A Project report on

CAREER PATH ADVISOR

A Dissertation submitted to JNTU Hyderabad in partial fulfillment of the academic requirements for the award of the degree.

Bachelor of Technology

in

Computer Science and Engineering

Submitted by

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY

KANDLAKOYA, MEDCHAL ROAD, HYDERABAD – 501401

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the Mini Project I report entitled **"CAREER PATH ADVISOR"** being submitted by DAVURI SAI SUJAN (21H51A0534), DESHAPATHI SAHITHI (21H51A0535), DHULIPALLA SAI SIVA JAYAPRAKASH (21H51A0536) in partial fulfillment for the award of **Bachelor of Technology in Computer Science and Engineering** is a record of bonafide work carried out his/her under my guidance and supervision.

The results embodied in this project report have not been submitted to any other University or Institute for the award of any Degree.

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Associate Professor
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Dept. of CSE

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ABSTRACT

Every one of us faces a certain dilemma in choosing the right career path for ourselves. In today's dynamic job market, individuals face an increasing challenge when it comes to making informed career decisions. The availability of diverse career options, changing skill requirements, and evolving industries make it difficult for individuals to navigate their career paths effectively. To address this challenge, we propose the development of a Career Path Advisor project. Our proposed solution is to implement a Machine Learning model using SVM algorithm. The objective of the Career Path Advisor project is to create an intelligent and user-friendly platform that assists individuals in making well-informed career decisions and planning their career paths effectively. This platform should consider a user's unique skills, interests, goals, and the current job market to provide personalized career recommendations and guidance. The basic underlying technology we intend to use is Machine Learning combined with Web Development for user interface and deployment. We compare the performance of different machine learning algorithms such as KNN-Classification algorithm, SVM-Classification algorithm on Multi-Class Classification task. We evaluate these algorithms using accuracy, precision and recall metrics. We use a dataset to train and test this machine learning model in order to provide the user with the right career choice by finding the most suitable outcome by comparing the dataset with the user input.

CHAPTER 1
INTRODUCTION

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1.1. Problem Statement

In today's dynamic job market, individuals often struggle to make informed career decisions, leading to skill-career mismatches and dissatisfaction. People often choose fields that are unsuitable for their skills just because of misguided suggestions. Navigating the contemporary job landscape is increasingly challenging for individuals seeking to align their skills with suitable career trajectories.

1.2. Research Objective

Develop a robust machine learning model for career guidance using SVM Machine Learning algorithm and interface it with a user-friendly web interface allowing users to input personal information and receive personalized career recommendations. Design and implement an intuitive and user-friendly web-based interface for the Career Path Advisor, which will enable users to input their personal information, preferences, and career goals, and receive personalized career recommendations based on the analysis of the machine learning model. Evaluate and compare the performance of different machine learning algorithms, specifically SVM and KNN-Classification, for the task of Multi-Class Classification in the context of career guidance. Analyze the model's accuracy, precision, recall, and F1-score to ensure the quality of career recommendations

CHAPTER 2
BACKGROUND WORK

CHAPTER 2

BACKGROUND WORK

EXISTING SOLUTIONS

2.1 PERSONAL CAREER COUNSELING

2.1.1 Introduction

Many educational institutions and career centers offer in-person career counseling services. These services often include assessments, one-on-one sessions and workshops to help individuals identify their strengths, interests and career paths. Professional career counselors and coaches offer the personalized guidance through one-on-one sessions. They assess individual skills, interests and goals to provide tailored advice.

Figure.2.1: Career Counseling

2.1.2 Merits

1. Personalized Guidance:

Career counseling centers provide one-on-one sessions where individuals can discuss their unique skills, interests and goals.

2. Informed Decision Making:

Career Counselors help individuals make informed decisions about their careers by providing information about different professions, industries and educational paths.

3. Networking Opportunities:

Some career counseling centers may facilitate networking events, connect with individuals with professionals in their desired fields.

Demerits

1. Limited Resources:

Career counseling centers may not have access to the most up-to-date information about every industry or profession. The resources available may be limited. The counselors may not have wide knowledge of countless various professions or career choices.

2. High Cost:

Some career counseling services may come with a fee, and not everyone may be able to afford these services. This could limit access for individuals with financial constraints.

3. Subjectivity:

The guidance provided by career counselors can be subjective and influenced by their personal biases or experiences. This subjectivity may not align with the individual's own values or preferences.

Challenges

1. Overwhelming Demand:

High demand can result in long waiting lists and limited availability for counseling sessions. This can probably result in most people losing various job opportunities or making wrong career choices.

