

Exploratory Analysis of Job Market Trends on LinkedIn

A Project Based Learning Report Submitted in partial fulfilment of the requirements for the award of the degree

of

Bachelor of Technology

in The Department of CSE

Data Analytic and Visualization with 24AD01HF

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NOV - 2025.

Abstract

The "AI Job Trends Explorer" is a web-based platform that analyzes and visualizes real-time job market trends using LinkedIn job data across India.

The project utilizes data analytics and machine learning techniques to identify the most in-demand job roles, required skills, and top hiring companies.

By leveraging AI-driven recommendations, the system helps users discover relevant jobs that align with their career goals.

This project aims to bridge the gap between job seekers and market trends, providing actionable insights through an interactive dashboard and intelligent job recommendations.

In today's data-driven era, understanding job trends has become essential for students, professionals, and educators. The *AI Job Trends Explorer* leverages Artificial Intelligence (AI) and Data Analytics to provide real-time insights into India's job market by analyzing LinkedIn job postings. The system identifies the most in-demand job titles, trending skills, and hiring locations using natural language processing (NLP) and similarity-based algorithms.

Our project focuses on creating an intelligent web application that not only visualizes job statistics but also recommends personalized job opportunities using machine learning models such as TF-IDF Vectorization and Cosine Similarity. The project was developed using Python (Flask Framework) for backend logic and HTML/CSS/Bootstrap for the frontend design.

This platform simplifies decision-making for job seekers by combining analytics with AI-powered suggestions, bridging the gap between academic learning and industry demand.

Introduction

The modern job market is rapidly evolving, with new technologies, skills, and roles emerging every day. For students, professionals, and career aspirants, understanding these trends is essential to make informed career decisions. LinkedIn, being a leading professional networking platform, offers a wealth of data on job postings, company hiring trends, and skill demands across regions.

The "AI Job Trends Explorer" project was developed to analyze this job data specifically for India. The project involves data collection, data cleaning, preprocessing, and visualization. The cleaned dataset was used to design an interactive website that provides key insights into top job titles, trending skills, and AI-based job recommendations.

Our website features four major sections:

1. ****Home Page**** – Introduces the system and highlights its purpose.
2. ****Dashboard**** – Displays visual analytics such as top job titles, companies, and locations.
3. ****Search Jobs**** – Allows users to search for jobs based on title, location, and work type.
4. ****AI Recommendations**** – Uses text similarity and AI models (TF-IDF and cosine similarity) to recommend jobs based on skills or keywords entered by the user.

This system not only benefits job seekers but also provides educators and institutions valuable insights into market demands for aligning academic programs with real-world needs.

Literature Survey

Several research papers and online resources have explored job market analytics using machine learning and natural language processing (NLP) techniques.

Studies indicate that data-driven job recommendation systems outperform traditional keyword search methods by analyzing job descriptions and user profiles more effectively.

LinkedIn job data has been widely used in previous research for trend prediction, salary estimation, and skill-gap analysis. Techniques such as TF-IDF, cosine similarity, and clustering are commonly applied for text-based job description analysis. Our project builds upon these foundations, focusing on Indian job market data to provide location-based insights and recommendations.

Existing job platforms provide search features but lack advanced analytics or AI-driven recommendations. Our project builds upon this research by integrating:

- Data Cleaning (handling null values and duplicates)
- Skill clustering using vector similarity
- Interactive visual dashboards for end users

This system differs by emphasizing *AI-based recommendation logic* rather than static job listings, thus providing a smart and educational experience.

Methodology

Step 1: Data Collection

Job data was sourced from a publicly available LinkedIn dataset containing thousands of job postings from Indian companies. The dataset included attributes like Job Title, Company, Location, Work Type, Skills, and Post Date.

Step 2: Data Cleaning & Preprocessing

- Removed duplicates and irrelevant entries.
- Normalized location names and standardized job titles.
- Filled missing skill data using inference from job descriptions.

Step 3: Feature Engineering

- Tokenization and lemmatization were applied to extract skills and job titles.
- TF-IDF vectorization was used to represent job descriptions numerically.

Step 4: Model Development

Cosine Similarity was applied on TF-IDF vectors to measure the similarity between job descriptions and user queries, forming the recommendation base.

Step 5: Visualization & Dashboard

Matplotlib and Seaborn were used to visualize job trends (e.g., top companies, top 15 job roles, and city-wise demand).

Step 6: Web Integration

The backend (Flask) communicates with the preprocessed dataset and recommendation model, rendering the insights dynamically on the frontend using HTML, CSS, and Bootstrap.

Experiments

Experiments were conducted on the processed LinkedIn dataset to generate visual insights and evaluate job similarity recommendations.

Key experiments include:

- Extraction of top 15 job titles, locations, and companies across India.
- Implementation of a search feature that filters jobs by keywords, location, and work type.
- Development of an AI recommendation engine that identifies the best-matching jobs based on user input.

