# JOB RECOMMENDATION AND SKILL RECOMMENDATION SYSTEM

## A PROJECT REPORT

*Submittedby*


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**MINI-PROJECT: JOB RECOMMENDATION AND SKILL RECOMMENDATION SYSTEM**

**BACHELOROFTECHNOLOGY**

***in***

**INFORMATIONTECHNOLOGY**



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# BONAFIDECERTIFICATE

**Certified that this idea report "JOB RECOMMENDATION AND SKILL RECOMMENDATION SYSTEM " is the bonafide work of "ASWATH KANNAN M(92132223022), DHARUN M (92132223036), HARIHARAN M (92132223049)" who carried out the idea work under my supervision**

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## ABSTRACT

The Job and Skills Recommendation System is designed to bridge the gap between job seekers and potential employment opportunities by leveraging machine learning and natural language processing techniques. This system analyzes user-inputted skills and preferences to provide personalized job recommendations from a comprehensive dataset of job titles, required skills, and associated companies. By utilizing the TF-IDF (Term Frequency-Inverse Document Frequency) algorithm, the system measures the relevance of user skills against existing job listings, enabling accurate matching and enhancing the job search experience.

Furthermore, the system offers additional functionalities, allowing users to query specific job titles to obtain relevant skills and companies associated with those positions. The frontend interface is designed to be user-friendly and visually appealing, incorporating modern web design principles and interactive elements to engage users effectively. Overall, this recommendation system not only aids individuals in identifying suitable job opportunities but also empowers them to understand the skills required for those roles, fostering career development and continuous learning in a competitive job market. By streamlining the job search process, this innovative solution aims to improve employment outcomes for users while assisting companies in finding qualifiedcandidates.

## INTRODUCTION

In today's fast-paced job market, effective job and skills matching is essential for both job seekers and employers. The Job and Skills Recommendation System addresses this challenge by utilizing advanced algorithms to connect users with relevant job opportunities based on their skills and preferences. By analyzing a comprehensive dataset of job listings through natural language processing techniques like TF-IDF (Term Frequency-Inverse Document Frequency), the system delivers personalized recommendations. It also provides insights into the skills required for specific roles, empowering users to pursue targeted skill development, ultimately streamlining the job search process and fostering a more efficient labor market.

## PROBLEM STATEMENT

The current job market presents significant challenges for both job seekers and employers, leading to inefficiencies in the recruitment process. Many job seekers struggle to identify opportunities that align with their skills and career aspirations due to the overwhelming volume of available job listings. Traditional job search methods often fail to provide personalized recommendations, resulting in wasted time and effort. Additionally, job seekers frequently lack awareness of the specific skills required for various roles, which hinders their ability to effectively target their professional development and can lead to frustration and decreased employability.

On the employer side, challenges persist in efficiently identifying qualified candidates from a vast pool of applicants. This often leads to prolonged vacancies and increased recruitment costs, as the mismatch between candidate skills and job requirements prolongs the hiring process. Moreover, the dynamic nature of industries and job roles complicates the job search landscape further, as job seekers may not be aware of emerging positions or the evolving skill sets needed to meet industry demands. These challenges underline the need for a comprehensive solution that enhances job matching efficiency while empowering job seekers with insights into the skills necessary for their desired roles.

## CHALLENGES:

1. **Personalization Deficiency**: Job seekers often receive generic job recommendations, leading to inefficient searches and missed opportunities.
2. **Skills Gap Awareness**: Many individuals are unaware of the specific skills required for various job roles, hindering their career advancement.
3. **Recruitment Inefficiency**: Employers face difficulties in identifying qualified candidates among a large pool, resulting in longer hiring times and increased costs.
4. **Dynamic Job Market**: Rapid changes in industries mean that job seekers may not know about emerging roles or necessary skills to remain competitive.
5. **Time-Consuming Processes**: Both job seekers and employers invest significant time in the recruitment process, often with unsatisfactory results, leading to frustration on both sides.

