

SMART CAMPUS RECRUITMENT PORTAL USING GENERATIVE AI FOR OPTIMIZED STUDENT PLACEMENT

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Keywords:

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Introduction:

1. The campus recruitment process plays a crucial role in shaping students' careers, yet many institutions still rely on manual or semi-automated systems that are inefficient, time-consuming, and prone to errors. Traditional placement systems often lack intelligent analysis of student profiles, making it difficult for Training and Placement Officers (TPOs) to efficiently shortlist candidates and match them with suitable job roles
2. In recent years, several recruitment platforms and Applicant Tracking Systems (ATS) have been developed to automate hiring processes. These systems focus on keyword-based resume filtering and basic matching techniques, but they often fail to provide deep insights such as skill-gap identification, contextual understanding of resumes, and personalized recommendations. With the emergence of Generative AI and Natural Language Processing (NLP), there is a significant opportunity to enhance recruitment systems with intelligent decision-making capabilities
3. The proposed project, "Smart Campus Recruitment Portal Using Generative AI for Optimized Student Placement," builds upon these existing systems by integrating advanced AI technologies. The system uses Google Gemini to perform semantic analysis of resumes and job descriptions, enabling accurate ATS scoring, skill extraction, and job-role matching. Unlike traditional systems, it provides detailed insights such as missing skills and job-fit analysis.

Objectives:

1. Build an AI-driven placement management system that automates student registration, resume uploads, job drive creation, and application tracking using a centralized platform.
2. Integrate Generative AI (Google Gemini) to analyze resumes by extracting key information, generating ATS scores, identifying skill gaps, and matching resumes with job descriptions.

3. Implement secure data storage and backend services using Supabase, including authentication, student profiles, job drives, applications, and AI-generated outputs.
4. Develop automated workflows using email notifications to inform students about shortlisting, selection, and placement updates in real time.
5. Deploy the portal and AI services on AWS using cloud infrastructure (EC2, S3, CloudWatch) for scalable, reliable, and high-performance access.
6. Enable CI/CD automation using DevOps tools (GitHub Actions/Jenkins) to ensure continuous testing, building, and deployment of application updates.
7. Provide AI-generated mock tests and proctoring features, including job-role-specific questions and browser tab-switch detection to prevent cheating.
8. Create role-based dashboards and analytics modules for Students, HODs, and TPOs, including downloadable Excel reports and placement statistics for institutional review.

Methodology:

1. The project begins with gathering placement requirements and identifying essential data such as student profiles, resumes, job descriptions, and placement drives. A secure backend is established using Supabase, where structured tables for Users, Students, Drives, Applications, and AI Scores are created to manage all data efficiently.
2. Student resumes are uploaded through the portal and preprocessed using Python libraries like PyPDF2 to extract textual content. The extracted data is cleaned by removing unnecessary formatting and organizing it into a structured format suitable for analysis.
3. The processed resume data and job descriptions are then passed to Google Gemini, which acts as a Generative AI-based Large Language Model. The model performs semantic analysis to generate ATS scores, extract key skills, identify missing skills, and evaluate job-role compatibility. The generated results are stored back in the database for further use.
4. The application logic is handled by a Flask-based backend, which manages authentication, role-based access control, and communication between the frontend, AI services, and database. Automated email notification systems are implemented to inform students about application status, shortlisting, and selection updates.
5. Advanced features include AI-generated mock tests based on job descriptions to help students prepare effectively. A proctoring mechanism using JavaScript is implemented to detect browser tab switching during tests, ensuring fairness and integrity.
6. The system undergoes thorough testing across all modules, including resume parsing, AI scoring, application tracking, and notification systems. Finally, the complete application is deployed on AWS using EC2 for hosting, S3 for storage, and CloudWatch for monitoring.
7. CI/CD pipelines are configured using GitHub Actions to automate testing, integration, and deployment processes. The final system provides a scalable, secure, and intelligent platform with real-time resume evaluation, placement management, and analytics dashboards for Students, HODs, and TPOs.

Result and Conclusion:

1. The system will provide an intelligent, automated, and scalable placement solution using Flask, Supabase, and AWS, where resumes are analyzed using Google Gemini to generate ATS scores, extract skills, and perform job-fit analysis.
2. Resume parsing using PyPDF2 and AI-based processing will produce reliable and consistent results, enabling efficient and unbiased candidate shortlisting through a real-time evaluation pipeline.
3. The portal will generate structured outputs such as ATS scores, skill match percentages, missing skills, and eligibility status, helping students improve their placement readiness while ensuring secure data storage using Supabase.
4. Deployment on AWS (EC2, S3, CloudWatch) will ensure scalability, high availability, and reliable performance, along with automated email notifications for real-time communication of application status and results.
5. Additional features such as AI-generated mock tests, proctoring mechanisms, and role-based dashboards with analytics will enhance student preparation and support data-driven decision-making, resulting in a robust and user-friendly placement platform.

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Future Scope:

1. The Smart Campus Recruitment Portal using Generative AI can be further enhanced by integrating more advanced AI models to improve the accuracy and depth of resume analysis and job matching. Future developments can include the use of multimodal AI models to analyze not only resumes but also video interviews and candidate communication skills.
2. The system can be extended to include predictive analytics, where machine learning models can forecast student placement success based on historical data and performance trends. Integration with external job portals such as LinkedIn, Naukri, or Indeed can expand job opportunities and improve candidate-job matching at a larger scale.

3. A dedicated mobile application can be developed to provide easy access for students and recruiters, enabling real-time notifications and seamless interaction. The platform can also incorporate chatbot-based career guidance systems to assist students in resume building, interview preparation, and career planning.
4. Advanced proctoring mechanisms such as webcam monitoring, facial recognition, and behaviour analysis can be implemented to ensure higher integrity during online assessments. Additionally, the system can be enhanced with role-specific analytics dashboards for institutions to track placement performance, recruiter engagement, and student progress.
5. The project can also be transformed into a Software-as-a-Service (SaaS) platform, allowing multiple institutions to use the system with customized configurations. Further research can focus on improving explainability of AI decisions, ensuring fairness, and reducing bias in recruitment processes.
6. Overall, the future scope of the project lies in expanding its capabilities into a comprehensive AI-driven recruitment ecosystem that supports intelligent hiring, skill development, and data-driven decision-making across educational institutions and industries.