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# MACHINE LEARNING BASED SYSTEM FOR PERSONALIZED JOB ROLE RECOMMENDATIONS AND INDUSTRY SPECIFIC TAILORING

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# ABSTRACT

The system collects job-related information from **industry information website**, including factors such as job title, salary estimates, company ratings, location, industry, and more. By analyzing this data, we aim to generate accurate recommendations tailored to the user's skills, interests, and career goals.

Key components of our system include:

- **Data Scraping:** We scrape relevant job data from industry information website to build our recommendation system.
- **Feature Engineering:** We preprocess and transform raw data, handling missing values, encoding categorical variables, and normalizing numerical features.
- **Machine Learning Techniques:** We employ **TF-IDF (Term Frequency-Inverse Document Frequency)** vectorization to capture the importance of words in job descriptions and user preferences. This enables the system to find similar job opportunities.

Our system not only recommends relevant job roles but also facilitates connections with industry experts. By combining data scraping, machine learning, and cloud deployment, we create an AI-powered solution that benefits both job seekers and employers.

# EXISTING SYSTEM

- **Data Collection:**

- **User profiles:** This includes skills, experience, education, and potentially interests or career goals.
- **Job postings:** Information about the role, required skills, and desired experience.

- **Recommendation Techniques:**

- **Content-based filtering:** Matches user profiles based on keywords and skills listed in job descriptions.
- **Collaborative filtering:** Recommends jobs similar to those preferred by users with similar profiles.
- **Hybrid approaches:** Combine content-based and collaborative filtering for a more comprehensive recommendation.

# PROPOSED SYSTEM

- **Dynamic Learning and Feedback Integration:**

- Continuously learn from user interactions, including clicks, applications, and job acceptance/rejection data.
- Allow users to provide feedback on recommendations to refine the system's accuracy over time.

- **Long-term Career Path Insights:**

- Move beyond just immediate job openings.
- Recommend courses, skill development programs, and networking opportunities based on the user's long-term career aspirations.

- **Advanced Job Description Analysis:**

- Utilize Natural Language Processing (NLP) to understand the context and intent behind job descriptions.
- Extract not just keywords but also the tone, company culture, and required soft skills

