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Smart Hiring Portal Using Machine Learning And Natural Language Processing

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Abstract : The "Smart Hiring Portal" is a web application that aims to simplify the hiring process, for both employers and job seekers. It incorporates features like extracting details from resumes suggesting relevant courses based on skills and providing user friendly interfaces for resume upload and download.

Employers can benefit from an interface that allows them to post job vacancies efficiently manage applicant lists and shortlist or reject candidates based on their qualifications. Additionally the system provides job suggestions tailored to job seekers preferences and skills creating a job search experience. The Smart Hiring Portal aims to revolutionize the recruitment process by integrating these features. Its goal is to make it more efficient personalized and create connections between employers and job seekers. This project represents a step in leveraging technology to address the evolving needs of the job market while fostering mutually beneficial relationships, in the professional world.The Smart Hiring Portal provides a comprehensive answer to the enduring problems associated with talent acquisition by utilizing the complementary strengths of NLP and ML. Employers may make well-informed recruiting decisions because to its resume parsing tool, which not only extracts relevant information but also recognizes subtle skills and experiences. The site's course recommendation modules also analyze user data and industry trends to advise specific learning opportunities, enabling job searchers to improve their credentials and competitiveness in the labor market. The Smart Hiring Portal, with its user-centric design and extensive feature set, heralds a new age in recruitment approaches marked by efficiency, customization, and strategic alignment with organizational goals in talent acquisition.

Index Terms **- Smart Hiring Portal, Web application, Resumes, Courses, Skills, NLP, ML.**

INTRODUCTION

The convergence of technology and human resources continuously modifies the effectiveness and efficiency of hiring procedures in the field of talent acquisition. In order to tackle the difficulties involved in matching talent, we present the "Smart Hiring Portal," a cutting-edge web tool that has the potential to completely alter the recruitment landscape. This platform provides an advanced feature set by utilizing state-of-the-art technologies including machine learning (ML) and natural language processing (NLP). With features like dynamic job recommendations, skill categorization, and complex resume processing, the Smart Hiring Portal makes it easier for employers and candidates to interact smoothly. With this introduction, we set out on a technical investigation into the capabilities of the platform, exploring its fundamental design and revolutionary possibilities for streamlining the hiring process.

Fundamentally, the "Smart Hiring Portal" offers a comprehensive response to the many facets of recruitment difficulties by bringing together technical innovation and human resource management. The platform uses advanced NLP and ML algorithms to automate repetitive operations and enhance decision-making using insights derived from data. Additionally, the user-friendly interfaces support an ecosystem of transparent and cooperative recruitment by meeting the various needs of both companies and job searchers. Organizations are realizing the strategic value of talent acquisition in gaining a competitive edge, and one important tool for managing the intricate complexities of today's labor market is the Smart Hiring Portal.

LITERATURE REVIEW

Yi- chi chou and Han-yen Yu et al in [1] introduced a resume analysis and job recommendation application using AI technology. This system helps numerous job applicants seek to match with the maximum job vaccancies provided by companies. The developed system conducts personal competitiveness analysis, personality trait analysis, and gives job vacancy recommendations according to the electronic resumes job applicants submit.

In [2], A resume parser and summarizer are introduced by Arshad Shaikh et al. This solution reduces hiring process complexity and benefits HR departments. It is a feature that helps you find the most relevant resumes fast by automatically classifying data into different fields and parameters, including contact details, educational background, work experience, skills, accomplishments, and professional certifications. Resume parsers have demonstrated up to 87% accuracy in accurately entering and classifying data. It's

critical for businesses to keep abreast of developments in artificial intelligence and natural language processing in order to increase resume parsing accuracy and prevent passing over competent applicants. All things considered, resume parsing is an essential tool for contemporaryhiring, but human inspection is still necessary to make sure the top applicants are not passed over.

In [3], Zhang Chuang et al. presented a resume parser system. They assist HR management in this paper by streamlining the hiring procedure and lowering its complexity. The research paper on resume document block analysis based on pattern matching, multi-level information identification, and feedback control algorithms was also prompted by the general characteristics of the semi-structured document and the particular characteristics of the resume document. The largest recruitment website, ChinaHR, built the Resume Parser system based on the findings. It has automatic information reading, analysis, retrieval, and storing capabilities. The precision and efficiency of this system can generally meet the practical requirements, based on the results of many experiments.\\

In [4], Md. Tanzim Reza and Md. Sakib Zaman of BRAC University use machine learning (ML) and natural language processing (NLP) to analyze resumes and CVs. Driven by the need to automate the procedures involved in selecting candidates, the research suggests a model that divides CVs/Resumes into essential portions and utilizes the ID3 decision tree algorithm to assess and prioritize applicants based on employer specifications. The study emphasizes the value of font information and syntax analysis for efficient segmentation, addressing issues like varied formats and visual components in CVs and resumes. With the use of experimental data, the suggested model methodically pulls qualifying features and shows how pattern recognition and decision tree learning are applied. In the end, our study advances the integration of NLP and ML in applicant selection systems by offering a structured framework for automating the examination of CVs and resumes, therefore expediting the recruitment process.