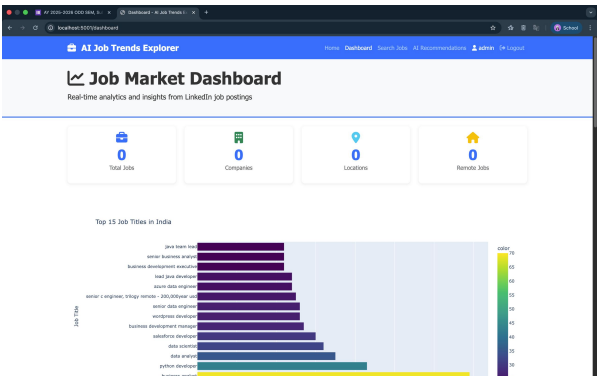
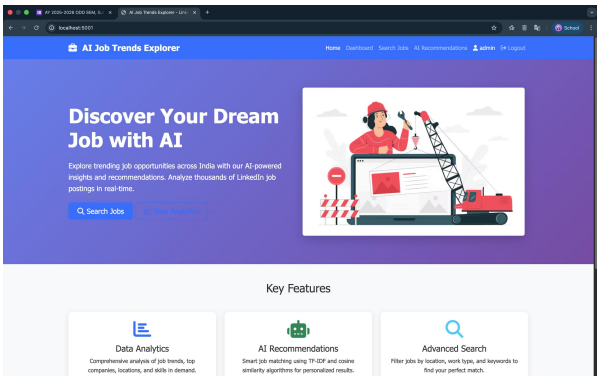
These results were visualized on the website dashboard through bar graphs and match percentage indicators.

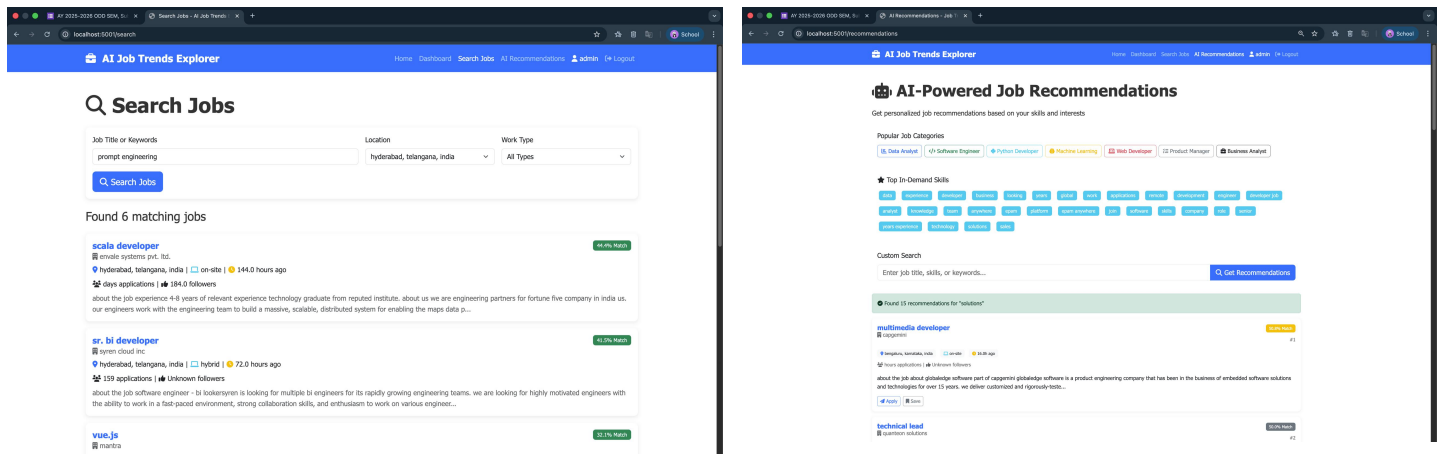
Results

The "AI Job Trends Explorer" web application provides:

- **Interactive Dashboard:** Displays total jobs, top job titles, and hiring locations.
- **AI Recommendations:** Suggests jobs based on similarity scores.
- **Advanced Search:** Enables filtering based on job title, location, and work type.

The platform successfully demonstrates how LinkedIn job data can be leveraged to derive meaningful insights and assist job seekers through AI-driven analytics.





Conclusion and Future Work

This project demonstrates the integration of data analytics, AI, and web technologies to explore real-world job trends from LinkedIn data.

The "AI Job Trends Explorer" offers users a comprehensive understanding of the Indian job market through data visualizations and personalized job recommendations.

Future improvements can include:

- Integration of real-time LinkedIn API for continuous data updates.
- Adding salary predictions and skill recommendations.
- Enhancing AI models using deep learning techniques for better accuracy.

References

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