## PROPOSED MODEL:

To address the challenges faced by job seekers and employers, we propose a comprehensive Job and Skills Recommendation System that leverages machine learning and natural language processing. The system consists of three main components: a User Input Interfac, a Recommendation Engine , and a Feedback Mechanism.

The User Input Interface allows job seekers to enter their skills, preferences, and career aspirations in a user-friendly format. The Recommendation Engine utilizes algorithms like TF-IDF (Term Frequency-Inverse Document Frequency) and cosine similarity to analyze these inputs against a robust dataset of job listings, skills, and companies.

This analysis yields personalized job recommendations and insights into the skills necessary for specific roles, guiding users in their professional development. Finally, the Feedback Mechanism enables users to provide feedback on the recommendations, facilitating continuous improvement of the system. Overall, this model aims to create a more efficient job search experience, empowering job seekers while assisting employers in finding suitable candidates.

# SOURCE CODE:

# Backend code:(python)

```python
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics.pairwise import cosine_similarity

# Updated dataset with job titles, skills, and associated companies
data = {
    'job_title': [
        'Data Scientist', 'Software Engineer', 'Product Manager',
        'Graphic Designer', 'Machine Learning Engineer', 'Data Analyst',
        'DevOps Engineer', 'Business Analyst', 'UX/UI Designer',
        'Cybersecurity Specialist', 'Web Developer', 'Cloud Architect',
        'Database Administrator', 'Mobile App Developer', 'SEO Specialist',
        'Network Engineer', 'IT Support Specialist', 'Technical Writer',
        'AI Researcher', 'Blockchain Developer', 'Game Developer',
        'Digital Marketing Manager', 'Embedded Systems Engineer',
        'Electrical Engineer', 'Civil Engineer', 'Mechanical Engineer'
    ],
    'skills': [
        'Python, Machine Learning, Data Analysis, SQL, Statistics',
        'Java, Software Development, SQL, Python, Problem-Solving',
        'Project Management, Communication, Agile, Roadmapping, Strategy',
        'Adobe Photoshop, Creativity, Graphic Design, Illustrator, UX',
        'Python, TensorFlow, Data Science, Deep Learning, AI',
        'Data Analysis, Excel, Python, SQL, Visualization',
        'Linux, Jenkins, Kubernetes, Cloud, CI/CD, Scripting',
        'Business Analysis, Data Analysis, Communication, Presentation',
        'UX Research, Wireframing, Prototyping, Figma, Adobe XD',
        'Network Security, Risk Assessment, Firewalls, Ethical Hacking',
        'HTML, CSS, JavaScript, Frontend Development, Responsive Design',
        'Cloud Computing, AWS, Azure, Network Architecture, Automation',
        'SQL, Database Design, Performance Tuning, Backup, Recovery',
        'Java, Kotlin, Android Development, iOS Development, APIs',
        'SEO, Google Analytics, SEM, Content Marketing, Keyword Research',
        'Networking, Cisco, Troubleshooting, Routing, Firewalls'
    ],
    'company': [
        'Google', 'Microsoft', 'Amazon', 'Apple', 'Facebook', 'IBM', 'Netflix',
        'Deloitte', 'Spotify', 'Cisco', 'Shopify', 'Oracle', 'Salesforce',
        'Uber', 'LinkedIn', 'Intel', 'Tesla', 'Slack', 'OpenAI', 'Coinbase',
        'Riot Games', 'HubSpot', 'Qualcomm', 'GE', 'Fluor Corporation', 'Boeing'
    ]
}

# Creating the DataFrame
jobs_df = pd.DataFrame(data)

# Function to recommend jobs and skills based on user input
def recommend_jobs_and_skills(user_input_skills, jobs_df):
    # Combine job title and skills into a single column
    jobs_df['combined'] = jobs_df['job_title'] + ' ' + jobs_df['skills']

    # Use TF-IDF Vectorizer for text processing
    tfidf = TfidfVectorizer()
    tfidf_matrix = tfidf.fit_transform(jobs_df['combined'])

    # Transform the user's input using the same vectorizer
    user_tfidf = tfidf.transform([user_input_skills])

    # Calculate cosine similarity between the user input and jobs in the dataset
    cosine_sim = cosine_similarity(user_tfidf, tfidf_matrix).flatten()

    # Get top 5 job recommendations
    recommended_indices = cosine_sim.argsort()[-5:][::-1]

    # Return the recommended jobs
    recommendations = jobs_df.iloc[recommended_indices]
    job_recommendations = recommendations[['job_title', 'skills', 'company']]

    return job_recommendations
```

```python
# Function to get company for a specific job title
def get_company_for_job(job_title, jobs_df):
    job = jobs_df[jobs_df['job_title'].str.lower() == job_title.lower()]
    if not job.empty:
        return job['company'].values[0]
    else:
        return "Job title not found."

# Get user input for skills
user_skills = input("Enter your skills (comma separated): ")
recommended_jobs = recommend_jobs_and_skills(user_skills, jobs_df)

# Output recommended jobs, skills, and companies
print("\nRecommended Jobs, Skills, and Companies:")
print(recommended_jobs)

# Ask the user if they want to query skills or company separately
choice = input("\nDo you want to find (1) skills or (2) company for a specific job? Enter 1 or 2: ")

if choice == '1':
    # Get user input for a specific job title to get skills
    job_title_input = input("\nEnter a job title to get required skills: ")
    skills = get_skills_for_job(job_title_input, jobs_df)
    print(f"\nSkills required for '{job_title_input}': {skills}")

elif choice == '2':
    # Get user input for a specific job title to get the company
    job_title_input = input("\nEnter a job title to get the company offering it: ")
    company = get_company_for_job(job_title_input, jobs_df)
    print(f"\nCompany offering '{job_title_input}': {company}")

else:
    print("Invalid input. Please enter 1 or 2.")
```