2. Time Constraints:

Limited time during counseling sessions may restrict the depth of exploration affecting the thoroughness of guidance provided.

2.1.3 Implementation of Career Counseling Centers

The successful implementation of career counseling centers involves a systematic and multifaceted approach. Initially, a comprehensive needs assessment is essential to understand the specific requirements of the target population, including demographic, educational, and career-related needs.

Adequate resource to allocate, encompassing funding, trained personnel, and technology infrastructure, forms the foundation for the centers' smooth functioning and the delivery of high-quality services. Clear goals and objectives should be established, defining the intended outcomes such as improved career decision-making and successful career transitions.

The design of counseling programs, incorporating individual sessions, group workshops, career assessments, and skill development resources, should align with the identified needs. Collaboration with educational institutions and the integration of technology, such as online platforms for assessments and also virtual counseling, enhance accessibility and flexibility.

Figure.2.2: Personal Career Counseling

2.2. ONLINE CAREER ASSESSMENT TOOLS:

2.2.1. INTRODUCTION

Online career assessment tools have emerged as valuable resources for individuals navigating the complex landscape of career choices. These tools offer self-assessment questionnaires that prompt users to reflect on their skills, interests, values, and personality traits. Incorporating elements like personality tests, skills inventories, and interest assessments, these tools provide a holistic view of an individual's professional profile. While online career assessment tools offer valuable insights, it's crucial for users to supplement this information with advice from career professionals, additional research to make well-informed decisions about their career journeys.

Figure.2.3: Online Career Assessment Tools

2.2.2. MERITS

1. Accessibility and Convenience:

The accessibility and convenience these tools provide. Users can access assessments from anywhere with an internet connection, making it convenient for individuals with busy schedules.

2. Cost-Effective:

Many online career assessment tools are cost-effective or free, by eliminating financial barriers and ensuring that individuals from various socio-economic backgrounds can benefit from career guidance.

3. Personalized Career Recommendations:

Advanced algorithms used by these tools to generate personalized career recommendations based on the user's assessment results. This tailored approach to increases the relevance of the suggested career paths.

DEMERITS

1. Lack of Personalization:

Despite using algorithms to generate personalized recommendations, online tools may not fully capture the intricacies of an individual's unique experiences, aspirations and values, leading to less personalized advice.

2. Subject to Bias:

Algorithms used in these tools may be influenced by biases present in the data used to train them. This can result in skewed recommendations that may not align with the individual's true potential or aspirations.

3.Security and Privacy Concerns:

Collecting personal data for assessments raises concerns about privacy and data security. Users may be hesitant to share sensitive information online, impacting the accuracy of assessments.

CHALLENGES

1. Accuracy and Reliability:

Ensuring the accuracy and reliability of the assessments is a persistent challenge. The quality of results depends on the validity of the underlying algorithms and the comprehensiveness of the data used during the tool's development.

2. Limited Human Interaction:

Online tools lack the human touch and personalized interaction that can be crucial in understanding an individual's unique circumstances, emotions, and motivations during the career exploration process.

3. Education and Socio-Economic Barriers:

Access to online tools may be limited by educational and socio-economic factors. Individuals with limited internet access, digital literacy, or financial resources may face barriers to benefiting from these tools.

2.2.3. Implementation of Online Career Assessment Tool

The implementation of online career assessment tools involves a systematic and user-centric approach to ensure their successful integration and effective utilization. Initiating the process with needs assessment helps identify the specific requirements of the target users, encompassing demographic, educational, and career-related needs. Once the online tools are selected or developed, seamless integration with existing systems, such as educational platforms or career counseling services, to enhance accessibility. User training and orientation sessions play a crucial role in empowering individuals to navigate the tools effectively, interpret results, and access supplementary resources.

Ensuring inclusivity, privacy, and security measures is paramount to building user trust. Strategic promotion and awareness campaigns, coupled with user support services, contribute to user engagement and satisfaction. Continuous monitoring and evaluation, along with regular updates and maintenance, are essential for keeping the tools current and relevant. Data analysis provides insights for continuous improvement, while user feedback loops and iterative development ensure that the tools evolve to meet changing user needs. The overall success of the implementation hinges on a holistic and adaptive approach that prioritizes user experience, accessibility, and ongoing enhancement.

