LABORATORY REPORT

Application Development Lab (CS33002)

B.Tech Program in ECSc

Submitted By

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Experiment Number	1
Experiment Title	Build a Resume using HTML/CSS
Date of Experiment	07/01/2025
Date of Submission	13/01/1025

1. Objective:-To design and develop a professional resume using HTML and CSS.

2. Procedure:- (Steps Followed)

- **Setup the Project**:

- Create a folder for your project.
- Inside the folder, create two files: `index.html` and `style.css`.

- **HTML Structure**:

- Open the `index.html` file and define the basic HTML structure:

    - Add the `DOCTYPE` declaration for HTML5. Create the `html`, `head`, and `body` sections. In the `head`, link to the CSS file using `<link rel="stylesheet" href="style.css">`.

- **Design the Layout**:

- Use a `div` with a class of `container` to hold the resume structure. Create two sections:

    - **Profile Section**:

        - Add a `div` with the class `profile` for the left-hand sidebar.
        - Include a `profile-photo` and `profile-info` for personal details.

    - **Resume Section**:

- Add a `div` with the class `resume` for the main content.
- Include child sections like `about`, `education`, `projects`, and `skills`.

- **Style the Components**:

- Open `style.css` to define styles for the template:

  - Set up a responsive grid using Flexbox in `.container`. o Add custom styles for colors, font sizes, and spacing. o Style specific sections like `.profile`, `.resume`, and their child elements.

- **Profile Section**:

- Use a `div` with the class `profile-photo` to display a profile image.
- Add personal details (e.g., name, contact information) in `profile-info`.
- Include a `languages` section with styled circular progress bars.
- **Resume Section**:

- **About Section**: o Add the candidate's name, position, and location in styled headings.

- **Education Section**: o Use a list (`<ul>`) with list items (`<li>`) for institutions, dates, and qualifications.

- **Projects Section**: o Display a list of projects, each with a title, date, and description. **Skills Section**:

  - Use horizontal progress bars to visually represent skill levels.

- **Make It Responsive**:

- Add `@media` queries in `style.css` to handle different screen sizes:

  - Adjust the layout for tablets (`max-width: 768px`) and phones (`max-width: 480px`). o Ensure content stacks vertically on smaller devices.

- **Testing and Optimization**:

- Open the `index.html` file in a web browser to view the resume.
- Test the responsiveness by resizing the browser window.
- Validate the HTML and CSS using online tools like W3C Validator.

- **Deployment**:

- Host the project using GitHub Pages, Netlify, or any static web hosting service.
- Ensure the profile image (`profile.png`) is available in the project directory.

3. Code:-

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
```

```
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Resume Template</title>
    <style>
        html {
  box-sizing: border-box;
}
*, *:after, *:before { box-
  sizing: inherit;

}
.container { display: flex; max-width:
  960px; background-color: #eaeaea;
  justify-content: space-between; margin:
  20px auto; box-shadow: 1px 1px 10px
  rgba(0,0,0,0.1)
}
.profile { flex-basis: 35%;
  background-color: #39383a;
  color: #abababab;
}
.profile-photo { height: 270px;
  background-image: url(./profile.png);
  background-size: cover; background-
  position: top; background-repeat: no-
  repeat;
}
.profile-info { padding-
  left: 30px; padding-
  right: 30px; padding-
  top: 50px; padding-
  bottom: 70px;
}
.profile-text { font-size:
  13px; line-height:
  24.19px; margin-
  bottom: 50px;
}
.heading { margin: 0;
  padding-bottom: 16px;
```

```
  text-transform: uppercase;
  font-weight: 700;
}
.heading-light {
  color: #ffffff;
  border-bottom: 2px #5a5a5a dashed;
}
.contacts { margin-
  bottom: 70px;
}
.contacts-title  {  color:
  #fff;  margin-bottom:
  13px;  font-size:  16px;
  font-weight: 400;
}
.contacts-text  {  color:
  #ababab;  text-
  decoration:  none;
  padding-left:  27px;
  line-height: 20.97px;
}
.contacts-item { padding-top: 24px;
  padding-bottom: 24px; border-
  bottom: 2px #5a5a5a dashed;
} address
{
  font-style: normal;
}
.fas { margin-right:
  7px;
}
.languages {
  display: flex; flex-
  wrap: wrap;
  padding-top: 40px;
}
.language { width: 100px;
  height: 100px; border:
```

```
  6px solid #5c5c5c; border-
  radius: 50%; display:
  flex; justify-content:
  center; align-items:
  center; flex-direction:
  column; margin-bottom:
  30px; margin-right: 30px;
}
.language:nth-child(3) { margin-
  bottom: 0;
}
.language-text { text-
  transform: uppercase; font-
  size: 11px
}
.languages-per { font-
  size: 15px; font-weight:
  600;
}
.lines { display: flex;
  flex-direction: column;
  justify-content: center;
}
.line { display: block; width:
  90px; height: 2px;
  background-color: #5c5c5c;
  margin-top: 10px; margin-
  bottom: 10px;
}
.line:nth-child(2) {
  width: 100px; margin-
  left: 20px;
}
.resume { padding: 25px
  30px; flex-basis: 63%;
  background-color: #fff;