# PROPOSED SYSTEM

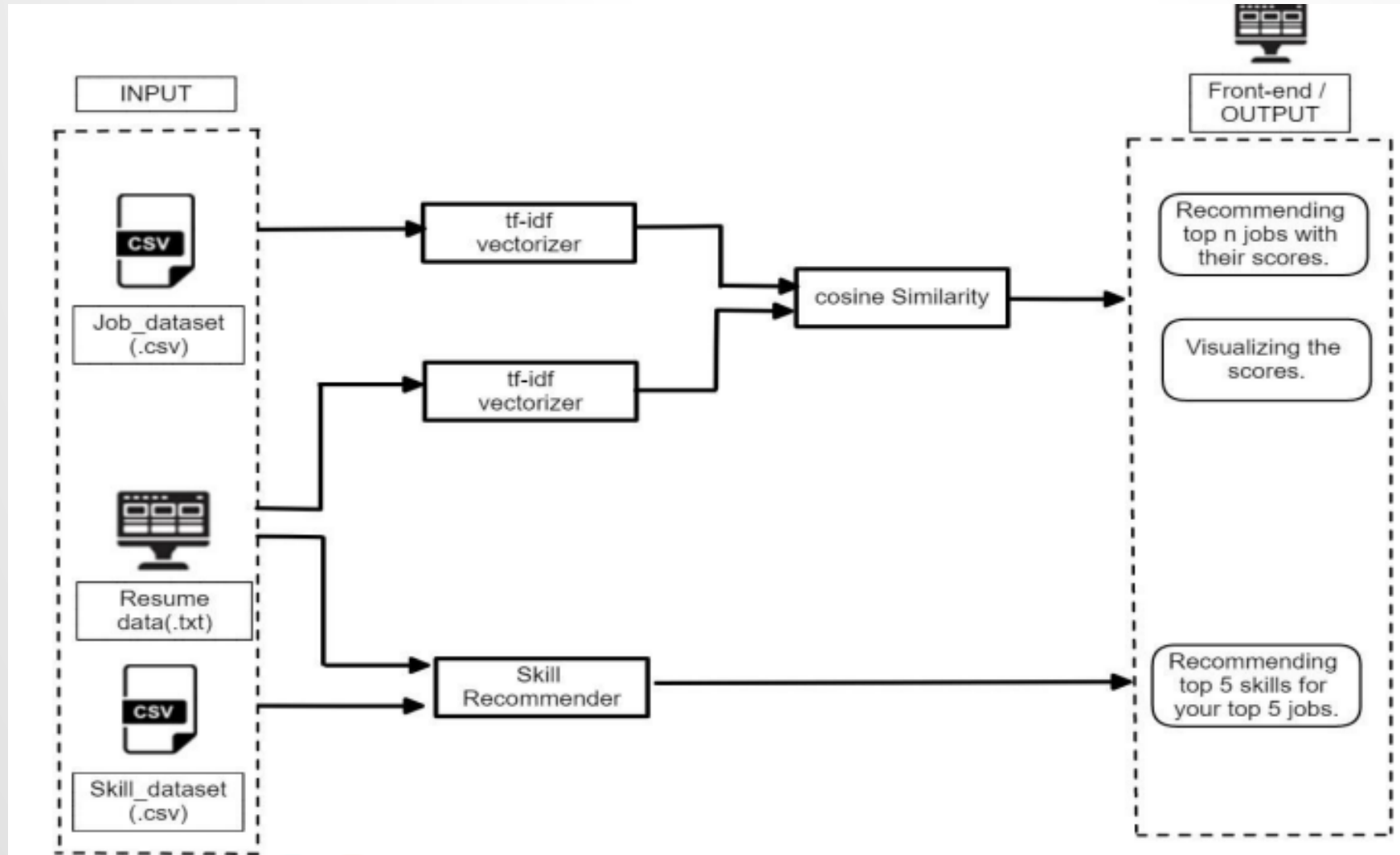
- **Multi-faceted User Profiling:**

- Go beyond just skills and experience.
- Include assessments to gauge cognitive abilities, personality traits, and work style preferences.
- Integrate with learning platforms to capture users' course completion and interests in emerging fields.

- **Hybrid Recommendation with Explainability:**

- Combine content-based, collaborative filtering, and a knowledge graph approach.
- Leverage a knowledge graph to connect skills, roles, and career paths for a more holistic view.
- Provide users with clear explanations for why specific jobs are recommended. This could involve highlighting relevant skills mentioned in their profile or explaining how the job aligns with their career goals gleaned from assessments.

# SYSTEM ARCHITECTURE



# MODULES IN THE SYSTEM

- **Data Collection:** Gather job postings and resumes.
- **Preprocessing:** Clean and transform the data.
- **Feature Extraction:** Extract relevant features from the text data.
- **Model Training:** Train machine learning models to match job roles with candidate profiles.
- **Recommendation:** Use the trained models to recommend job roles to candidates.
- **Deployment:** Deploy the recommendation system and monitor its performance.

# MODULES IN THE SYSTEM

- **Data Collection and Preprocessing:** Gather job postings and resumes.
  - Data Sources
  - Data Cleaning
  - Data Transformation
- **Feature Extraction:** Extract relevant features from the text data.
  - Text Features
    - Tokenization
    - Stemming/Lemmatization
    - Stop word removal
    - TF-IDF
    - Word Embeddings
  - Numerical Features



# MODULES IN THE SYSTEM

- **Model Training:** Train machine learning models to match job roles with candidate profiles.
  - Classification models
  - Ranking models
  - Training
  - Validation and testing
  - Metrics
- **Recommendation and Deployment:** Use the trained models to recommend job roles to candidates.
  - Skill extraction
  - Profile building
  - Similarity metrics
  - Real time processing

## RESULT AND DISCUSSION

Summary Motivated and determined individual from a Data Science and Machine Learning data analysis and machine learning in multiple data science projects. My logical and analytical skills, as well as recognizing the importance teamwork for opportunities where I can deploy data analytic skills.

