



Green University of Bangladesh

*Department of Computer Science and Engineering (CSE)
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AI-Powered Next-Gen Job Recommendation System Using NLP and Machine Learning

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1 Introduction

The AI-Powered Next-Gen Job Recommendation System (NGJRS) leverages Natural Language Processing (NLP) and Machine Learning (ML) to enhance job matching. It provides personalized job recommendations by analyzing user profiles, resumes, and job listings. The system offers real-time job search, automated CV parsing, employer-candidate matching, and a user-friendly interface. By integrating external job boards and continuously learning from user interactions, NGJRS ensures accurate and efficient job recommendations, making the hiring process faster and more effective for both job seekers and employers.

2 Objectives

The major objectives of this project are:

- **Develop an AI-Based Job Recommendation System:** Implement an intelligent recommendation engine that utilizes NLP and machine learning to enhance job matching accuracy.
- **Improve Candidate-Job Suitability:** Use BERT embeddings and semantic similarity techniques to ensure that job recommendations align with candidate skills and preferences.
- **Optimize the Recruitment Process:** Provide recruiters with a ranked list of potential candidates based on job requirements, reducing manual filtering efforts.
- **Enhance User Experience:** Design an intuitive user interface for job seekers and employers, ensuring ease of use and seamless navigation.
- **Integrate External Job Data Sources:** Aggregate job listings from various external job boards to provide users with up-to-date employment opportunities.

3 Main Component of the System

In this chapter, we discuss the key components of the *AI-Powered Next-Gen Job Recommendation System Using NLP and Machine Learning* (NGJRS). The system is primarily composed of three main components: **Job Recommendation, Job Searching, and User Profile Management.**

3.1 Job Recommendation

The job recommendation system leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to suggest relevant job opportunities based on user profiles, skills, and preferences. The system:

- Analyzes user data to determine career preferences.

- Uses NLP techniques to extract meaningful insights from job descriptions.
- Applies machine learning algorithms to provide personalized job recommendations.
- Continuously updates recommendations based on user activity and feedback.

3.2 Job Searching

The job searching module enables users to find jobs efficiently based on various criteria. The key functionalities include:

- Search jobs using keywords, categories, and location-based filters.
- Integrate job postings from multiple sources in real-time.
- Rank search results based on relevance to the user's profile.
- Provide advanced filtering and sorting options to enhance user experience.

3.3 User Profile Management

This component allows users to create and manage their profiles efficiently. The main functionalities include:

- Users can generate a CV dynamically based on the information they provide.
- Users can upload an existing CV, and the system extracts relevant information using NLP techniques.
- Manage user preferences, skills, and career goals.
- Store and update user data securely in the database for future recommendations.

These core components collectively enhance the efficiency of job search and recommendation, ensuring an intelligent, AI-driven system that optimizes the job-matching process.

3.4 High-Level Architecture Diagram

The high-level architecture of the system is illustrated in Figure 1. It provides an overview of how different components interact within the system.

The diagram highlights the interconnection between the main components, showcasing how user data flows through the system for job recommendations, job searching, and profile management. The system dynamically fetches job listings and ensures real-time updates to improve accuracy and efficiency.

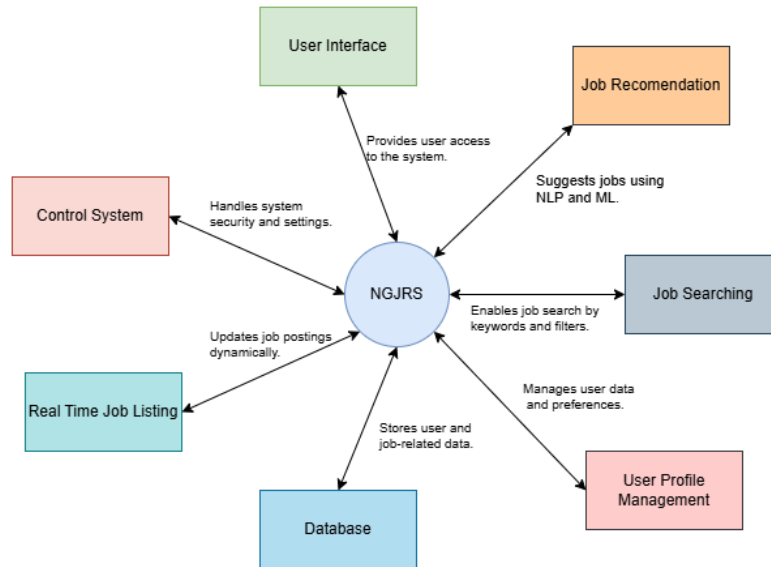


Figure 1: High-Level Architecture of NGJRS

4 Conclusion & Discussion

4.1 Conclusion

The *AI-Powered Next-Gen Job Recommendation System Using NLP and Machine Learning* was designed to enhance job search efficiency by leveraging advanced AI techniques. The system integrates three main components: **Job Recommendation**, **Job Searching**, and **User Profile Management**, each playing a crucial role in delivering personalized job opportunities to users.

Through the use of NLP and ML, the system effectively analyzes user profiles and job descriptions to provide intelligent recommendations. The job search functionality ensures flexibility by allowing users to filter and explore job listings based on various criteria. Additionally, the profile management module simplifies the job application process by enabling users to either generate a CV from their details or extract information from an uploaded CV.

4.2 Discussion

The development of this system addresses several challenges in traditional job search platforms. By utilizing real-time job listings and AI-driven recommendations, the system enhances the job-seeking experience. However, some aspects require further improvement:

- **Scalability:** As the number of users and job listings grows, the system must efficiently handle large-scale data processing.
- **Data Accuracy:** Ensuring accurate extraction of user details from uploaded CVs remains a challenge, requiring further refinement of NLP models.

- **User Experience:** The system should continuously improve its interface to provide a seamless experience for job seekers.

Future enhancements may include integrating more advanced deep learning techniques for improved job matching, expanding the database of job listings, and implementing real-time feedback from users to refine recommendations.

References

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