}
```

```
.resume-wrap { padding: 36px 56px;
  border: 1px solid rgba(168, 168, 168, 0.44);
  min-height: 100%;
}
.logo  {  display:  flex;
  justify-content:
  center;          margin-
  bottom: 38px;
}
.logo-img { width: 90px;
  height: 90px; border: 1px
  solid #39383a; border-
  radius: 50%; display: flex;
  justify-content: center;
  align-items: center;
}
.logo-lines { display:
  flex; align-items:
  center; justify-content:
  center; flex-direction:
  column; margin-left:
  17px; margin-right:
  17px;
}
.logo-line { width: 43px;
  height: 2px; background-
  color: #39383a; margin-top:
  10px; margin-bottom: 10px;
}
.logo-lines_left .logo-line:nth-child(2) {
  margin-right: 20px; width: 55px;
}
.logo-lines_right .logo-line:nth-child(2) {
  margin-left: 20px; width: 55px;
}
.about  {  padding-bottom:  30px;
  border-bottom: 1px solid #e0e0e0;
```

```
  text-align: center; margin-bottom:
  40px;
}
.name {
  font-size:  16px;  text-
  transform:  uppercase;
  letter-spacing:  10.75px;
  margin-bottom: 10px;
}
.position { display: inline-
  block; font-size: 9px; text-
  transform: uppercase;
  color: #808080; margin-
  bottom: 30px;
}
.about-address  {  font-
  size:  13px;  margin-
  bottom:  15px;  font-
  family: Roboto;
}
.about-contacts { font-
  size: 8px;
}
.about-contacts__link  {
  text-decoration: none;
  color: #777777;
}
.heading_dark { font-size: 16px;
  font-weight: 400; border-bottom:
  1px solid #e0e0e0; margin-
  bottom: 37px;

}
.list { list-style:
  none; padding-
  left: 0;
}
.list-item { position: relative;
  padding-left: 40px; padding-
```

```
  bottom: 30px; margin-bottom:
  30px; border-bottom: 2px dashed
  #ececec;
}
.list-item:before {
  content: ''; position:
  absolute; left: 0; top:
  3px; width: 9px; height:
  9px; border-radius:
  50%; background-color:
  #000;
}
.list-item__title { font-size:
  11px; text-transform:
  uppercase; margin-
  bottom: 5px;
}.list-item__date { font-size:
  10px; text-transform:
  uppercase;
}
.list-item__text {
  font-size: 10px;
  color: #777;
}
.list-item_non-border {
  border: none;
}
.heading_skills {
  margin-bottom: 48px;
}
.skills-list { list-style-
  type: none; padding-
  left: 0;
}
.skills-list__item { margin-
  bottom: 30px; text-transform:
  uppercase; font-size: 11px;
```

```
  display:   flex;   justify-content:
  space-between;
}
.level {
  width: 70%; height: 8px;
  border: 1px solid
  #39383a; position:
  relative;
}
.level:before { content: '';
  position: absolute; left: 0;
  top: 0; height: 100%;
  background-color: #898989;
}
.level-80:before {
  width: 80%;
}
.level-90:before {
  width: 90%;
}
.level-50:before {
  width: 50%;
}

@media (max-width: 1024px) {
  .container {
    width: 90%;
  }
}

@media (max-width: 992px) {
  .container { flex-direction:
  column; width: 70%;
  }
  .profile-photo { width:
    200px; height: 200px;
    border: 3px solid
```

```
    #fff; margin: auto;
    margin-top: 40px;
  }
  .profile { position:
    relative;
  }
  .profile:before {
    content: '';
    width: 100%; height: 150px;
    background-color:
    #03A9F4; display: block;
    position: absolute;
  }
  .profile-photo {
    position: relative; z-
    index: 0;
  }
  .lines { display:
    none;
  }
}
@media (max-width: 768px) {
  .container { width: 80%;
  }
  .resume {
    padding: 10px;
  }
  .resume-wrap { padding-
    left: 20px; padding-right:
    20px;
  }
  .list-item__title { font-
    size: 14px;
  }
  .list-item__date {
  font-size: 12px; }
```

```
  .list-item__text { font-
    size: 12px; line-height:
    1.4;
  }
  .about-contacts__link
    {    display:    block;
    font-size: 13px;
  }
}
@media (max-width: 567px) {
  .logo-img { width: 70px;
  height: 70px;
  }
  .logo-lines { margin-
    left: 8px; margin-
    right: 8px;
  }
}
@media (max-width: 480px) {
  .logo { display: none;
  }
  .container { min-
    width: 320px;
  }
  .name { letter-spacing:
    normal;
  }
  .level {
    width: 50%;
  }