Technical Skills	Machine Learning	Deep Learning	Tableau
<ul style="list-style-type: none"> <li>● Proficient: Python, Pandas, Keras-Tensorflow,</li> <li>● Familiar: with: SQL</li> </ul>			

Xccelerate	Full-time	Data	Science and	Machine Learning	Immersive	Bootcamp
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Graduate from Xccelerate's Full-time Data Science Bootcamp, developing various data both individually and in a team. Some of the Projects:

House	Ownership	Scheme	Market	Analysis	(Web-scraping, Pandas)
● Deployed	web-scraping	technique	on	various websites	and obta
● Deployed	Pandas	visualization	tools	to	analyze housing estate information.
● Identified	significant	insights	in	the	public housing estate mark

Flight Ticket	Price Prediction	(Machine Learning, Pandas)
● Performed techniques such as Pandas and Regular Expression on		
● Trained and deployed various regression models to conduct price		
● Models and could predict prices with more than 75%.		

Facial Detection and Recognition System (Deep Learning)

- Deployed facial detection technique and captured faces from
- Developed and optimized model with convolution neural network (CNN)
- Model achieved more than 85% on gender prediction and

Work Experience									
● Laboratory Technician	at	Smith and Associates	Far East Ltd						
Conduct quality control on	electronic	components	via visual inspection						
Detect counterfeit electronic	components	and report relevant	disc						

● Technician at Perform testing and	Creston repairing	Asia of	Limited company's	products
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### Education

● Bachelor of Engineering in Chemical Engineering, University  
● Brockenhurst College A-Levels: Mathematics, Chemistry, Physics, Chi

Language: Native in Cantonese, fluent in English and familiar

JobID		title	KNN	TF-IDF	CV	Final
0	641	Senior Machine Learning Engineer/Expert (Plann...	0.333333	0.333333	0.189947	0.856614
3	7357	Associate Data Scientist/ Data Scientist - Top...	0.27341	0.275167	0.278731	0.827308
7	7259	Data Insights Analyst (Big Data- Machine Learn...	0.249845	0.252081	0.325352	0.827278
2	3942	Software Engineer Trainee (AI / GIS)	0.275054	0.276773	0.248643	0.80047
10	857	Associate Data Scientist	0.214888	0.217617	0.310602	0.743106
8	7312	Artificial Intelligence (AI) R&D Engineer	0.242279	0.244644	0.238304	0.725226
9	5717	Data Science Manager - Machine Learning/AI   2...	0.239048	0.241464	0.212282	0.692794
4	12794	Vice President, Big Data Analytics & Machine L...	0.270547	0.272368	0.142904	0.685819
12	3247	Machine Learning Engineer/ Data Scientist	0.19946	0.202323	0.259108	0.66089
14	7582	Data Scientist Team Lead	0.178896	0.181858	0.299642	0.660395

# RESULT AND DISCUSSION

A job role recommendation system using machine learning (ML) leverages algorithms to analyze a candidate's skills, experience, and preferences to suggest the most suitable job roles. The system typically employs Natural Language Processing (NLP) to understand job descriptions and resumes, and uses clustering or classification techniques to match candidates with roles. ML models such as decision trees, support vector machines, and neural networks can predict job fit based on historical hiring data and candidate profiles.

This results in a more efficient hiring process, as the system can quickly filter and rank potential roles, reducing the time and effort required by human recruiters. Additionally, the system improves candidate satisfaction by aligning job opportunities with their qualifications and career aspirations, ultimately leading to better job performance and reduced turnover rates. By continuously learning from new data, the recommendation system becomes more accurate over time, adapting to changing job market trends and candidate profiles.

# CONCLUSION

The proposed model presents a significant advancement in the realm of career guidance and employment matching. Through the utilization of machine learning algorithms, it offers tailored recommendations for job roles based on individual skills, preferences, and industry requirements. This innovative system not only streamlines the job search process for individuals but also enhances workforce efficiency by aligning candidates with positions that best suit their capabilities. With its potential to revolutionize recruitment processes and optimize workforce utilization, this project marks a pivotal step towards a more personalized and effective approach to employment placement in diverse industries.

# FUTURE ENHACEMENT

**Explainability and Transparency:** Incorporate methods to explain how the recommendations are generated, increasing user trust and understanding of the system.

**Personalization and Customization:** Allow users to provide feedback and customize their preferences, such as preferred job locations, salary range, company size, etc., to tailor recommendations more accurately to individual needs.

***THANK you***