Smart Hire – An Intelligent Hiring Platform
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Abstract- In the rapidly evolving landscape of human resources and talent acquisition, traditional methods of hiring are proving increasingly inadequate in meeting the demands of modern organizations and job seekers. The inefficiencies inherent in manual resume screening, subjective evaluations, and disjointed recruitment processes contribute to extended timelines, suboptimal candidate selections, and diminished candidate experiences. Recognizing these challenges, this research endeavors to introduce a paradigm shift in recruitment practices by harnessing the power of micro-service architecture. Through the development of a sophisticated web application, this study aims to revolutionize the hiring process by integrating cutting-edge technologies such as Natural Language Processing (NLP) for resume screening, examination management, and interview scheduling. By adopting a modular micro-service architecture, the system promises to streamline recruitment workflows, enhance decision-making accuracy, and elevate the overall candidate experience. The primary objective of this research is to create a comprehensive solution that not only addresses the immediate pain points of recruiters and job seekers but also lays the foundation for a more agile and responsive recruitment ecosystem. By automating repetitive tasks, minimizing bias in candidate evaluation, and facilitating transparent communication between stakeholders, the proposed system seeks to transform recruitment into a strategic advantage for organizations. Furthermore, this research explores the potential benefits of the micro-service based approach, including improved efficiency, enhanced accuracy, better candidate experiences, and greater scalability. Through meticulous design and rigorous testing, the system aims to deliver tangible outcomes that align with the evolving needs of the talent market and contribute to organizational success in an increasingly competitive landscape.

Index Terms- Artificial Intelligence, Hiring Platform, Resume shortlisting, micro-services.

I. INTRODUCTION

1. Objective
The recruitment process is a cornerstone of organizational success, serving as a gateway to talent acquisition and retention. However, traditional hiring practices often prove cumbersome and time-consuming, hindering organizational agility and competitiveness. In response to these challenges, this report proposes a novel approach to recruitment leveraging micro service architecture and advanced technologies to optimize efficiency, accuracy, and candidate experience.

2. Problem Statement
The traditional hiring process is fraught with inefficiencies and challenges that undermine organizational performance and hinder talent acquisition efforts. Manual resume screening processes are time-consuming and prone to bias, while subjective evaluation criteria may result in suboptimal candidate selection. Additionally, cumbersome scheduling procedures and lack of feedback contribute to a poor candidate experience, impacting employer branding and retention efforts. These challenges highlight the need for a modernized recruitment solution that leverages technology to streamline processes, improve accuracy, and enhance candidate engagement.

II. LITERATURE REVIEW
The recruitment process is a cornerstone of organizational success, serving as a gateway to talent acquisition and retention. However, traditional hiring practices often prove cumbersome and time-consuming, hindering organizational agility and competitiveness. In response to these challenges, this report proposes a novel approach to recruitment leveraging micro-service architecture and advanced technologies to optimize efficiency, accuracy, and candidate experience. The paper by Lalitha et al. [1] suggests a trend towards utilizing Natural Language Processing (NLP) techniques in applicant screening systems. This indicates a move towards more automated and potentially more efficient methods of filtering job applicants. The work by Kulkarnipai
et al. [2] highlights the growing importance of online platforms for conducting coding exams and interviews. This reflects a shift towards remote work and virtual recruitment processes, possibly influenced by factors such as the COVID-19 pandemic. Papers by Mishra et al. [3] and Romani et al. [4] discuss the transition from monolithic to micro services architecture in software development. This suggests a broader industry trend towards adopting micro services-based architectures for improved scalability, flexibility, and maintainability of software systems. The papers by Sukamto et al. [5] and Jiang et al. [6] emphasize the importance of user-centered design and responsive web design in enhancing the user experience of websites and web applications. This indicates a continued emphasis on UX principles in web development practices. The paper by Romani et al. [4] introduces a data-centric process for identifying micro services during the migration of legacy software systems. This suggests a growing recognition of the importance of data management and integration in the context of transitioning to micro services architectures, indicating a shift towards more holistic approaches to software system design and evolution. Wei Jiang et al. [6] discuss responsive web design modes and applications in the context of industry applications. This indicates a growing emphasis on leveraging advanced technologies such as responsive design techniques to enhance user experiences across various industrial sectors. This inference suggests a trend towards adopting cutting-edge technologies to address the evolving needs and expectations of users in different domains.

