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Department of Computer Engineering

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Project Synopsis Template (2024-25) - Sem V

SkillBridge AI

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Abstract

The employment market is increasingly competitive, requiring job seekers to possess not only relevant skills but also an ability to adapt to rapidly changing demands. Current employment portals often fall short in offering personalized, data-driven support that helps individuals bridge the gap between their existing competencies and the requirements of desired job roles. This project proposes a comprehensive employment platform integrating an AI-powered competency diagnostic and candidate profile score calculator. The system will assess job seekers' competencies, identify skill gaps, and provide tailored job recommendations alongside targeted training opportunities. By leveraging adaptive learning pathways, real-time job market insights, and a robust skills verification mechanism, the platform aims to enhance job seekers' competitiveness in the market, ensuring they are better equipped to secure their desired positions.

Introduction

In the modern employment landscape, job seekers often struggle to find positions that match their skills while simultaneously identifying and closing any gaps in their competencies. Traditional job portals offer static job listings without considering the unique capabilities and learning needs of individuals. This project aims to transform the job-seeking experience by introducing an intelligent platform that not only matches candidates with relevant job opportunities but also guides them through a personalized journey of skill enhancement.

The proposed system will utilize artificial intelligence to analyze candidates' profiles, recommend job opportunities, and suggest tailored training programs to close identified skill gaps. By integrating adaptive learning pathways and real-time market insights, the platform will provide a holistic approach to career development, helping users navigate their professional journeys more effectively.

Problem Statement

Smart Competency Diagnostic and Candidate Profile Score Calculator

Project Concept: Comprehensive Employment Platform/Portal The current employment portal lacks a personalized and adaptive approach to job matching and skill development. There is a need for an intelligent system that not only matches job seekers with potential employers but also identifies and suggests training courses to bridge skill gaps. We wish to design a competency diagnostic which would ask a series of questions to students to test their competence and based on their scores in the test, recommend jobs to them and also appropriate training courses to them to cover the gaps in their skill curve. Requirements: 1. AI-Powered Job/Training Recommendation System: • Implement an AI-based recommendation system trained on multiple data points (e.g., skills, experience, preferences) to analyze job seekers' profiles and recommend suitable job opportunities. • Training Course Recommendations: Suggest relevant online courses, workshops, and training programs based on the desired job roles. 2. Skill Gap Analysis and Recommendations: • Gap Identification: The recommendation System should assess job seekers' competencies against the requirements of their desired job roles to identify areas for improvement. • Personalized Suggestions: Provide tailored recommendations for online courses, workshops, and training programs to help job seekers upskill and close identified gaps. 3. Adaptive Learning Pathways: • Personalized Learning: Develop adaptive learning pathways based on the job seeker's progress and feedback. • Content Variety: Offer a mix of micro-courses, webinars, and hands-on projects relevant to the job market to enhance learning and skill development. 4. Real-Time Job Market Insights based on candidate’s skills and competencies: • Dashboard: Create a dashboard displaying real-time data on trending jobs, skills in demand, and salary benchmarks. • Data Analytics: Use data analytics to provide insights into job market trends and forecast future skill requirements. 5. Skills Verification and Certification: • Skill Assessments: Implement a system for verifying skills and certifying competencies through assessments and tests. • Badges and Certifications: Offer badges and certifications that candidates can display on their profiles and share on social media platforms like LinkedIn. 6. Resume Wizard • Automated Resume Building: Develop a resume wizard to help candidates automatically build their resumes based on their profiles, ensuring a professional and comprehensive presentation of their skills and experiences. 7. Community and Peer Support: • Community Forum: Integrate a community forum where individuals can share experiences, ask questions, and receive support from peers and mentors. • Virtual Events: Organize virtual events, workshops, and webinars focused on employment and career development, including special

sessions for people with special needs. Expected Outcome: The system will facilitate a personalized job matching process and offer targeted skill development recommendations, helping job seekers become more competitive in the job market.

Proposed Solution

The proposed system is designed as a multi-functional platform that encompasses several key components:

1. **AI-Powered Job/Training Recommendation System**:
    - An AI-based recommendation engine will analyze job seekers' profiles, including skills, experience, and preferences, to suggest suitable job opportunities.
    - The system will recommend relevant training courses, workshops, and certifications to bridge skill gaps identified in the candidate's profile.
2. **Skill Gap Analysis and Recommendations**:
    - The system will compare the candidate's existing competencies against the requirements of their desired job roles.
    - Based on the analysis, it will provide personalized suggestions for online courses and training programs to upskill the candidate.
3. **Adaptive Learning Pathways**:
    - The platform will create personalized learning pathways that adapt to the candidate's progress and feedback.
    - A variety of content, including micro-courses, webinars, and hands-on projects, will be offered to enhance skill development.
4. **Real-Time Job Market Insights**:
    - A dashboard will display real-time data on trending jobs, in-demand skills, and salary benchmarks.
    - Data analytics will be used to provide insights into job market trends and forecast future skill requirements.
5. **Skills Verification and Certification**:
    - The system will include tools for verifying skills and certifying competencies through assessments and tests.