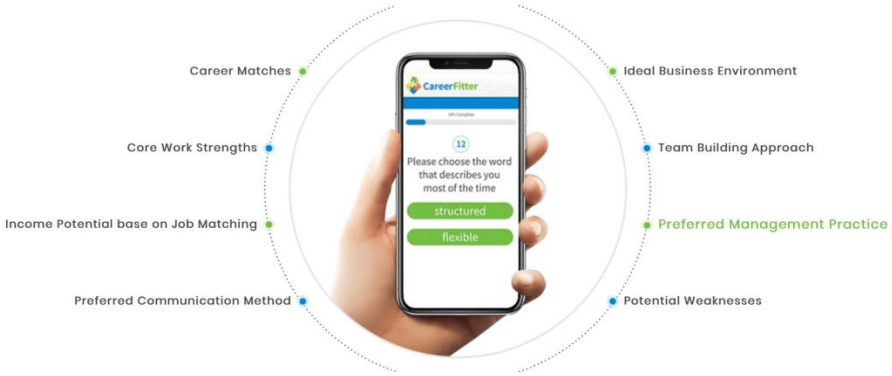


Figure.2.4: Online Assessment Application

2.3. AI-DRIVEN CAREER GUIDANCE:

2.3.1. INTRODUCTION

Some platforms use AI and machine learning to provide personalized career advice. These systems analyse user data and provide recommendations for suitable career paths based on trends, skills, and preferences**.** AI-driven career guidance represents a transformative approach to helping individuals navigate their professional journeys. By harnessing the power of artificial intelligence, these systems offer data-driven insights and personalized recommendations. Analyzing vast datasets, AI algorithms consider factors such as skills, interests, and personality traits to tailor guidance to the unique profile of each user.

Figure.2.5. AI Guidance

2.3.2. MERITS

1. Data-Driven Insights:

Leveraging vast datasets, AI provides data-driven insights into industries, job markets, and emerging trends. This ensures that users receive information based on the latest and most relevant data available.

2. Efficiency and Automation:

Automation of routine tasks, such as skills assessments and job matching, enhances efficiency. This allows users to focus more on strategic aspects of their career exploration, saving time and streamlining the decision-making process.

3. Remote and Global Access:

The accessibility of AI-driven career guidance on a global scale ensures that individuals worldwide can benefit from advanced career insights. This broad reach democratizes access to valuable guidance resources.

DEMERITS

1. Lack of Human Touch:

AI lacks the human touch and empathy that can be crucial in addressing the emotional aspects of career decisions. Individuals may require human interaction for nuanced guidance, especially in handling sensitive topics or unique life circumstances.

2. Risk of Information Overload:

AI-driven systems, if not carefully designed, may overwhelm users with excessive information and choices. This information overload can hinder rather than facilitate effective decision-making.

CHALLENGES

1. Privacy Concerns:

Collecting and analyzing personal data for career assessments raises privacy concerns. Maintaining robust privacy measures, securing user data, and ensuring compliance with data protection regulations are ongoing challenges.

2. User Empowerment and Education:

Empowering users to understand and interpret AI-driven guidance results and educating them about the capabilities and limitations of the technology are ongoing challenges. Enhancing user literacy in the context of AI-driven guidance is crucial.

3. Ethical Use of Data:

Ethical considerations surrounding the use of personal data for career assessments need careful attention. Establishing ethical guidelines and frameworks to govern data usage and prevent misuse is a persistent challenge.

2.3.3. Implementation of AI-Driven Career Guidance

The implementation of AI-driven career guidance involves a strategic and user-centric approach to harness the benefits of artificial intelligence in assisting individuals with their career decisions. Beginning with a thorough needs assessment, the process focuses on understanding the specific requirements of the target users, encompassing demographic, educational, and career-related aspects.

Subsequently, the development and training of AI algorithms incorporate factors such as skills, interests, and industry trends to ensure data-driven and personalized recommendations. The user interface is designed to be intuitive and engaging, facilitating a seamless experience for users.

Privacy and security measures are paramount, addressing concerns related to the collection and storage of personal data. Integration with existing systems, coupled with user training and orientation, ensures widespread adoption and effective utilization. Continuous monitoring, evaluation, and iterative improvement, guided by user feedback, contribute to the system's ongoing enhancement. Providing robust user support services and implementing awareness campaigns further optimize the user experience, fostering engagement and informed decision-making in the dynamic realm of career exploration.

Figure.2.6. AI Search

CHAPTER 3
PROPOSED SYSTEM

CHAPTER 3
PROPOSED SYSTEM

3.1 OBJECTIVE OF PROPOSED SYSTEM

The objective of the proposed system is to overcome the challenges faced by the existing solutions. Our proposed system is a machine learning model that can suggest viable career paths to the user based on the skills, interests and goals of the user. The machine learning model is to be interfaced with an interactive website for ease of use for the user.

The objective of a proposed career path advisor system is to assist individuals in making informed and strategic decisions about their careers. The system aims to provide personalized guidance, resources, and recommendations to help users navigate their career journeys effectively.