}
    </style>
</head>
<body>
    <div class="container">
        <div class="profile">
          <div class="profile-photo"></div>
```

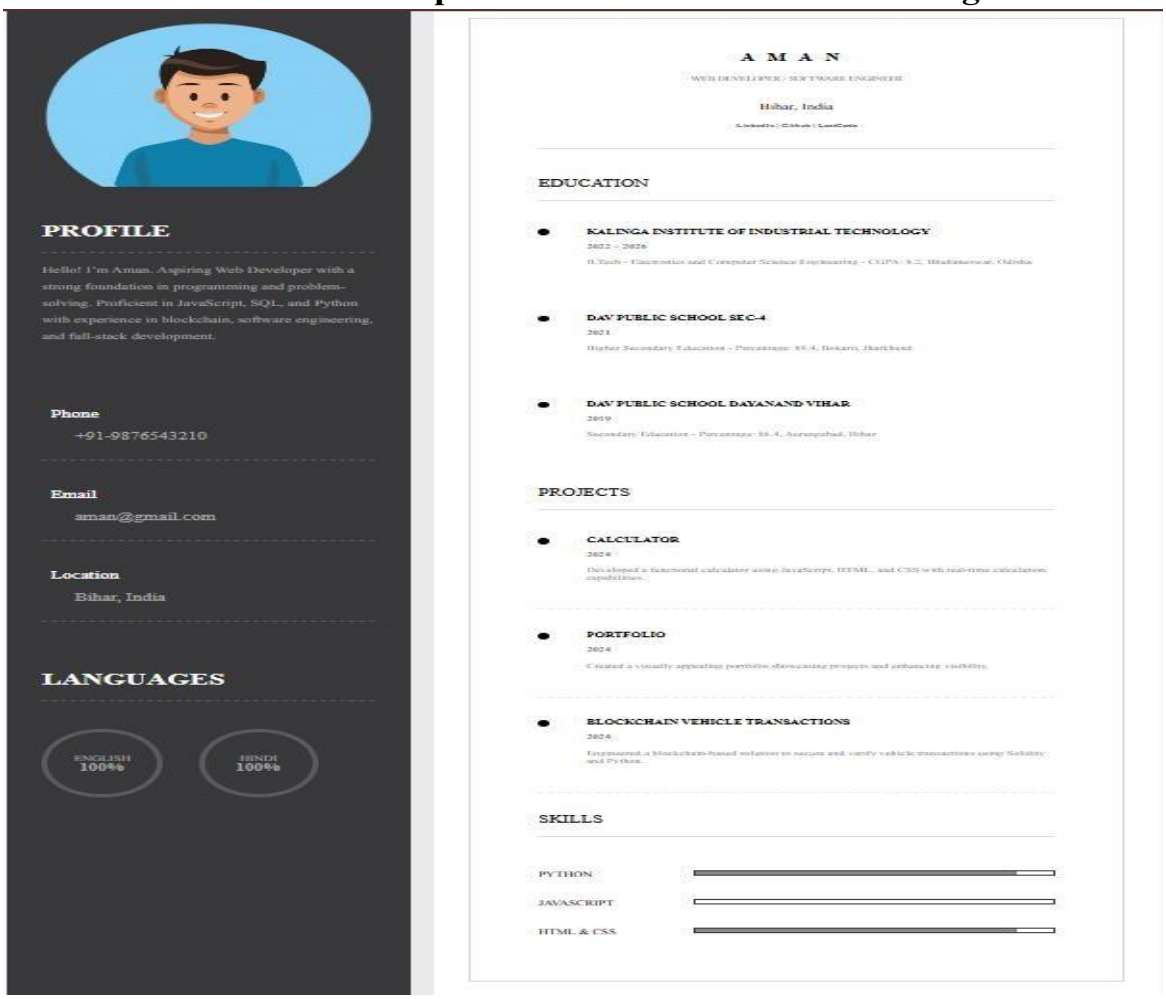
```
<div class="profile-info">
  <h2 class="heading heading-light">
    Profile
  </h2>
  <p class="profile-text">
    Hello! I’m Aman. Aspiring Web Developer with a strong foundation in programming and problem-solving.
    Proficient in JavaScript, SQL, and Python with experience in blockchain, software engineering, and full-stack development.
  </p>
  <div class="contacts">
    <div class="contacts-item">
      <h3 class="contacts-title">
        <i class="fas fa-phone-volume"></i>
        Phone
      </h3>
      <a href="tel:+919876543210" class="contacts-text">+91-9876543210</a>
    </div>
    <div class="contacts-item">
      <h3 class="contacts-title">
        <i class="fas fa-envelope"></i>
        Email
      </h3>
      <a href="mailto:aman@example.com" class="contacts-text">aman@gmail.com</a>
    </div>
    <div class="contacts-item">
      <h3 class="contacts-title">
        <i class="fas fa-map-marker-alt"></i>
        Location
      </h3>
      <address class="contacts-text">
        Bihar, India
      </address>
    </div>
  </div>
  <h2 class="heading heading-light">Languages</h2>
  <div class="languages">
    <div class="language">
      <span class="language-text">English</span>
      <strong class="languages-per">100%</strong>
```