    - Candidates will earn badges and certifications that can be displayed on their profiles and shared on social media platforms like LinkedIn.
6. **Resume Wizard**:
    - An automated resume-building tool will help candidates create professional resumes based on their profiles.
7. **Community and Peer Support**:
    - A community forum will be integrated, allowing individuals to share experiences, ask questions, and receive support from peers and mentors.
    - The platform will also host virtual events, workshops, and webinars focused on career development.

Methodology

Project Setup:

- Development Environment: Set up the development environment using Node.js, Express.js, React.js, and Tailwind CSS to establish a strong and scalable tech stack.
- Firebase Initialization: The project will be initialized with Firebase to handle essential backend services, including authentication and real-time database management.

Frontend Development:

- UI Design: The user interfaces will be designed with React.js and Tailwind CSS to ensure they are responsive and modern, providing an excellent user experience.
- Component Development: Build reusable components for various parts of the application, such as forms and dashboards, to enhance modularity and maintainability.
- Integration: The frontend will be integrated with Firebase to manage real-time data and handle user authentication seamlessly.

Backend Development:

- API Development: RESTful APIs will be developed using Express.js to manage client requests and communicate with Firebase services effectively.
- Authentication: Firebase Authentication will be implemented to manage user sign-ups, logins, and access control with a focus on security.
- Database Integration: Firebase Realtime Database or Firestore will be utilized for efficient data storage and retrieval.

Machine Learning Integration:

- TensorFlow.js Setup: TensorFlow.js will be incorporated to run machine learning models directly in the browser or on the Node.js server.
- Model Selection: The appropriate machine learning models will be selected or trained to handle tasks such as job recommendations, skill diagnostics, and predictions.
- Model Deployment: Models will be deployed on the client side (in the browser) or server side (Node.js with GPU support if necessary) to integrate AI functionalities.

Testing and Optimization:

- Unit Testing: Unit testing will be conducted on individual components and API endpoints to ensure they function as expected.
- End-to-End Testing: End-to-end testing will be performed to verify that the entire workflow, from the frontend to the backend, works smoothly.
- Performance Optimization: The application will be optimized for speed, including strategies like lazy loading of components and refining database queries.

Deployment:

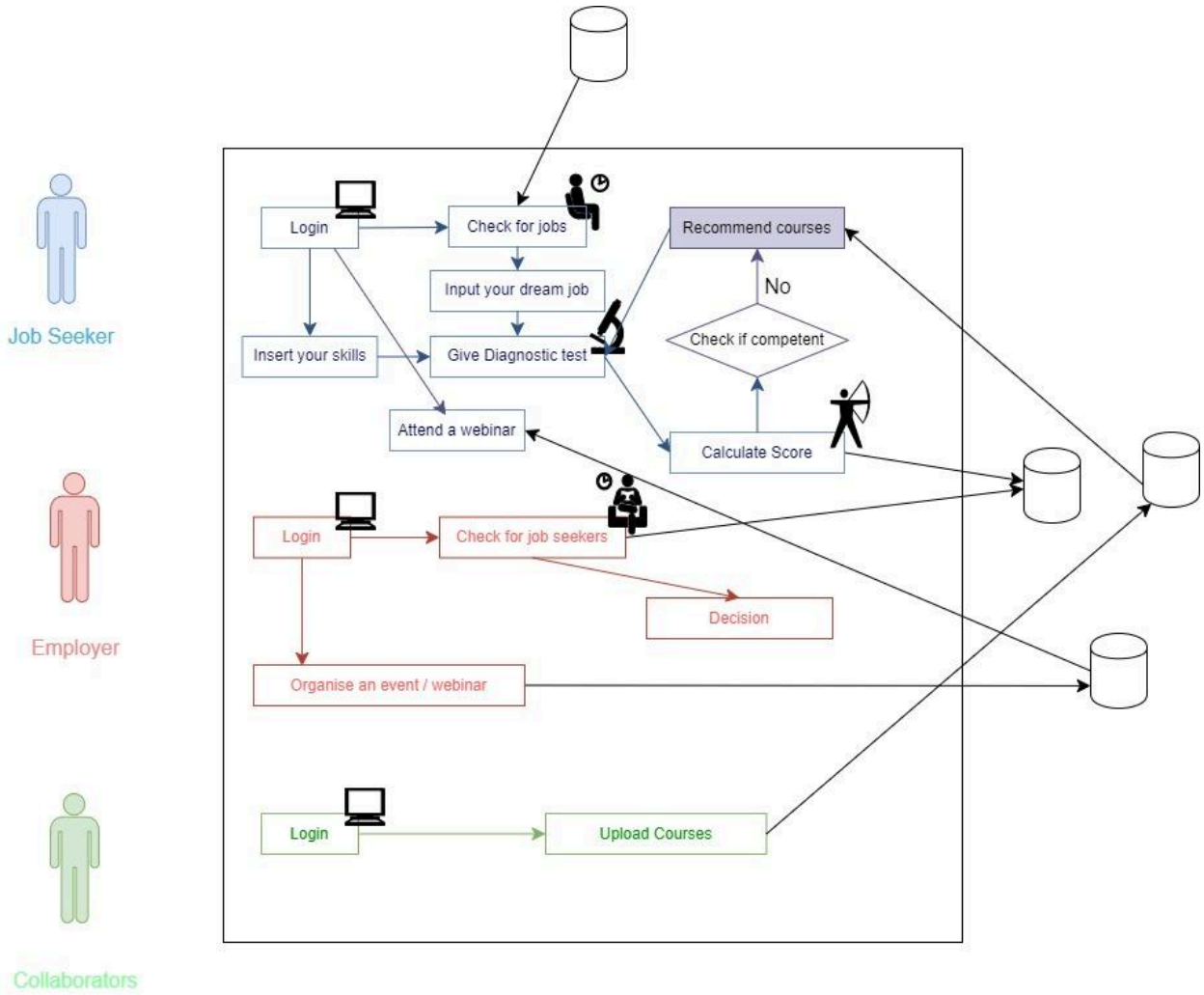
- Frontend Deployment: The React.js application will be hosted using Firebase Hosting for reliable and scalable performance.
- Backend Deployment: The Node.js server will be deployed on a cloud platform such as AWS or GCP to manage backend processes effectively.

- CI/CD: Continuous integration and continuous deployment (CI/CD) pipelines will be set up using tools like GitHub Actions to automate the deployment process.

Monitoring and Maintenance:

- Monitoring: Firebase Analytics and other monitoring tools will be used to track application performance and user interactions.
- Updates: The application will be regularly updated based on user feedback and technological advancements to ensure it remains current and functional.
- Security: Security best practices, including SSL/TLS, secure coding techniques, and Firebase security rules, will be continuously implemented and monitored to protect user data and ensure application integrity.

Block Diagram



Hardware, Software and Tools Requirements

- Development Machines:
    - CPU: Multi-core processor (e.g., Intel i5/i7 or AMD Ryzen 5/7)
    - RAM: 16GB or more
    - Storage: SSD with at least 256GB
    - GPU: Optional for local machine learning training

Software Requirements:

- Backend:
    - Node.js: Runtime environment
    - Express.js: Web framework
- Frontend:
    - React.js: UI library
    - Tailwind CSS: Utility-first CSS framework
- Machine Learning:
    - TensorFlow.js: JavaScript library for ML in the browser or Node.js
- Database & Hosting:
    - Firebase: Backend as a Service (BaaS) for database, authentication, and hosting

Proposed Evaluation Measures

The success of the proposed system will be evaluated through the following measures:

1. **User Engagement**:
    - Metrics such as time spent on the platform, the number of job applications submitted, and the number of courses completed will be tracked.
2. **Job Matching Accuracy**:
    - The accuracy of job recommendations will be assessed by measuring the relevance of suggested jobs to the candidates' profiles and the success rate of job applications.

3. **Skill Improvement**:
    - The effectiveness of training recommendations will be evaluated by tracking the progress of candidates in closing skill gaps and acquiring new certifications.
4. **User Satisfaction**:
    - Surveys and feedback forms will be used to gauge user satisfaction with the platform's features and recommendations.
5. **Employment Outcomes**:
    - The ultimate success of the platform will be measured by the employment outcomes of its users, including job placement rates and career advancement.

Conclusion

The proposed employment platform represents a significant innovation in the way job seekers interact with employment portals. By integrating AI-powered recommendations, adaptive learning pathways, and real-time market insights, the platform provides a personalized and data-driven approach to career development. The system's ability to identify skill gaps, recommend targeted training, and verify competencies ensures that candidates are well-prepared for the job market, increasing their chances of securing desirable positions. This holistic approach not only benefits job seekers but also addresses the evolving needs of employers in a dynamic job market.

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