Key Features

**Integrated Resume Shortlisting**

The hiring platform has an artificial intelligence (AI) resume ranking system that provides a similarity score for the resumes with the given job description. The platform uses NER model to extract important features from the resumes of the candidates and generate a similarity score with the job description. Using the similarity score resumes can be ranked automatically or manually.

**Integrated Coding Examination**

The platform contains a examination module for conduction coding test for the shortlisted candidates. An online judge system is created for executing the code and providing results. Questions are added manually for each coding test along with the required test cases.

**Video Conferencing for Interview**

Apart from that, this smart hiring platform also provides video conferencing for conduction interviews inside the application. After resume shortlisting and conducting coding exam the passed candidates can be invited for in app interview which can be scheduled through a dashboard for recruiters. Zoom API can be used for creating the video conferencing.

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**III. PROPOSED METHODOLOGY**

The proposed methodology includes various components and modules that are combined together to create a functioning application. The various components are authentication service used for authenticating the candidates as well as recruiters, resume ranking service, coding service and interview service. A micro service architecture is created for the separate services mentioned above. All the micro services is then combined into a web application to bring out all the functionalities in a single application. The services are connected through a api gateway using http calls. Technologies like Nodejs for server, React js for frontend, python for resume shortlisting are used. For authentication JWT (Json Web Token) is used which gives a secure and easy to use method for generating authentication tokens which are used throughout the micro service structure.

1. **System Architecture**

The system architecture of Smart Hire is meticulously designed to leverage micro service-based architecture, enabling modularity, scalability, and flexibility in the implementation of various recruitment functionalities. Each micro service is responsible for distinct tasks within the recruitment process, seamlessly communicating with other components through well-defined APIs. The above figure describes the surface level structure of the system. As shown in the figure there are 3 major components in the system i.e Resume Ranking Service, Examination Service and Interview Service. The system consists of a micro service architecture with 3 services as mentioned in the figure which are then connected in a web application to create a full fledged hiring application. All the services are authenticated by using another service i.e authentication service.

The diagram illustrates a micro services architecture within a technical environment. In this architectural pattern, a software system is broken down into smaller, independent services, each responsible for specific business capabilities. Here are the key components:
Web Browsers and API Gateway
Web Browsers represent users or external systems making requests to the system. API Gateway is the central hub for all incoming requests. It handles authentication, routing, and load balancing. When a user interacts with the system, their request first reaches the API Gateway.

Microservices
Microservices are the heart of this architecture. They are individual services that perform specific tasks. Interview Microservice manages interview-related processes, such as scheduling interviews, conducting them, and collecting feedback. Resume Shortlisting Microservice filters and ranks resumes based on predefined criteria. Examination Microservice handles examination-related processes, including scheduling exams, conducting them, and grading.

Authentication Service
Validates user credentials and ensures secure access to the system. Also it provides access tokens for authorized communication between services.

Server and Data Storage
Server represents the backend infrastructure where business logic executes and interacts with microservices and databases. Data Storage/Database Services are used to store critical information related to users, interviews, resumes, and examination results.

Flow of Requests
A user’s request (initiated from a web browser) enters the system via the API Gateway. The API Gateway routes the request to the appropriate microservice based on the requested functionality (interview, resume shortlisting, or examination).