```
        </div>
        <div class="language">
          <span class="language-text">Hindi</span>
          <strong class="languages-per">100%</strong>
        </div>
      </div>
    </div>
  </div>
  <div class="resume">
    <div class="resume-wrap">
      <div class="about">
        <h1 class="name">Aman</h1>
        <span class="position">Web Developer / Software Engineer</span>
        <address class="about-address">Bihar, India</address>
        <div class="about-contacts">
          <a class="about-contacts__link" href="https://www.linkedin.com">
            <b>LinkedIn</b>
          </a> |
          <a class="about-contacts__link" href="https://github.com/">
            <b>Github</b>
          </a> |
          <a class="about-contacts__link" href="https://leetcode.com/">
            <b>LeetCode</b>
          </a>
        </div>
      </div>
      <div class="education">
        <h2 class="heading heading_dark">
          Education
        </h2>
        <ul class="list">
          <li class="list-item list-item_non-border">
            <h4 class="list-item__title">Kalinga Institute of Industrial Technology</h4>
            <span class="list-item__date">2022 – 2026</span>
            <p class="list-item__text">B.Tech - Electronics and Computer Science Engineering - CGPA: 8.2, Bhubaneswar, Odisha</p>
          </li>
          <li class="list-item list-item_non-border">
            <h4 class="list-item__title">DAV Public School Sec-4</h4>
```

```
            <span class="list-item__date">2021</span>
            <p class="list-item__text">Higher Secondary Education - Percentage: 89.4, Bokaro, Jharkhand</p>
          </li>
          <li class="list-item list-item_non-border">
            <h4 class="list-item__title">DAV Public School Dayanand Vihar</h4>
            <span class="list-item__date">2019</span>
            <p class="list-item__text">Secondary Education - Percentage: 86.4, Aurangabad, Bihar</p>
          </li>
        </ul>
      </div>
      <div class="projects">
        <h2 class="heading heading_dark">
          Projects
        </h2>
        <ul class="list">
          <li class="list-item">
            <h4 class="list-item__title">Calculator</h4>
            <span class="list-item__date">2024</span>
            <p class="list-item__text">Developed a functional calculator using JavaScript, HTML, and CSS with real-time calculation capabilities.</p>
          </li>
          <li class="list-item">
            <h4 class="list-item__title">Portfolio</h4>
            <span class="list-item__date">2024</span>
            <p class="list-item__text">Created a visually appealing portfolio showcasing projects and enhancing visibility.</p>
          </li>
          <li class="list-item">
            <h4 class="list-item__title">Blockchain Vehicle Transactions</h4>
            <span class="list-item__date">2024</span>
            <p class="list-item__text">Engineered a blockchain-based solution to secure and verify vehicle transactions using Solidity and Python.</p>
          </li>
        </ul>
      </div>
      <div class="skills">
        <h2 class="heading heading_dark heading_skills">
          Skills
        </h2>
```

```
          <ul class="skills-list">
            <li class="skills-list__item">
              Python
              <div class="level level-90"></div>
            </li>
            <li class="skills-list__item">
              JavaScript
              <div class="level level-85"></div>
            </li>
            <li class="skills-list__item">
              HTML & CSS
              <div class="level level-90"></div>
            </li>
          </ul>
        </div>
      </div>
    </div>
  </div>

</body>
</html>
```

4. Results/Output:- Entire Screen Shot including Date & Time



5. Remarks:-

Signature of the Student

(Name of the Student)

Signature of the Lab Coordinator

(Name of the Coordinator)

Experiment Number	2
Experiment Title	To classify images as cats or dogs using machine learning models.
Date of Experiment	14/01/2025
Date of Submission	21/01/1025

1.Objective:-To classify images as cats or dogs using machine learning models.

2. Procedure:-

Download the Dataset:

1. Obtain a dataset of cat and dog images, e.g., from Kaggle.
2. Unzip the dataset if necessary.

Organize the Dataset:

1.Place cat images in the `cats` folder and dog images in the `dogs` folder.

Verify the Path in Code:

1. Ensure the `data_dir` variable in the script matches the dataset path.
   Example: If the dataset is located in `C:/Users/KIIT/Desktop/AD/Lab2/data/train`, set `data_dir` accordingly.

Add Error Handling:

1. Update the script to check if the required folders (`cats` and `dogs`) exist.
2. Raise an appropriate error message if they do not.

Check File Formats:

1. Ensure all images in the `cats` and `dogs` folders are valid image files (e.g., `.jpg`, `.png`).

Verify Dataset Access:

1. Use a simple script to print the number of files in each folder to ensure the data is correctly placed and accessible.

Run the Model Training Script:

1. Execute the training script (`train_models.py`) to preprocess the data and train models.

Save Trained Models:

1. Ensure the trained models are saved (e.g., `svm_model.pkl`, `cnn_model.h5`) in the specified location.

Start Flask Backend:

1. Run the Flask app to serve the trained models and handle predictions.

Test the Frontend:

- Upload an image via the frontend UI and select a model for prediction.
- Verify that the output correctly identifies the uploaded image as a cat or a dog.

Code -

Training of model-

```
import os import pickle import cv2 import numpy as np from sklearn.svm import SVC from sklearn.ensemble import
RandomForestClassifier from sklearn.linear_model import LogisticRegression from sklearn.cluster import KMeans from
keras.api.models import Sequential from keras.api.layers import Conv2D, MaxPooling2D, Flatten, Dense