3.2 ALGORITHMS USED FOR PROPOSED MODEL

After serious considerations and research, the viable algorithms that can be used for implementing this project have been narrowed down to the 2 algorithms, i.e., SVM Algorithm and KNN Algorithm.

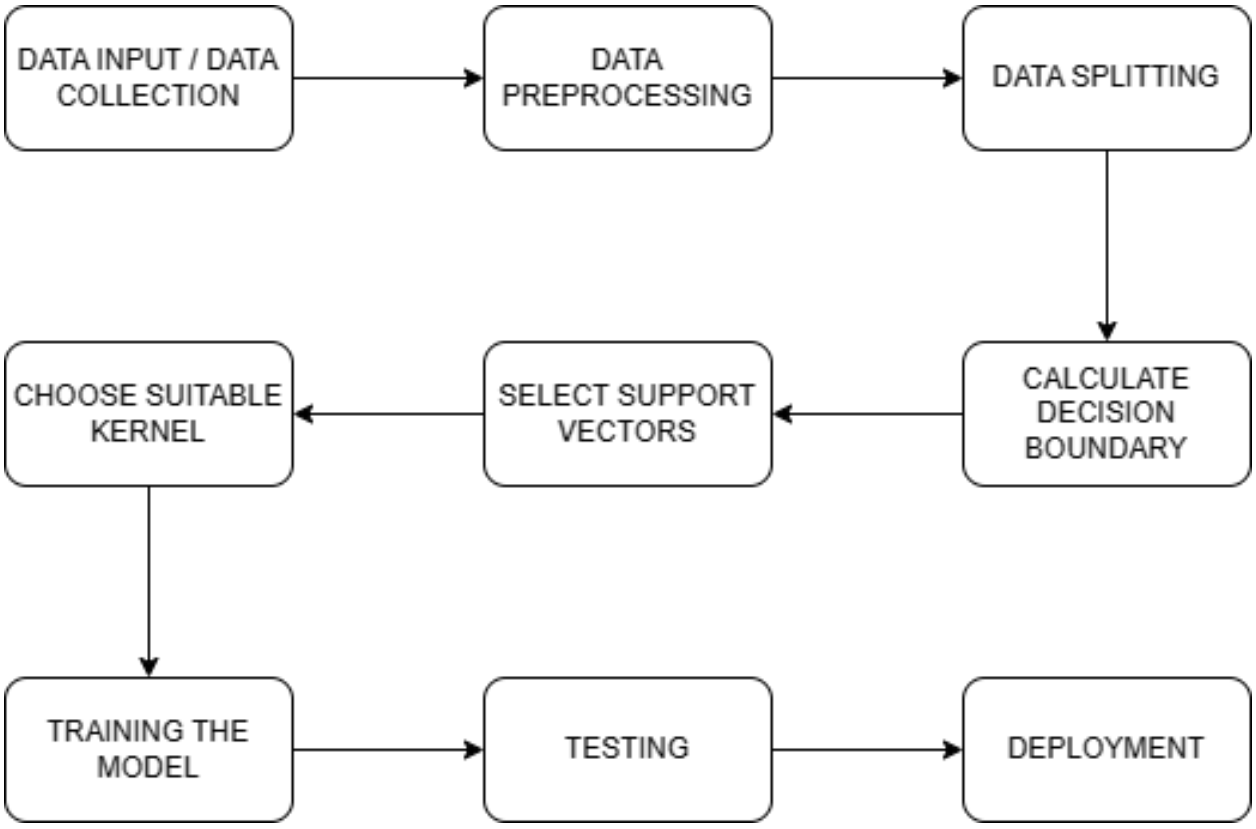
We compare the performance of different machine learning algorithms such as KNN-Classification algorithm, SVM-Classification algorithm on Multi-Class Classification task. We use a dataset to train and test this machine learning model in order to provide the user with the right career choice by finding the most suitable outcome by comparing the dataset with the user input.

Our approach involves leveraging Machine Learning, specifically the SVM algorithm, to build an intelligent platform designed to assist individuals in making informed career decisions. Our goal is to create a user-friendly space that takes into account an individual's distinct skills, interests, and aspirations alongside current job market dynamics.

At the core of this initiative lies the fusion of Machine Learning with Web Development, resulting in an intuitive interface for users. Through a rigorous comparison of various machine learning algorithms—such as KNN-Classification and SVM-Classification—for Multi-Class Classification tasks, we will evaluate their performance using accuracy, precision, and recall metrics.