In [5], In order to reduce the time and effort recruiters must expend sorting through a large number of resumes in search of job vacancies, the document proposes an automated resume screening system. Using Natural Language Processing (NLP), the system distills each application to enable effective analysis by extracting relevant information from unstructured resumes. It ranks candidates by matching resumes with job descriptions using techniques like tokenization and cosine similarity, allowing recruiters to find the most qualified individuals. All things considered, the technology provides a solid answer to problems with manual screening, improving candidate selection and recruiting procedures.

TECHNOLOGY USED

Python

Python is a programming language renowned for its simplicity and robustness. It provides efficient data structures at a high level and adheres to a straight forward yet impactful approach to object-oriented programming. Python's graceful syntax and dynamic typing make it particularly suitable for scripting purposes and the identification and acknowledgment of hand gestures.

PyCharm

Created by JetBrains, PyCharm stands as a premier integrated development environment (IDE) favored by Python programmers, furnishing an extensive array of features to optimize their workflow, boost efficiency, and simplify code creation.

Flask

Flask is a lightweight Python web framework renowned for its simplicity and flexibility, ideal for building web applications and APIs. It offers a minimalistic design, enabling developers to swiftly create robust solutions with features like routing, templating, and support for various extensions, ensuring scalability and ease of maintenance

Express

Express.js is a fast,Node.js is web framework used for building robust web applications and APIs. It provides a minimalist, flexible structure with powerful features for routing, middleware integration, and handling HTTP requests and responses, making it ideal for creating scalable and efficient server-side applications.

Node.js

Node.js is an open-source, event-driven JavaScript runtime built on Chrome's V8 JavaScript engine. It allows server-side execution of JavaScript, enabling developers to create scalable, fast, and lightweight network applications. Node.js excels in handling I/O-intensive tasks and supports a vibrant ecosystem of packages via npm (Node Package Manager).

Javascript

JavaScript is a high-level, interpreted programming language primarily used for web development. It enables dynamic, interactive web pages by adding behavior and functionality. JavaScript runs in web browsers and on servers with Node.js.

PROPOSED SYSTEM

The proposed application allows users to classify numerous resumes and filtered out them according to the suitable job roles. The need to make online job portal, as it helps recruiters as well as applicant. applicant can apply for different jobs online and recruiter can see their resumes online and also filtered them with the help of tags in resume.

It ranks candidates by matching resumes with job descriptions, allowing recruiters to find the most qualified individuals. Using a sample job description and résumé, the article outlines the methodology, including NLP procedures and content-based recommendation steps.

IMPLEMENTATION

We use different models to create job hiring portal such as Word2Vec , Named Entity Recognition (NER) . Two main tasks are course recommendation for the candidate to improve their skills and increase the chances for cracking a job. Another task is Resume

analysis and job fit score for a candidate . We can analyse the resume using resume parsing technique and give a appropriate score to a candidate. Python libraries also helped to fulfill the following tasks. The name of libraries are Numpy , pandas, scikit-learn(sklearn) etc.

A. Preprocessing Resume

Remove irrelevant characters like punctuation, special symbols, and stop words (e.g., "the", "a", "an"). Split the resume text into individual words or meaningful units (e.g., splitting "machine learning" into separate tokens). Lowercase all words or apply stemming/lemmatization to reduce word variations (e.g., "running", "ran", and "runs" could be mapped to "run").

B. Using Named Entity Recognition (NER)

We use NLTK library for smart hiring job portal. These library provide pre-trained NER models that can identify named entities like:

1] Person Names: Candidate's name
2] Locations: Places of work or education
3] Organizations: Companies mentioned in the work experience section
4] Dates: Dates of employment or education
5] Quantities: Years of experience, salary expectations
6] Skills: Technical skills or keywords

C. Using python libraries

NLTK is integrated well with python libraries like numpy , pandas , scikit-learn for building a comprehensive resume parsing system.