# Load dataset def load_data(data_dir):
    X, y = [], []
    for label, class_dir in enumerate(['cats', 'dogs']):
        class_path = os.path.join(data_dir, class_dir) for img_name in os.listdir(class_path):
            img_path = os.path.join(class_path, img_name) img = cv2.imread(img_path, cv2.IMREAD_COLOR) img =
            cv2.resize(img, (64, 64)) # Resize images X.append(img.flatten()) # Flatten image
            y.append(label) # 0 for cat, 1 for dog
    return np.array(X), np.array(y)
```

```
# Train SVM def train_svm(X, y): model =
SVC(kernel='linear', probability=True) model.fit(X, y)
with open('backend/models/svm_model.pkl', 'wb') as f:
        pickle.dump(model, f)


# Train Random Forest def
train_random_forest(X, y):
    model = RandomForestClassifier(n_estimators=100)
    model.fit(X, y) with
    open('backend/models/random_forest.pkl', 'wb') as f:
        pickle.dump(model, f)
# Train Logistic Regression def
train_logistic_regression(X, y):
    model = LogisticRegression() model.fit(X, y) with
    open('backend/models/logistic_regression.pkl', 'wb') as f:
        pickle.dump(model, f)
```

```
# Train K-Means def train_kmeans(X): model =
KMeans(n_clusters=2) model.fit(X) with
open('backend/models/kmeans_model.pkl', 'wb') as f:
pickle.dump(model, f)
```

```
# Train CNN def
train_cnn(X, y):
    X = X.reshape(-1, 64, 64, 3) / 255.0 # Normalize and reshape model
    = Sequential([
        Conv2D(32, (3, 3), activation='relu', input_shape=(64, 64, 3)),
        MaxPooling2D((2, 2)),
        Flatten(),
        Dense(128, activation='relu'),
        Dense(1, activation='sigmoid')
    ]) model.compile(optimizer='adam', loss='binary_crossentropy',
    metrics=['accuracy']) model.fit(X, y, epochs=10, batch_size=32,
    validation_split=0.2)
    model.save('backend/models/cnn_model.h5')
if __name__ == '__main__': data_dir =
    'data/train' X, y =
    load_data(data_dir) train_svm(X, y)
    train_random_forest(X, y)
    train_logistic_regression(X, y)
```

```
    train_kmeans(X) train_cnn(X, y)
    print("All models trained and saved.")
```

App.py

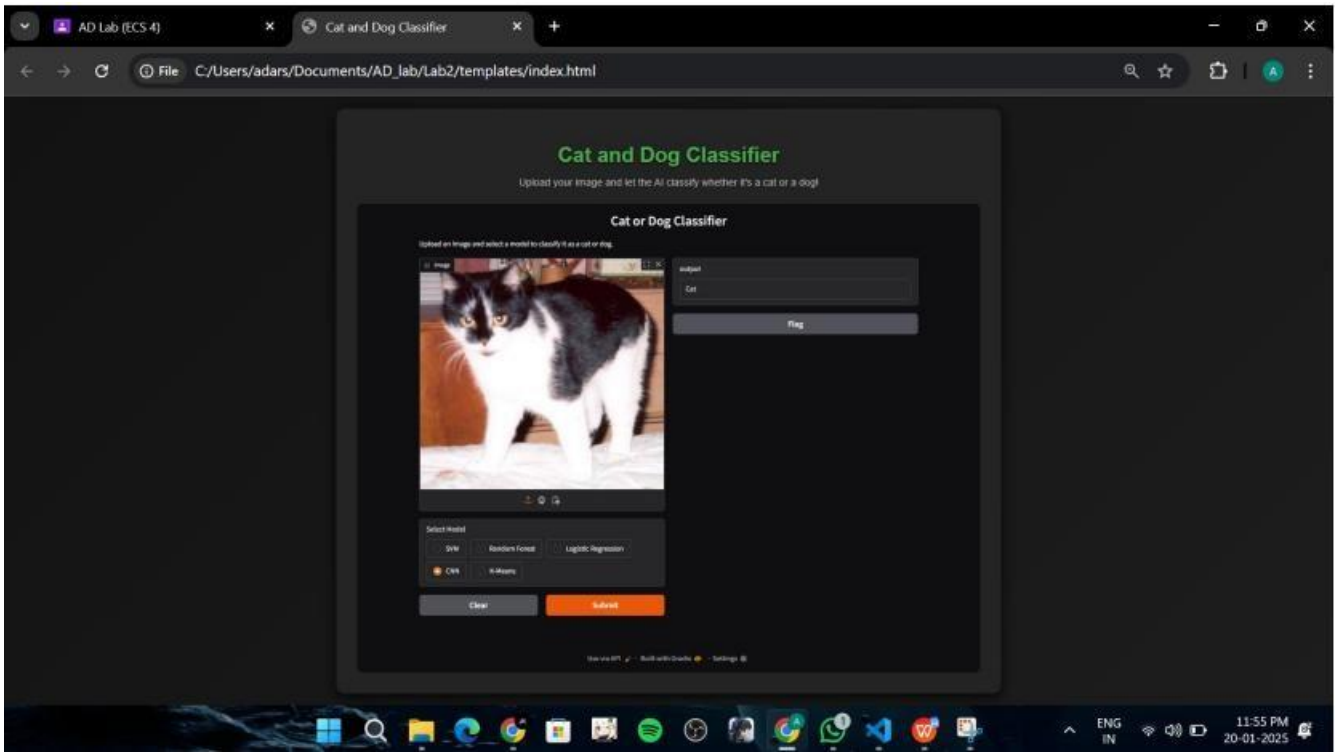
```
from flask import Flask, request, render_template,
jsonify import os import pickle import cv2 import
numpy as np from keras.api.models import
load_model

app = Flask(__name__) UPLOAD_FOLDER =
'backend/uploads/' app.config['UPLOAD_FOLDER'] =
UPLOAD_FOLDER
```