# Frontend Code:(HTML,Css)

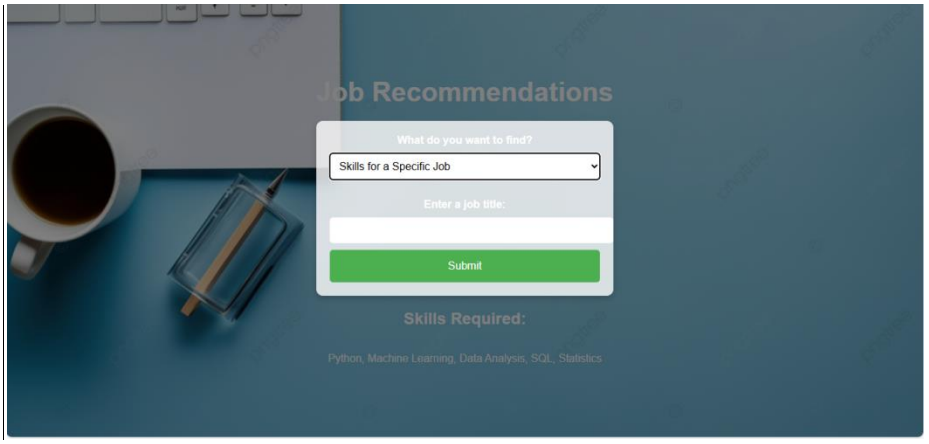
```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Job Recommendations</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            background-image: url('https://png.pngtree.com/thumb_back/fw800/background/20231019/pngtree-mornin
            background-size: cover;
            background-position: center;
            color: #fff;
            margin: 0;
            padding: 0;
            display: flex;
            flex-direction: column;
            align-items: center;
            justify-content: center;
            height: 100vh;
            text-align: center;
            position: relative;
        }

        .overlay {
            background: rgba(0, 0, 0, 0.5); /* Dark overlay for better text visibility */
            width: 100%;
            height: 100%;
            position: absolute;
            top: 0;
            left: 0;
            z-index: 1;
```