3.3 DESIGNING

3.3.1 UML DIAGRAM



3.4 STEPWISE IMPLEMENTATION AND CODE

Python Code

```
from flask import Flask, render_template, request
import pickle
import numpy as np

app = Flask(__name__)

# Load the trained machine learning model
model = pickle.load(open("career_pkl.pkl", "rb"))

# Define the route for the home page
@app.route('/')
def home():
    return render_template('index.html')

# Define the route for form submission and model prediction
@app.route('/predict', methods=['POST'])
def predict():
    try:
        # Access form data submitted by the user
        data = {

    'database' : request.form['database'],
    'computer_architecture': request.form['computer_architecture'],
    'distributed_computing': request.form['distributed_computing'],
    'cyber_security': request.form['cyber_security'],
    'networking': request.form['networking'],
    'software_development': request.form['software_development'],
    'programming_skills':  request.form['programming_skills'],
    'project_management':  request.form['project_management'],
    'computer_forensics':  request.form['computer_forensics'],
    'technical_communication':  request.form['technical_communication'],
    'ai_ml':  request.form['ai_ml'],
    'software_engineering':  request.form['software_engineering'],
    'business_analysis':  request.form['business_analysis'],
    'communication_skills':  request.form['communication_skills'],
    'data_science':  request.form['data_science'],
    'troubleshooting_skills':  request.form['troubleshooting_skills'],
    'graphics_designing':  request.form['graphics_designing']
            # Add more form data for each label in the HTML form
        }
```

```
        # Map the form data to numerical values, if needed
        # For example, you can create a dictionary to map options to numerical
values
        mapping = {
            'Not Interested': 0,
            'Poor': 1,
            'Beginner': 2,
            'Average': 3,
            'Intermediate': 4,
            'Excellent': 5,
            'Professional': 6
        }

        # Convert the form data to numerical values
        for key, value in data.items():
            data[key] = mapping[value]

        # Convert the data to a numpy array
        data_array = np.array(list(data.values())).reshape(1, -1)

        # Make predictions using the loaded model
        prediction = model.predict(data_array)

        # Return the prediction as a template variable to display on the result
page
        return render_template('result.html',prediction=prediction[0])

    except Exception as e:
        return render_template('error.html')

if __name__ == '__main__':
    app.run(debug=True)
@app.errorhandler(500)
def internal_server_error(e):
    return render_template('error.html'), 500
```

HTML Code

```
<!DOCTYPE html>
<html>
<head>
    <title>Machine Learning Model Prediction</title>
    <style>
      body {
```

```
            font-family: 'Arial', sans-serif;
            margin: 20px;
            background-color: #f2f2f2;
        }
        h1 {
            text-align: center;
            color: #333;
        }
        form {
            max-width: 600px;
            margin: 0 auto;
            background-color: #ffffff;
            padding: 20px;
            border-radius: 8px;
            box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
            opacity: 0;
            animation: fadeIn 1s ease-in-out forwards;
        }
        @keyframes fadeIn {
            from {
                opacity: 0;
            }
            to {
                opacity: 1;
            }
        }
        label {
            display: block;
            margin-bottom: 8px;
            color: #555;
        }



        select,
        input[type="text"]:not([disabled]) {
            width: 100%;
            padding: 10px;
            border: 1px solid #ccc;
            border-radius: 4px;
            box-sizing: border-box;
            margin-bottom: 20px;
            transition: transform 0.3s ease, border-color 0.3s ease;
        }
        select:hover,
```

```
        input[type="text"]:not([disabled]):hover {
            transform: scale(1.02);
            border-color: #4CAF50;
        }
        input[type="submit"] {
            width: 100%;
            padding: 12px;
            background-color: #4CAF50;
            color: #fff;
            border: none;
            border-radius: 4px;
            cursor: pointer;
            font-size: 16px;
            transition: background-color 0.3s ease;
        }
        input[type="submit"]:hover {
            background-color: #45a049;
        }

        p {
            color: #666;
            line-height: 1.5;
        }

        /* Styles for the footer */
        footer {
            text-align: center;
            margin-top: 20px;
            padding: 10px;
            background-color: #333;
            color: #fff;
        }
    </style>
</head>
<body>
    <h1>Enter Your Preferences:</h1>
    <form action="/predict" method="post">
        <label for="database">Database Fundamentals:</label>
        <select id="database" name="database">
            <option value="Not Interested">Not Interested</option>
            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
```

```
            <option value="Professional">Professional</option>
        </select>

        <label for="computer_architecture">Computer Architecture:</label>
        <select id="computer_architecture" name="computer_architecture">
            <option value="Not Interested">Not Interested</option>
            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>

        <label for="distributed_computing">Distributed Computing Systems:</label>
        <select id="distributed_computing" name="distributed_computing">
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            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>


        <label for="cyber_security">Cyber Security:</label>
        <select id="cyber_security" name="cyber_security">
            <option value="Not Interested">Not Interested</option>
            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>


        <label for="networking">Networking:</label>
        <select id="networking" name="networking">
            <option value="Not Interested">Not Interested</option>
            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
```

```
        <option value="Excellent">Excellent</option>
        <option value="Professional">Professional</option>
    </select>


    <label for="software_development">Software Development:</label>
    <select id="software_development" name="software_development">
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        <option value="Poor">Poor</option>
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        <option value="Average">Average</option>
        <option value="Intermediate">Intermediate</option>
        <option value="Excellent">Excellent</option>
        <option value="Professional">Professional</option>
    </select>

    <label for="programming_skills">Programming Skills:</label>
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        <option value="Average">Average</option>
        <option value="Intermediate">Intermediate</option>
        <option value="Excellent">Excellent</option>
        <option value="Professional">Professional</option>
    </select>


    <label for="project_management">Project Management:</label>
    <select id="project_management" name="project_management">

        <option value="Not Interested">Not Interested</option>
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        <option value="Beginner">Beginner</option>
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        <option value="Intermediate">Intermediate</option>
        <option value="Excellent">Excellent</option>
        <option value="Professional">Professional</option>
    </select>


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        <option value="Poor">Poor</option>
```

```
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>


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            <option value="Intermediate">Intermediate</option>
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            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>



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            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
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```