```
# Load models
MODELS = {
    'svm': pickle.load(open('backend/models/svm_model.pkl', 'rb')),
    'random_forest': pickle.load(open('backend/models/random_forest.pkl', 'rb')),
    'logistic_regression': pickle.load(open('backend/models/logistic_regression.pkl', 'rb')),
    'kmeans': pickle.load(open('backend/models/kmeans_model.pkl', 'rb')),
    'cnn': load_model('backend/models/cnn_model.h5')
}
@app.route('/')
def index():
    return render_template('index.html')
@app.route('/predict', methods=['POST'])
def predict():
    if 'image' not in request.files:
        return jsonify({'error': 'No file uploaded'}), 400
    file = request.files['image']
    model_name = request.form['model']
```

```
    if file and model_name in MODELS:
        filepath = os.path.join(app.config['UPLOAD_FOLDER'], file.filename)
        file.save(filepath)
        img = cv2.imread(filepath) img = cv2.resize(img,
        (64, 64)).flatten() / 255.0 img = np.array([img])
```

```
        model = MODELS[model_name]
        if model_name == 'cnn':
            img = img.reshape(-1, 64, 64, 3) prediction =
            model.predict(img) label = 'Cat' if
            prediction[0] < 0.5 else 'Dog'
        elif model_name == 'kmeans':
            cluster = model.predict(img) label = 'Cat'
        if cluster[0] == 0 else 'Dog' else:
            prediction = model.predict(img) label = 'Cat'
            if prediction[0] < 0.5 else 'Dog'

    return jsonify({'prediction': label})
    return jsonify({'error': 'Invalid request'}), 400
if __name__ == '__main__':
    app.run(debug=True)
```

Results/Output:-



6. Remarks:-

Signature of the Student _____ Signature of the Lab Coordinator _____

(Name of the Student) (Name of the Coordinator)

Experiment Number	3
Experiment Title	Regression Analysis for Stock Prediction
Date of Experiment	
Date of Submission	

1. Objective:-

2. Procedure:-

Procedure:

1. Collect historical stock price data.
2. Preprocess the data for analysis (missing data, scaling, splitting into train/test)
3. . Implement Linear Regression to predict future stock prices.
4. Design and train an LSTM model for time-series prediction.
5. Compare the accuracy of both models.
6. Create a Flask backend for model predictions.
7. Build a frontend to visualize predictions using charts and graphs.

3. Code:-

Linear Regression-

```
import pandas as pd
from sklearn.model_selection import train_test_split from
sklearn.linear_model import LinearRegression from
sklearn.metrics import mean_squared_error, r2_score
import matplotlib.pyplot as plt import os

def linear_regression_model(): # File path for stock data file_path =
    'C:\\Users\\KIIT\\Desktop\\AD\\Lab3\\data\\stock_data.csv'

    # Check if the file exists if not os.path.exists(file_path):
    raise FileNotFoundError(f"File not found: {file_path}")

    # Load data data =
    pd.read_csv(file_path)

    # Ensure necessary columns exist
    required_columns = ['Open', 'High', 'Low', 'Close']
    for col in required_columns:
        if col not in data.columns: raise ValueError(f"Missing
            required column: {col}")

    # Feature selection (X) and target variable (y)
    X = data[['Open', 'High', 'Low']] # Using Open, High, and Low as features y
    = data['Close'] # Using Close price as the target variable

    # Train-test split
    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
    # Model initialization
    model = LinearRegression()

    # Training the model
    model.fit(X_train, y_train)

    # Predictions y_pred =
    model.predict(X_test)

    # Evaluation metrics
    mse = mean_squared_error(y_test, y_pred) r2 =
    r2_score(y_test, y_pred) accuracy = r2 * 100 #
    Accuracy as a percentage

    # Visualization plt.figure(figsize=(10, 6)) plt.scatter(range(len(y_test)), y_test,
    color="blue", label="Actual Values", alpha=0.6) plt.scatter(range(len(y_pred)), y_pred,
    color="red", label="Predicted Values", alpha=0.6) plt.title("Actual vs Predicted Values")
    plt.xlabel("Data Points") plt.ylabel("Close Price") plt.legend() plt.grid() plt.tight_layout()
    plt.savefig('output_visualization.png') # Save the graph as an image plt.show()

    # Return results
    results = {
        "message": "Linear regression model executed successfully.",
        "model_coefficients": model.coef_.tolist(), # Coefficients of the features
        "model_intercept": model.intercept_, # Intercept of the regression line
        "mean_squared_error": mse,
```