2. Software Tools and Technologies Used
The tools and technologies are chosen to enhance the performance and usability of the application. Several technologies for various purposes are used in this application. The frontend layer uses React.js, HTML, CSS and JavaScript. The backend layer uses technologies like Node.js, Express.js, RESTful APIs. The Resume Screening Microservice uses Python, Flask, Natural Language Processing (NLP) libraries (e.g., NLTK, spaCy). The Examination Microservice uses technologies like Node.js, Express.js, MySQL. The Interview Microservice uses Node.js, Express.js, MongoDB, Zoom. The Database Layer consists of technologies like MYSQL, MongoDB. The Authentication and Authorization module uses tools like JSON Web Tokens (JWT), bcrypt etc. For purposes like containerization and orchestration technologies like Docker, Kubernetes etc are used. There are some other external integrations as well. Smart Hire may integrate with external services such as email providers (e.g., Send Grid) for sending notifications, calendar services (e.g., Google Calendar) for interview scheduling, and identity providers (e.g., OAuth providers) for single sign-on authentication. These integrations enhance the functionality and usability of the SmartHire application, providing seamless experiences for users.

3. Authentication Flow

The image depicts a flowchart outlining the process of user login on a website. The flowchart begins at the “Start” point, leading users to the “Login Page”. Here, users input their username and password. If the format is invalid, the process reaches an endpoint labeled “Invalid Format”. However, if the credentials are valid, the system checks whether they match the database records.

If the credentials are not in the database, the flow leads to another endpoint labeled “Invalid Credentials”. But when the credentials match, the system extracts the password from the database. A subsequent decision point verifies whether the extracted password is correct. If not, the process loops back to the “Invalid Credentials” endpoint.

However, if the extracted password is indeed correct, several actions occur in sequence:

- **Generate JWT Token:** A token is created for secure authentication.
- **Add Token to Cookie:** The token is added to cookies for subsequent requests.
- **Redirect:** Users are redirected to the “Home Page”, marking the successful completion of the login process.

4. Resume Ranking
The figure represents a workflow for processing and evaluating resumes in PDF format against job descriptions. First Resumes are fed into the system in PDF format. Then the resumes undergo lexical and semantic analysis to extract
meaningful information. It is also known as preprocessing. Then the words from preprocessed resumes are compared for similarities with the job description. Then the resume and Job Description Comparison happens. The system evaluates how well the resume matches the job description using similarity scores. Then score calculation by LDA (Latent Dirichlet Allocation) is done. LDA helps identify topics present in the text data and contributes to the compatibility score. The final results, likely compatibility scores or other relevant information, can be viewed through a web interface. This process streamlines the resume evaluation process, aiding recruiters and employers in finding the best-fit candidates.

**IV. RESULT AND DISCUSSION**

1. **Overview of Findings**
The Smart Hire system has delivered promising outcomes in efficiency, accuracy, scalability, and user satisfaction. It streamlines recruitment processes through automation and NLP techniques, ensuring faster candidate screening and standardized assessment. The modular architecture enables seamless scalability and optimal resource utilization, while user feedback reflects high satisfaction levels. Further refinements include performance optimization, algorithmic fine-tuning, enhanced user experience, stringent security measures, and integration with external systems for extended functionality.

2. **Interpretation of Results**
The results show that an easy-to-use application with integrated resume shortlisting capabilities is created with a clean UI and simple UX.

**V. CONCLUSION AND FUTURE WORK**

In conclusion, the micro service-based approach presents a viable solution for streamlining the hiring process, offering numerous benefits in terms of efficiency, accuracy, and candidate experience. However, there is still room for improvement and further research. Future work could focus on optimizing system performance, enhancing scalability, and integrating additional features such as predictive analytics and
machine learning algorithms for talent forecasting and retention. Additionally, expanding the scope of the system to encompass post recruitment activities could provide a more comprehensive solution for talent acquisition and management, ultimately driving organizational success and competitiveness in the dynamic job market. research to evaluate the coding platform's long-term effects on programming ability and career advancement.

REFERENCES