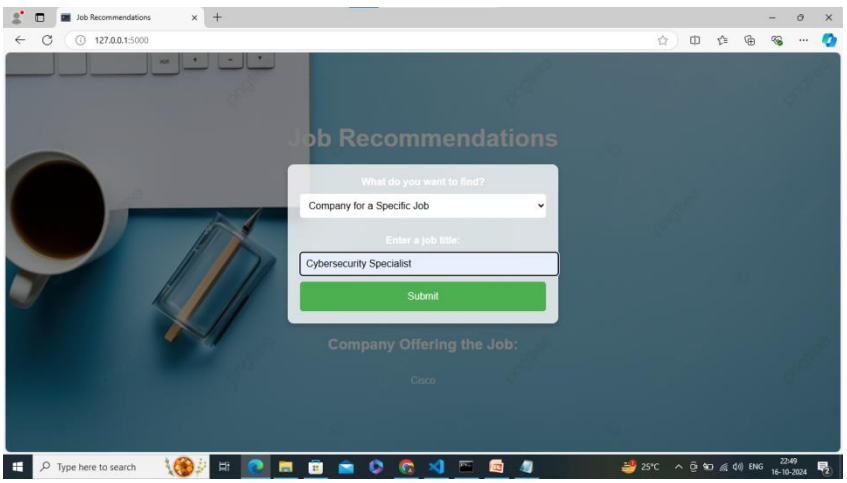
```html
<html lang="en">
<head>
    <style>

        h1 {
            margin-bottom: 20px;
            font-size: 2.5em;
        }

        form {
            position: relative;
            z-index: 2;
            background: rgba(255, 255, 255, 0.8); /* Light background for the form */
            border-radius: 10px;
            padding: 20px;
            width: 90%;
            max-width: 400px;
            box-shadow: 0 4px 8px rgba(0, 0, 0, 0.2);
        }

        label {
            font-weight: bold;
        }

        select, input[type="text"] {
            width: 100%;
            padding: 10px;
            margin: 10px 0;
            border: none;
            border-radius: 5px;
            font-size: 1em;
        }
```

```html
<style>
    button {
        background-color: #4CAF50; /* Green */
        color: white;
        padding: 15px 20px;
        border: none;
        border-radius: 5px;
        cursor: pointer;
        font-size: 1em;
        width: 100%;
    }

    button:hover {
        background-color: #45a049; /* Darker green */
    }

    h2 {
        margin-top: 20px;
    }

    ul {
        list-style-type: none;
        padding: 0;
    }

    li {
        background: rgba(255, 255, 255, 0.8);
        border-radius: 5px;
        margin: 10px 0;
```

```
    choiceSelect.addEventListener('change', function() {
        if (this.value === 'recommendations') {
            recommendationsInput.style.display = 'block';
            jobInput.style.display = 'none';
        } else {
            recommendationsInput.style.display = 'none';
            jobInput.style.display = 'block';
        }
    });
</script>

{% if recommendations %}
<h2>Recommended Jobs:</h2>
<ul>
    {% for job in recommendations %}
    <li>
        <strong>{{ job.job_title }}</strong><br>
        Skills: {{ job.skills }}<br>
        Company: {{ job.company }}
    </li>
    {% endfor %}
</ul>
{% endif %}

{% if skills_needed %}
<h2>Skills Required:</h2>
<p>{{ skills_needed }}</p>
```

# OUTPUT:



## CONCLUSION:

The Job and Skills Recommendation System addresses critical challenges in the modern job market by effectively connecting job seekers with relevant opportunities. Utilizing advanced algorithms and natural language processing, the system provides personalized job recommendations based on individual skills and aspirations. Its user-friendly interface, coupled with a feedback mechanism, ensures continuous improvement and accuracy of recommendations. As the job market evolves, this system empowers job seekers to navigate their career paths more effectively while assisting employers in identifying suitable candidates efficiently. Ultimately, it fosters a dynamic and responsive labor market, benefiting both job seekers and employers alike