1] numpy :Powerful library for numerical computations with arrays and matrices. Offers vectorization for efficient array operations.
2] pandas : Provides high-performance data structures like DataFrames for data analysis and manipulation. Enables easy data cleaning, filtering, and transformation
3] scikit-learn :Collection of machine learning algorithms and it Offers pre-built functions and tools for various machine learning workflows
4] cosine similarity :A measure of similarity between two vectors, calculated as the dot product of the vectors divided by the product of their magnitudes. In simpler terms, it reflects how closely aligned two directions are in space.

D. User flow chart for recruiter

The user–job recruiter flow chart illustrates that the system can compile all resumes submitted for a job vacancy provided through the designed logic operation. Job recruiters can subsequently select their ideal candidates from all the applicants.

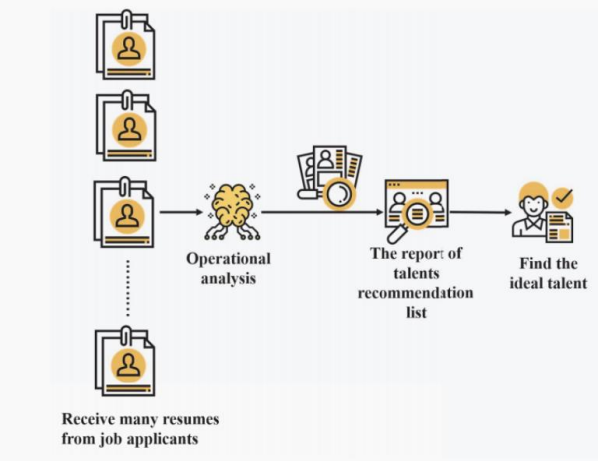

Figure 1: The user flow chart for recruiter

E. Course recommendation

We give course recommendation to candidate. candidate will develop the skills and increase the chances of cracking a job . We use coursera dataset to add different courses for a particular candidate. There are so many top courses available in dataset of coursera which will help candidate to learn and develop their skills.

RESULT ANALYSIS

We add score for each candidate, which is generated after analysing the resume of candidate. We suggest candidate different courses for develop their skills in a particular field to increase the chances of cracking a job.