```
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    <option value="Average">Average</option>
    <option value="Intermediate">Intermediate</option>
    <option value="Excellent">Excellent</option>
    <option value="Professional">Professional</option>
</select>


<label for="communication_skills">Communication skills:</label>
<select id="communication_skills" name="communication_skills">
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    <option value="Poor">Poor</option>
    <option value="Beginner">Beginner</option>
    <option value="Average">Average</option>
    <option value="Intermediate">Intermediate</option>
    <option value="Excellent">Excellent</option>
    <option value="Professional">Professional</option>
</select>



<label for="data_science">Data Science:</label>
<select id="data_science" name="data_science">
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    <option value="Poor">Poor</option>
    <option value="Beginner">Beginner</option>
    <option value="Average">Average</option>
    <option value="Intermediate">Intermediate</option>
    <option value="Excellent">Excellent</option>
    <option value="Professional">Professional</option>
</select>



<label for="troubleshooting_skills">Troubleshooting skills:</label>
<select id="troubleshooting_skills" name="troubleshooting_skills">
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    <option value="Poor">Poor</option>
    <option value="Beginner">Beginner</option>
    <option value="Average">Average</option>
```

```
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>


        <label for="graphics_designing">Graphics Designing:</label>
        <select id="graphics_designing" name="graphics_designing">
            <option value="Not Interested">Not Interested</option>
            <option value="Poor">Poor</option>
            <option value="Beginner">Beginner</option>
            <option value="Average">Average</option>
            <option value="Intermediate">Intermediate</option>
            <option value="Excellent">Excellent</option>
            <option value="Professional">Professional</option>
        </select>

        <input type="submit" value="Predict">
    </form>
</body>
</html>
```

Machine Learning Code

```
import pandas as pd
from sklearn import metrics
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
import numpy as np
import joblib  # Use joblib to save the SVM model as a .pkl file

# Read data
career = pd.read_csv("career.csv")

# Encode categorical features
label_encoder = LabelEncoder()
categorical_columns = ["Database Fundamentals", "Computer Architecture",
"Distributed Computing Systems", "Cyber Security",
                       "Networking", "Software Development", "Programming
Skills", "Project Management",
```

```
                        "Computer Forensics Fundamentals", "Technical
Communication", "AI ML", "Software Engineering",
                        "Business Analysis", "Communication skills", "Data
Science", "Troubleshooting skills", "Graphics Designing"]

for column in categorical_columns:
    career[column] = label_encoder.fit_transform(career[column])