```
        "r2_score": r2,
        "accuracy": accuracy,
        "sample_predictions": {
            "actual": y_test.tolist()[:5], # First 5 actual values
            "predicted": y_pred.tolist()[:5] # First 5 predicted values }
    } return

    results

if __name__ == '__main__':
    try:
        results = linear_regression_model()
        print("Linear Regression Results:")
        print(f"Mean Squared Error: {results['mean_squared_error']}")
        print(f"R2 Score: {results['r2_score']}") print(f"Accuracy:
        {results['accuracy']}%")
    except FileNotFoundError as e:
        print(e)
    except ValueError as e:
        print(e)
```

LSTM Model

```
import
pandas as pd import
numpy as np from
keras.api.models
import Sequential
from
keras.api.layers
import Dense,
LSTM from
sklearn.preprocessi
ng import
MinMaxScaler
from
sklearn.metrics
import
mean_squared_erro
r, r2_score import
matplotlib.pyplot as
plt

def create_dataset(data, look_back=1):
    X, Y = [], []
    for i in range(len(data) - look_back):
        X.append(data[i:(i + look_back), 0])
        Y.append(data[i + look_back, 0])
    return np.array(X), np.array(Y)

def lstm_model(): #
    Load the dataset
    data = pd.read_csv('C:\\Users\\KIIT\\Desktop\\AD\\Lab3\\data\\stock_data.csv')
    data['Date'] = pd.to_datetime(data['Date']) data.set_index('Date', inplace=True)

    # Normalize the Close prices scaler = MinMaxScaler() data['Close'] =
    scaler.fit_transform(data['Close'].values.reshape(-1, 1))
```

```
# Split data into training and testing
train_size = int(len(data) * 0.8)
train_data = data[:train_size]
test_data = data[train_size:]

# Prepare data for LSTM
look_back = 10
train_scaled = train_data['Close'].values.reshape(-1, 1)
test_scaled = test_data['Close'].values.reshape(-1, 1)

X_train, y_train = create_dataset(train_scaled, look_back)
X_test, y_test = create_dataset(test_scaled, look_back)

X_train = X_train.reshape(X_train.shape[0], X_train.shape[1], 1)
X_test = X_test.reshape(X_test.shape[0], X_test.shape[1], 1)

# Build the LSTM model
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape=(look_back, 1)))
model.add(LSTM(50)) model.add(Dense(1))
model.compile(optimizer='adam', loss='mean_squared_error')

# Train the model history = model.fit(X_train, y_train, epochs=10,
batch_size=32, verbose=1)

# Make predictions predictions =
model.predict(X_test) predictions =
scaler.inverse_transform(predictions) y_test =
scaler.inverse_transform(y_test.reshape(-1, 1))

# Calculate metrics
mse = mean_squared_error(y_test, predictions)
r2 = r2_score(y_test, predictions)

# Visualization: Actual vs Predicted Close Prices
plt.figure(figsize=(12, 6))
plt.plot(y_test, label="Actual Prices", color='blue', alpha=0.6)
plt.plot(predictions, label="Predicted Prices", color='red', alpha=0.6)
plt.title("Actual vs Predicted Stock Prices") plt.xlabel("Time")
plt.ylabel("Close Price") plt.legend() plt.grid()
plt.tight_layout()
plt.savefig("actual_vs_predicted.png") # Save the graph as an image plt.show()

# Visualization: Training Loss
plt.figure(figsize=(10, 4))
plt.plot(history.history['loss'], label="Training Loss", color='green')
plt.title("Model Training Loss Over Epochs")
plt.xlabel("Epochs")
plt.ylabel("Loss")
plt.legend()
plt.grid()
plt.tight_layout()
plt.savefig("training_loss.png") # Save the graph as an image plt.show()