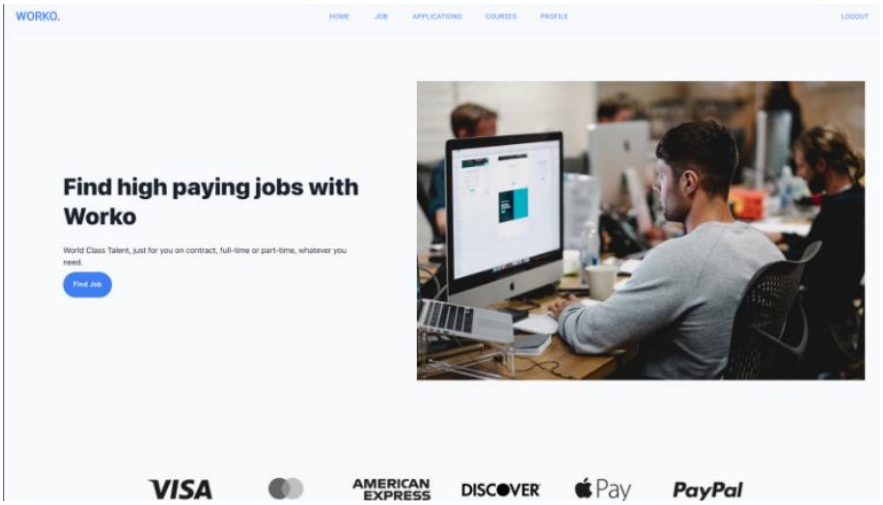

Figure 2: Home Page

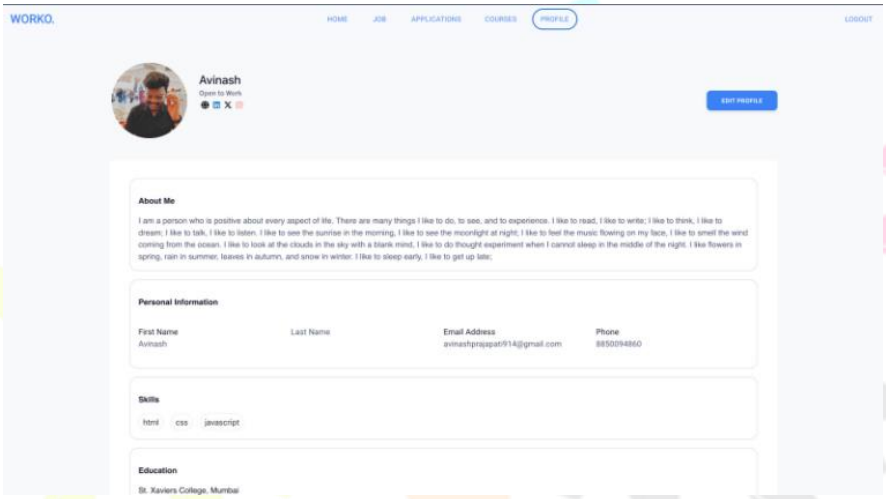

Figure 3: Profile Page

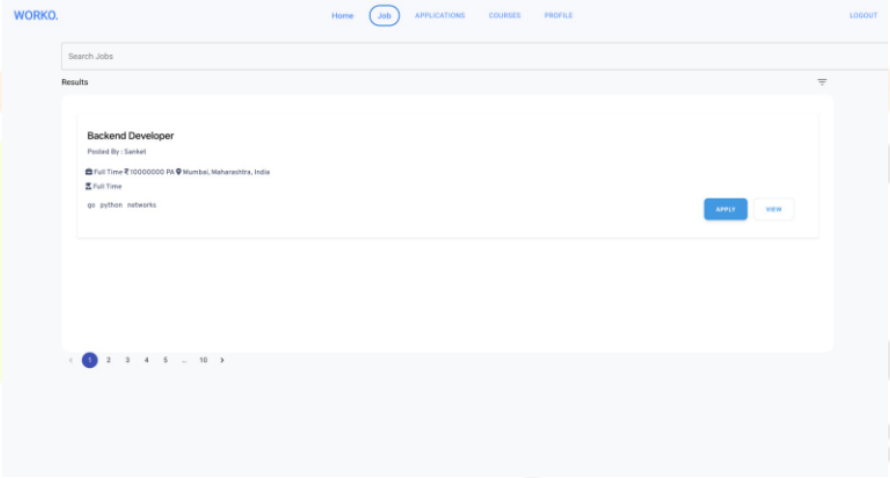

Figure 4: User can apply for various jobs

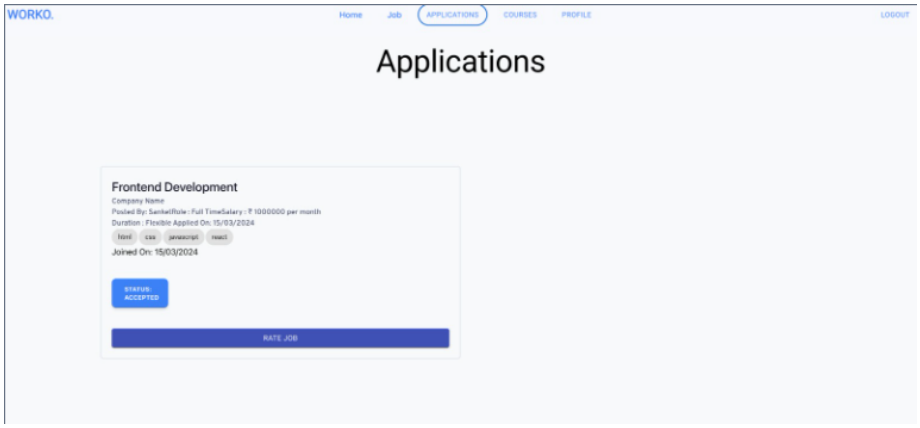

Figure 5: Applications

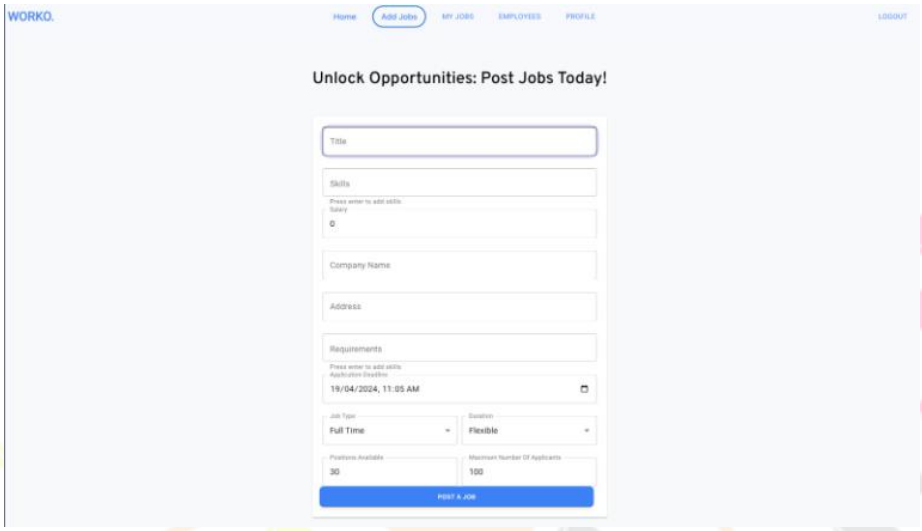

Figure 6: Recruiters can create the jobs

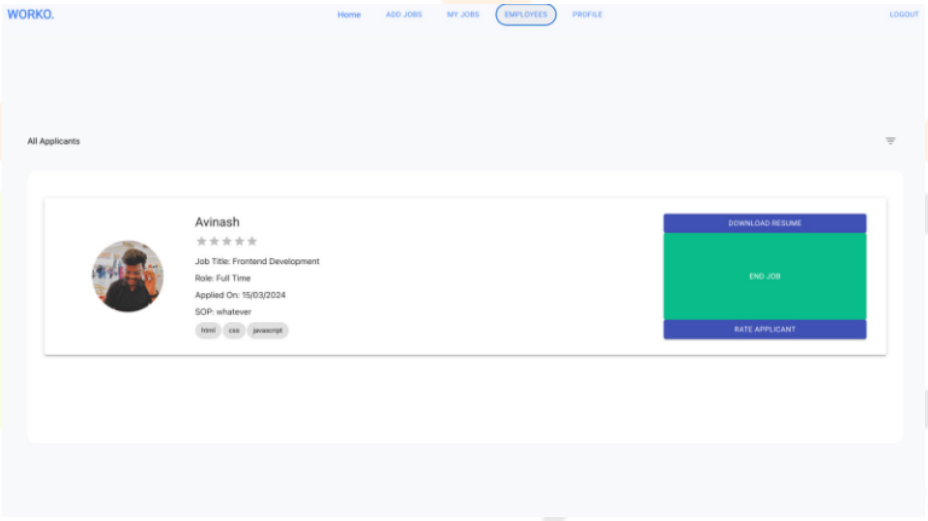

Figure 7: Recruiters can view the responses

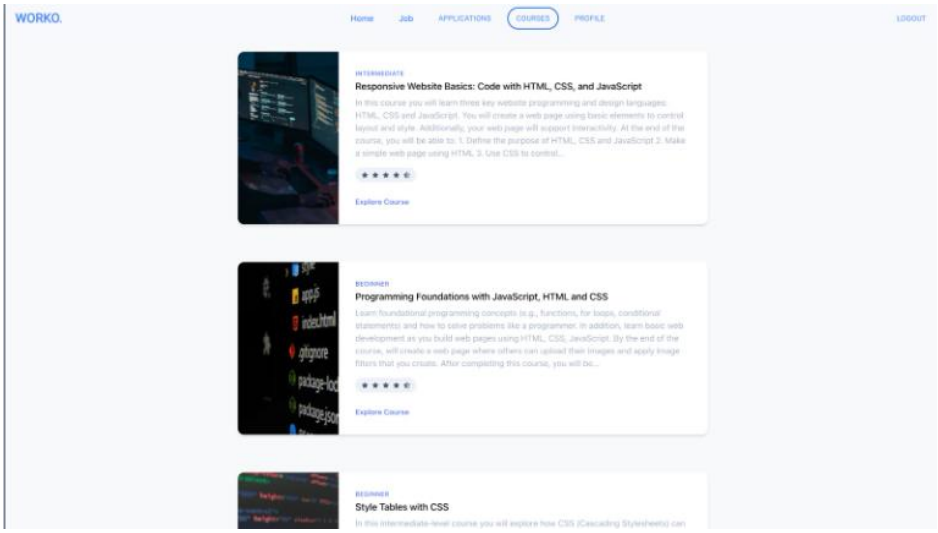

Figure 8: Courses recommended for the candidate

CONCLUSION

The conclusion of Smart Hiring Portal is following. This web application has effectively tackled the inefficiencies and difficulties associated with conventional employment procedures by means of the smooth integration of sophisticated algorithms and user centric design. With the help of the Smart Hiring Portal, which provides job seekers with personalized job recommendations based on their profiles and provides employers with advanced tools for skill evaluation, resume parsing, and applicant management, a new era of efficiency and effectiveness in talent acquisition has begun. In the future, we see recruitment as a dynamic ecosystem that fosters meaningful interactions and mutual progress, rather than just a transactional process. This vision is informed by our reflections on the experience of designing and executing this unique platform.

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