# Split data into features (x) and target (y)
y = career["Role"]
x = career.drop('Role', axis=1)

# Split into training and testing sets
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2)

# Create SVC (Support Vector Machine) model
svm = SVC()

# Fit the model
svm.fit(x_train, y_train)

# Save the trained model as a .pkl file
joblib.dump(svm, 'svm_model.pkl')

# Convert x_test to a contiguous NumPy array
x_test_np = np.ascontiguousarray(x_test)

# Predict using the model
y_pred = svm.predict(x_test_np)
print('y_pred', y_pred)

# Evaluate accuracy
accuracy = metrics.accuracy_score(y_test, y_pred)
print('Accuracy=', accuracy * 100)
```

CHAPTER 4
RESULTS AND DISCUSSION

CHAPTER 4

RESULTS AND DISCUSSION

4.1 PERFORMANCE METRICS

Accuracy:

Calculate the overall accuracy of the machine learning model by measuring the percentage of correct career recommendations provided to users.

Precision and Recall:

Evaluate the model's precision (the fraction of recommended careers that are relevant) and recall (the fraction of relevant careers that were recommended), especially important for minimizing false positives and false negatives in recommendations.

F1-Score:

Use the F1-score to balance precision and recall, providing a single measure of the model's performance that considers both false positives and false negatives.

User Satisfaction:

Collect user feedback and conduct surveys to gauge user satisfaction with the recommendations and overall experience of the Career Path Advisor.

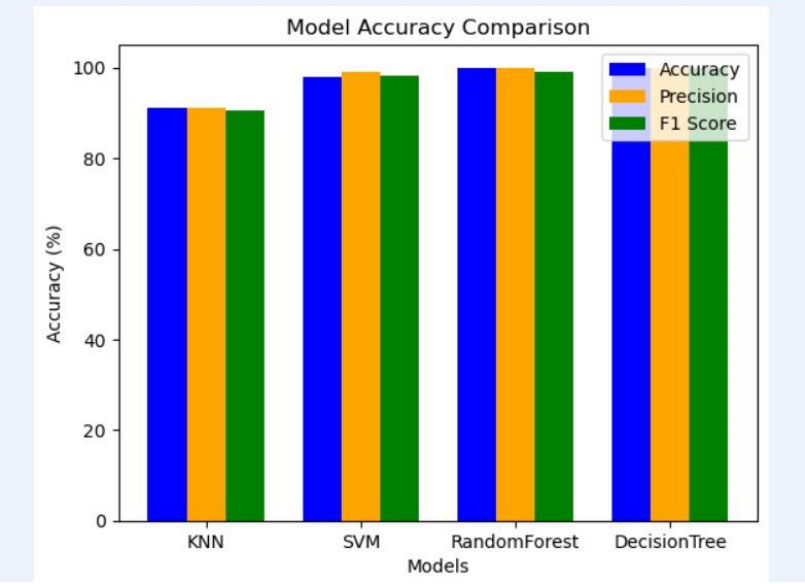

Figure.4.1: Performance Metrics Graph

Accuracy = 99.17211328976035
Precision = 99.19410391556734
Recall = 99.17211328976035
F1 Score = 99.1729743358712

Table 4.1 Dataset Example

Skill 1	Skill 2	Skill 3	Skill 4	Skill 5	Skill 6	Role
Professional	Excellent	Intermediate	Average	Beginner	Not Interested	Database Administrator
Not Interested	Professional	Excellent	Intermediate	Average	Beginner	Graphic Designer
Not Interested	Beginner	Professional	Excellent	Intermediate	Average	Software Developer
Beginner	Not Interested	Average	Professional	Excellent	Intermediate	Software Tester
Intermediate	Average	Beginner	Not Interested	Professional	Excellent	Cyber Security Specialist
Excellent	Intermediate	Average	Beginner	Not Interested	Professional	Hardware Engineer

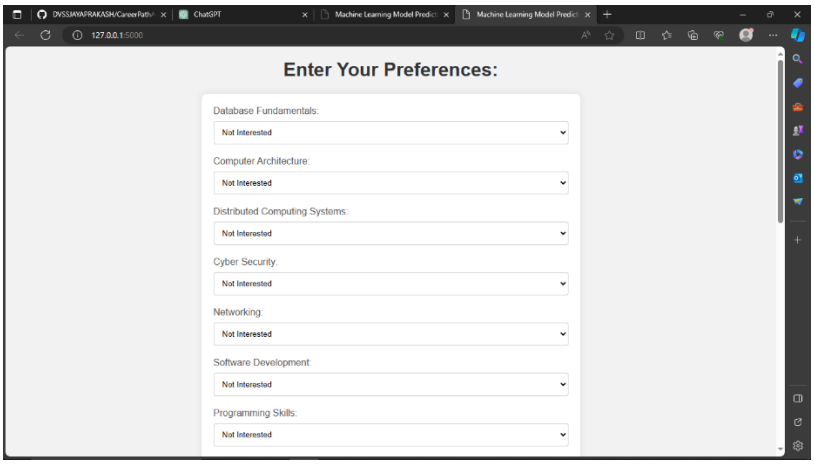

Figure.4.2: Project Input Page 1

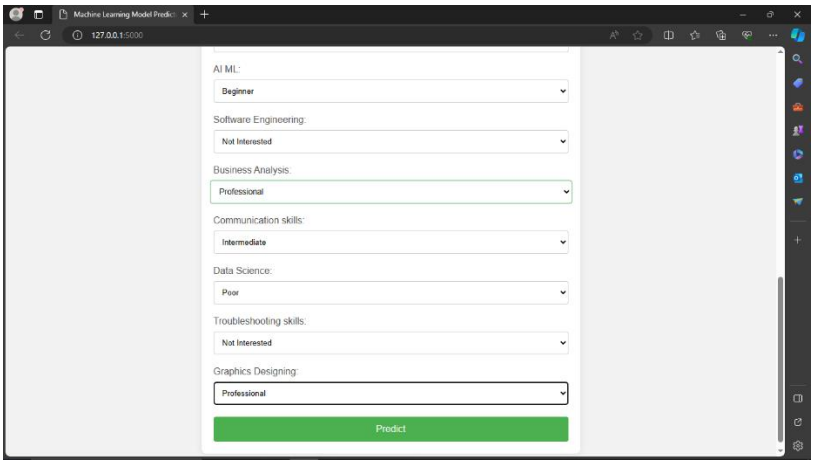

