AI-DRIVEN CAREER PATHWAYS: DECODING PAST EMPLOYMENT TRENDS AND COMPANY EXPECTATIONS FOR TARGETED SKILL GROWTH

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Keywords:

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Introduction:

In today's fast-evolving job market, where technology reshapes industries and employer expectations shift rapidly, engineering students must adapt swiftly. At Malnad College of Engineering (MCE), Hassan, the Training and Placement (T&P) cell plays a key role in bridging academic learning with industry demands.

This project introduces an AI-powered placement portal customized for MCE. It analyses historical placement data, decodes employer requirements, and delivers personalized career insights. The platform uses NLP-based resume analysis, job-role prediction, and data-driven dashboards to help students enhance their skills and assist recruiters in finding suitable candidates. With secure login, real-time updates, and intuitive navigation, it streamlines communication among students, placement officers, and companies. Integrating AI into the placement system improves efficiency and empowers MCE students to be industry-ready.

Objectives:

1. To develop an AI-driven platform that enhances the efficiency of the placement process at MCE.
2. To analyze historical placement data and employer trends for predictive insights.
3. To recommend targeted skill development pathways to students.
4. To assist placement officers with dashboards for better decision-making.
5. To facilitate accurate resume parsing and job-role matching using NLP.
6. To provide a secure, accessible, and user-friendly platform for all stakeholders involved.
7. To improve the connection between academia and industry through intelligent data analysis.

Methodology:

The project began with Requirement Analysis, where the core users Admin, Company, and Candidate were identified, and essential functionalities like job postings, applications, resume matching, and communication modules were defined. For Database Design, a structured relational schema was developed using MySQL, with key tables for Admin, Company_Details, Candidate_Details, Jobs, ApplyDetails, Notification, and Contact to manage recruitment data. The Backend Development utilized the Flask web framework, with SQLAlchemy integrated as an ORM to streamline database operations.

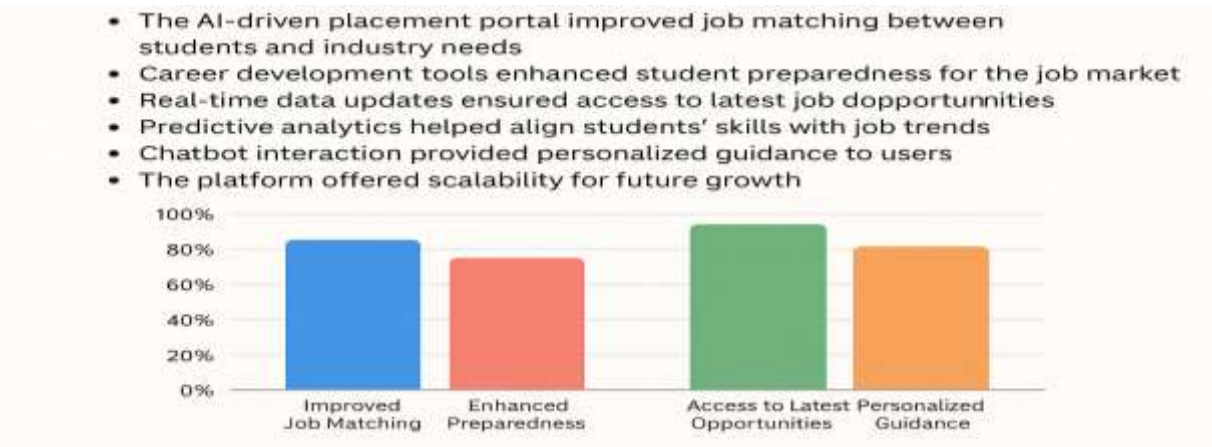
Routes for user authentication, job postings, candidate-job matching, and password recovery were implemented. For the Frontend Implementation, interactive HTML pages were created using Jinja2 templating, with Bootstrap ensuring responsive design. Forms for login, registration, and application submissions were also designed. The Skill Matching Engine compared candidate-entered skills with predefined job-role requirements, using the intersection count of matching skills to assess job suitability. A Chatbot and Recommendation Logic was developed with a lightweight rule-based chatbot that guides students through keyword matching, while skill-based job recommendations were computed using set operations. Email Integration was achieved using Gmail's SMTP service to send notifications and password reset emails, with MIME libraries ensuring secure message formatting. Testing and Validation

included unit and integration tests for each module in the Flask testing environment, ensuring correctness in form inputs and backend queries. Finally, the application was deployed locally on a Flask server connected to MySQL for testing purposes.

Result and Conclusion:

In Conclusion, The AI-driven placement portal integrates predictive analytics and machine learning to improve job matching between students and industry needs. Key outcomes include real-time data updates, improved peer collaboration, and better access to career development tools. AI algorithms offer personalized job recommendations based on students' skills, enabling targeted career planning.

The system enhanced the job application process, reduced mismatches, and boosted recruitment efficiency. Tools like resume builders, interview guides, and career counselling helped students prepare effectively. Real-time updates ensured access to the latest job opportunities, while recruiters benefited from streamlined candidate filtering. Chatbot integration increased student engagement, and the secure, modular architecture allows for future scalability. Overall, the project successfully strengthened student career development and simplified placement workflows, offering long-term potential for institutional adoption.



Project Outcome & Industry Relevance:

The AI-powered Placement Portal bridges the gap between academic learning and industry expectations by offering tools like interview simulations, resume building, and AI-driven job recommendations. It enhances placement efficiency at Malnad College of Engineering, allowing placement officers to track job trends and candidate

performance. Recruiters benefit from skill-based candidate filtering. The system's scalable design enables future adaptation and expansion, potentially integrating with institutional databases or other departments.

Working Model vs. Simulation/Study:

The project developed a fully functional model using Flask for the backend and MySQL for database management. It includes modules for login, registration, job posting, application submission, and an admin dashboard, all manually tested in a local environment. Features like skill-based job recommendations, application tracking, and chatbot support were validated with live data. The system, ready for deployment, can be directly adopted and scaled at Malnad College of Engineering and extended to other campuses.

Project Outcomes and Learnings:

The project developed a functional AI-based placement portal, streamlining the recruitment workflow. It provided hands-on experience in full-stack web development with Flask and SQL, including secure login and role-based access. The integration of a basic chatbot and SMTP email system offered insights into user engagement. Through debugging and testing, the team gained experience in backend integration, frontend responsiveness, and system validation. Overall, the project enhanced their ability to design scalable platforms aligned with industry needs.

Future Scope:

- The AI-driven placement portal has the potential to transform recruitment in academic institutions.
- It can be extended beyond a single college, supporting a centralized platform for multiple institutions under a university or state body.
- As data accumulates, predictive modelling will improve, allowing for proactive career guidance.
- The system can track student progress, skill development, and placement trends over time.
- Its modular design allows integration with national employment databases and government skilling initiatives.

- Future research could focus on adaptive learning pathways and intelligent mentorship suggestions.
- Incorporating psychometric assessments can enhance job-role matching accuracy.