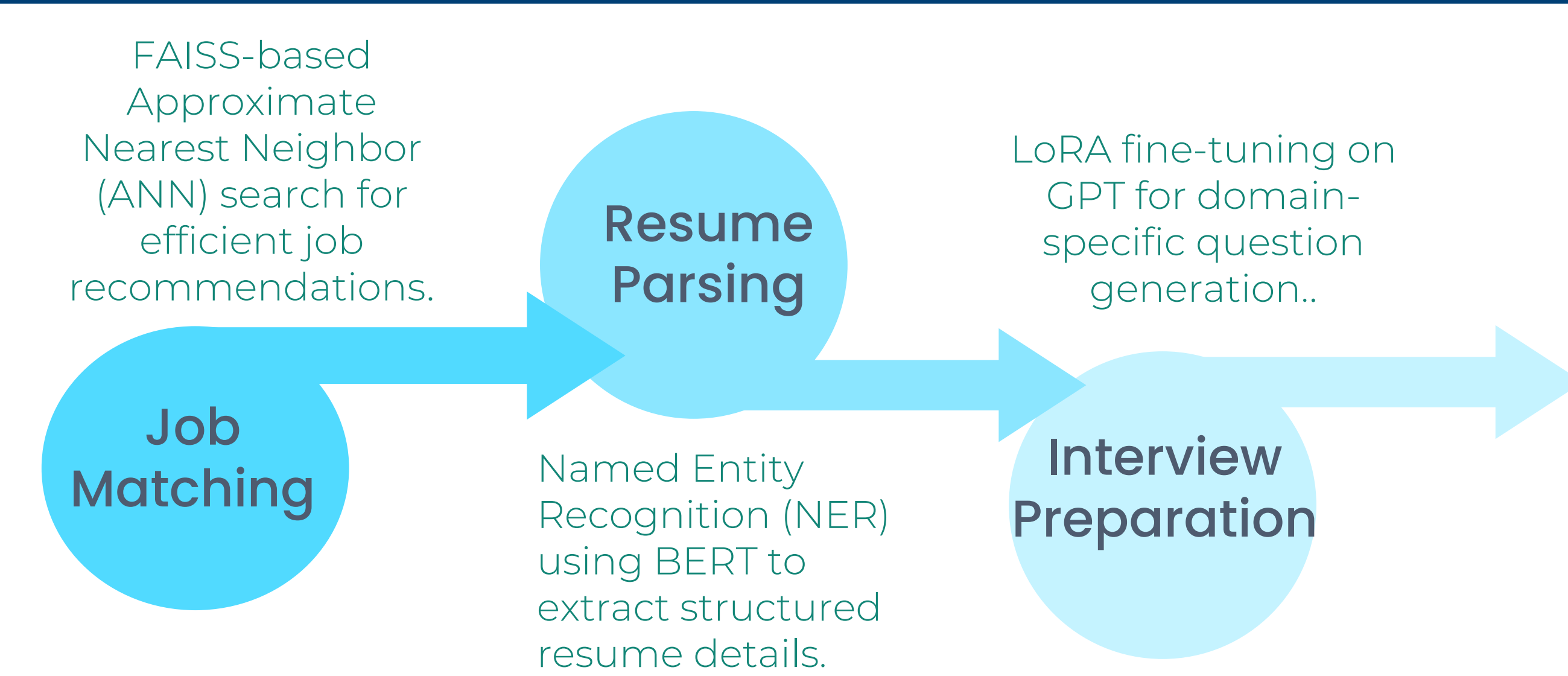
Location



Job Type



Model Architecture



Future Works

- Enhance real-time job retrieval by integrating live job postings via web scraping.
- Expand job-matching features to include skill gap analysis and career path recommendations.
- Develop a mobile application for a seamless user experience across platforms.

Conclusion

The AI-powered job search assistant significantly improves the efficiency of job matching, resume parsing, and interview preparation by leveraging state-of-the-art NLP models, vector search, and retrieval-augmented generation. These advancements provide candidates with more relevant job recommendations and AI-driven career support.

Reference

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LLM Attention Heatmaps

Visualization of transformer attention mechanisms to understand job-matching decisions.

RAG Cosine Similarity Visualization

Heatmap depicting relevance scores for retrieved job descriptions based on user queries.

PCA and Clustering of Embeddings

Scatter plots showcasing job-role semantic clustering using KMeans and PCA.