Figure.4.3: Project Input Page 2

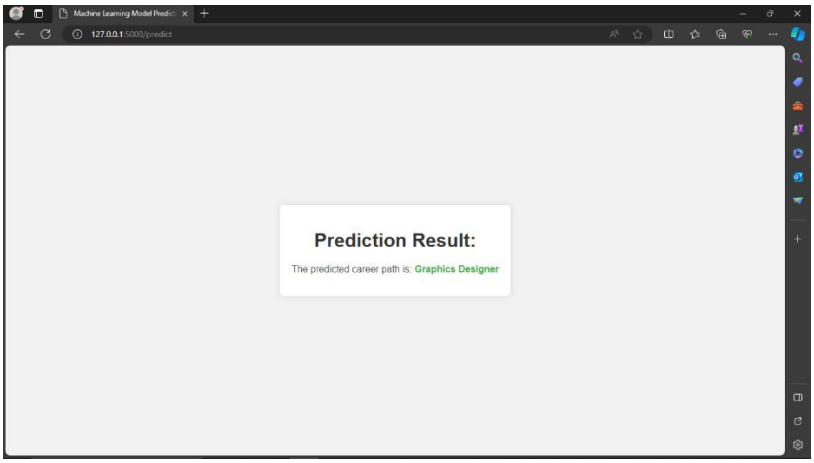

Figure.4.4: Project Output Page

CHAPTER 5
CONCLUSION

CHAPTER 5
CONCLUSION

5.1 CONCLUSION AND FUTURE ENHANCEMENT

CONCLUSION

The Career Path Advisor project uses machine learning and web development to provide personalized career recommendations. Performance metrics, user feedback, and data privacy measures are crucial for evaluating the system's effectiveness. Continuous analysis and improvements ensure the project helps individuals make informed career decisions.

The project empowers users to navigate their career paths in a dynamic job market by offering tailored guidance and recommendations. It represents a valuable resource for individuals seeking meaningful and informed career choices in today's ever-changing professional landscape.

FUTURE WORK

- **Advanced Machine Learning Techniques:** Explore and implement state-of-the-art machine learning algorithms and natural language processing (NLP) techniques to improve recommendation accuracy and personalization.
- **Deep Learning:** Investigate the application of deep learning models, such as neural networks and recurrent neural networks (RNNs), for better understanding and predicting user preferences and job market trends.
- **Multi-Modal Data:** Incorporate multimedia data like images and videos to provide a richer understanding of job descriptions and user profiles, enabling more comprehensive recommendations.
- **Real-Time Job Market Data:** Integrate real-time job market data feeds to keep recommendations up-to-date with the rapidly changing job landscape.

REFERENCES

REFERENCES

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   Career Recommendation for College Students Based on Deep Learning and Machine Learning (hindawi.com)
2. Data Privacy and Security Measures in Various Career Advisory Platforms
   Protecting Data and Confidentiality in Career Counseling Research (linkedin.com)
3. Python Documentation for scikit-learn
   scikit-learn Tutorials — scikit-learn 1.3.2 documentation
4. GitHub repositories
5. Geeks For Geeks - Machine Learning algorithms
   Machine Learning Algorithms (geeksforgeeks.org)

GITHUB LINK

GitHub Repository Link:

DVSSJAYAPRAKASH/CareerPathAdvisor: Career path advisor using ML (github.com)

GitHub Repository Clone Link:

https://github.com/DVSSJAYAPRAKASH/CareerPathAdvisor.git