return {
    "MSE": mse,
    "R2": r2,
```

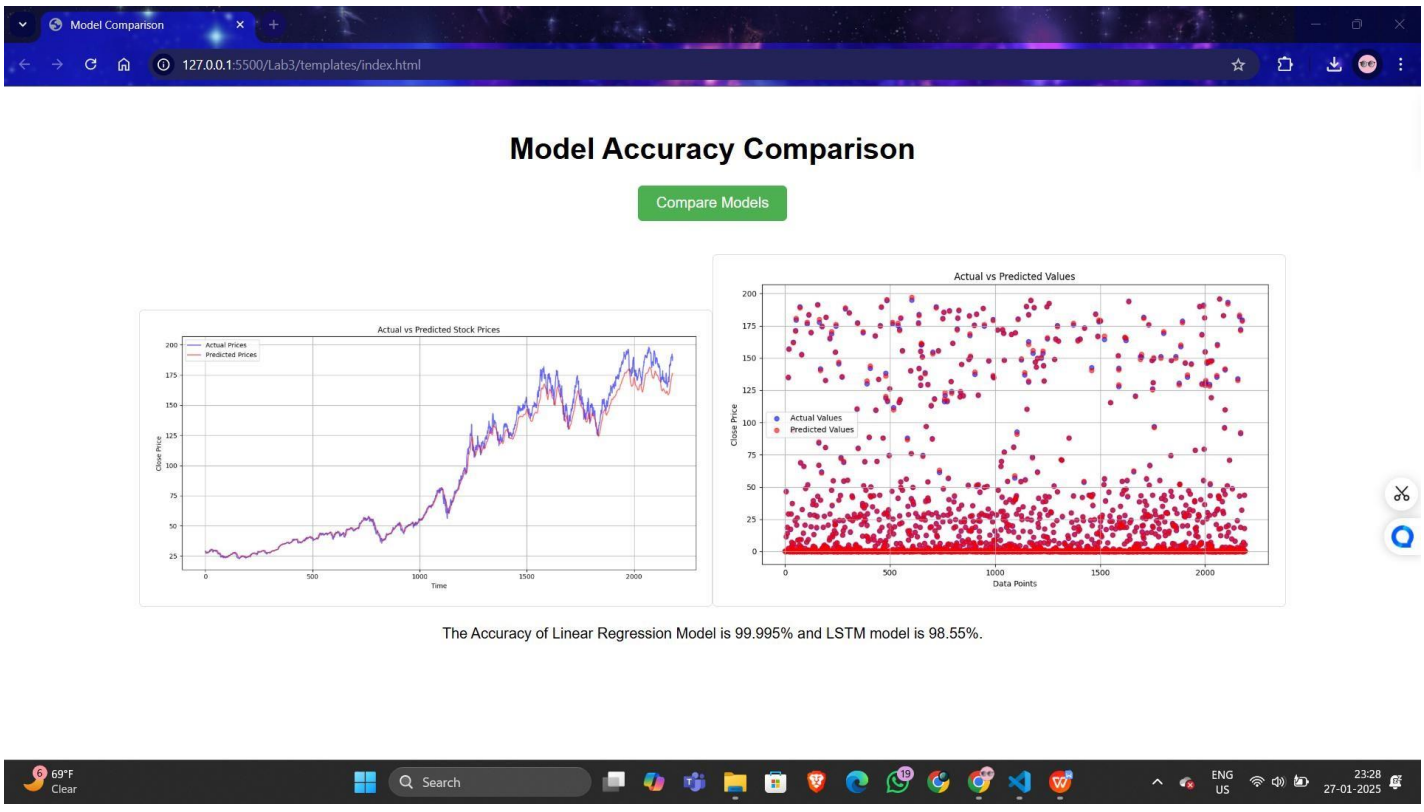
```
        "Predictions": predictions.flatten().tolist()
    }

if __name__ == '__main__':
    results = lstm_model()
    print("LSTM Results:")
    print(f"Mean Squared Error: {results['MSE']}")
    print(f"R2 Score: {results['R2']}")
```

APP-

```
from flask import Flask, render_template, jsonify, send_from_directory
from flask_cors import CORS
import os import matplotlib
import matplotlib.pyplot as
plt
from linear_regression import linear_regression_model
from lstm_model import lstm_model
import traceback

app = Flask(__name__)
CORS(app)

def create_accuracy_chart(lr_accuracy, lstm_accuracy):
    try:
        # Data for the chart models = ['Linear
        Regression', 'LSTM'] accuracies =
        [lr_accuracy, lstm_accuracy]

        # Create a bar chart
        plt.figure(figsize=(6, 4))
        plt.bar(models, accuracies, color=['blue', 'green'])
        plt.title('Model Accuracy Comparison')
        plt.xlabel('Models')
        plt.ylabel('Accuracy (%)')
        plt.ylim(0, 100)

        # Save the chart
        chart_path = os.path.join('static', 'graphs', 'accuracy_comparison.png')
        # Ensure the directory exists
        os.makedirs(os.path.dirname(chart_path), exist_ok=True)
        plt.savefig(chart_path) plt.close()

        return chart_path
    except Exception as e:
        print(f"Error generating chart: {e}")
        return None

# Route to serve the frontend
@app.route('/') def index(): return
render_template('index.html')

@app.route('/compare-models', methods=['GET'])
def compare_models(): try:
            lr_results = linear_regression_model()
        lstm_results = lstm_model()
```

```
        # Calculate accuracy percentages lr_accuracy = lr_results["accuracy"] * 100 # Assuming
        accuracy is already in percentage form lstm_accuracy = lstm_results["R2"] * 100 # Assuming
        R2 is converted to percentage form

        # Generate the comparison chart chart_path =
        create_accuracy_chart(lr_accuracy, lstm_accuracy)

        if not chart_path: return jsonify({"error": "Error generating
            comparison chart"}), 500

        # Respond with the chart's URL
        response = {
            "chart_url": f"/static/graphs/accuracy_comparison.png"
        } return
        jsonify(response)

    except Exception as e:
        print(f"Error: {e}")
        print(traceback.format_exc()) # Log full traceback return
        jsonify({"error": str(e)}), 500

# Route to serve static files (like graphs)
@app.route('/static/<path:filename>',
methods=['GET']) def serve_static(filename): static_dir
= os.path.join(os.getcwd(), 'static') return
send_from_directory(static_dir, filename)

if __name__ == '__main__':
    os.makedirs('static/graphs', exist_ok=True)
    app.run(debug=True)
```

4. Results/Output:-



5. Remarks:-

Signature of the Lab Coordinator

Prof. Bhragav Appasani ----------