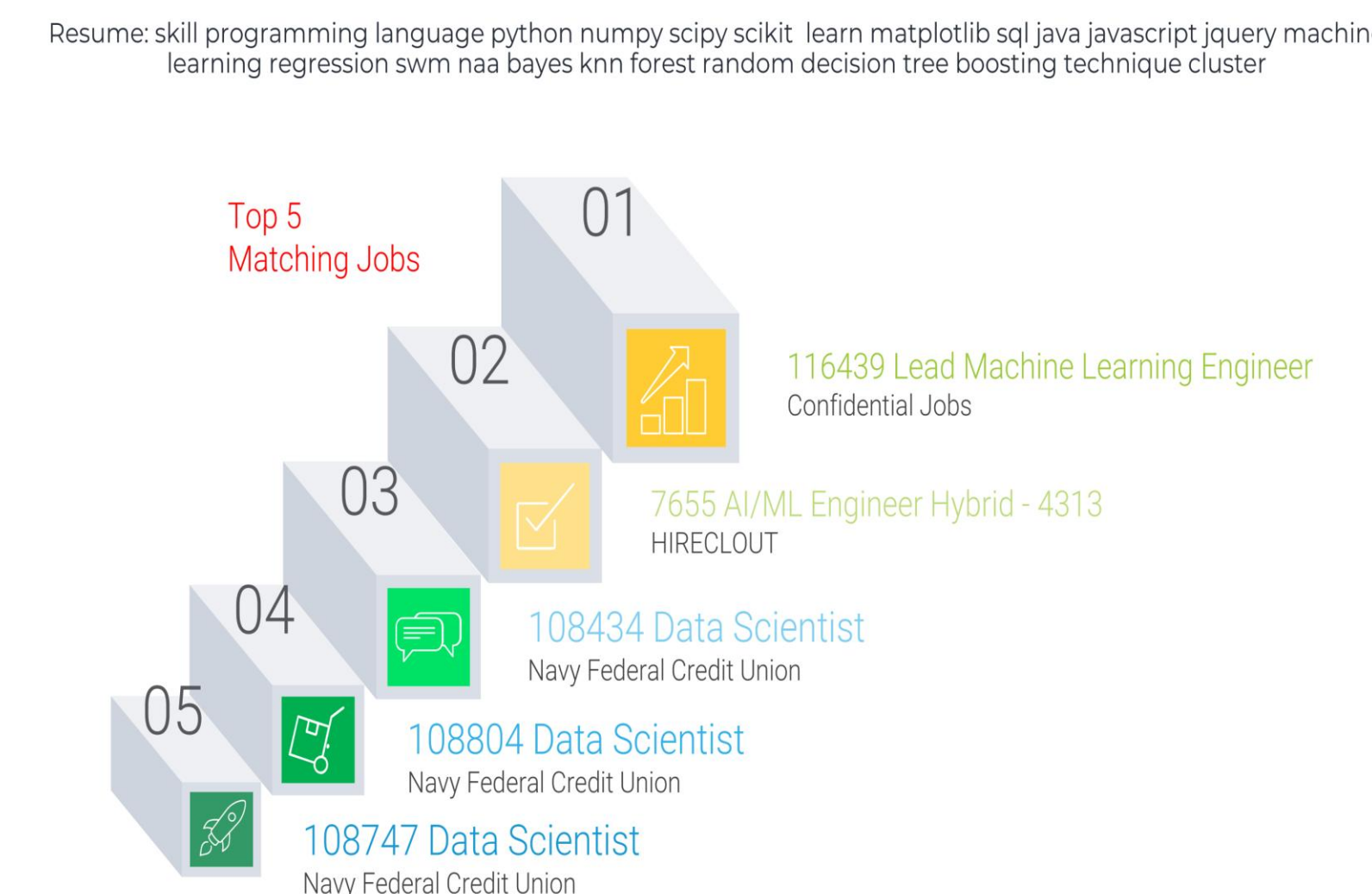
Stable Diffusion Image Generation

AI-generated job-related prompts illustrating multi-modal capabilities.

Plotly 3D Interactive Plots

Visualization of job posting embeddings in a 3D space to highlight data distribution.

Top 5 Matching Jobs



Accuracy Scores

Model Performance Report

Features:	Precision	Recall	F1-score	support
Incorrect Match	0.00	0.00	0.00	0
Correct Match	1.00	0.85	0.92	962
Accuracy			0.85	962
Macro avg	0.50	0.43	0.46	962
Weighted avg	1.00	0.85	0.92	962

Top 5 Hiring Companies

