EXP NO: 9	MINI PROJECT - TIME SERIES-BASED STOCK PRICE FORECASTING WITH LINEAR REGRESSION

AIM:

To predict future stock prices using historical time series data by implementing a **Linear Regression** model, and to evaluate its performance in forecasting trends.

ALGORITHM:

1. Data Collection: Obtain historical stock price data (e.g., from Yahoo Finance).
2. Data Preprocessing:
3. Handle missing values.
4. Convert date columns to datetime format.
5. Sort data chronologically.
6. Feature Selection:
7. Use relevant features such as Open, High, Low, Close prices, and Volume.
8. Create lag features if needed for prediction.
9. Train-Test Split: Divide the data into training and testing sets (e.g., 80%-20%).
10. Model Training: Fit a Linear Regression model using the training data.
11. Prediction: Use the trained model to predict stock prices on the test set.
12. Evaluation: Assess the model performance using metrics like Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R^2 score.
13. Visualization: Plot actual vs predicted stock prices to observe forecasting accuracy.

CODE:

Index.html

```
<!DOCTYPE html>
<html>
<head>
  <meta charset="UTF-8">
  <title>Stock Price Predictor Web App</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet'>
  <link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet'>
  <link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet'>
        <link        href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300'
rel='stylesheet'>
                                        <link                                        rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css">
  <style>
    body {
```

```
    font-family: 'Arimo', sans-serif;
    background-color: #f0f8ff;
    padding: 50px;
  }
  .login {
    max-width: 500px;
    margin: auto;
    background: white;
    padding: 30px;
    border-radius: 10px;
    box-shadow: 0px 0px 10px 0px gray;
  }
  h1, h2 {
    color: #1e81b0;
  }
  .footer-dark {
    text-align: center;
    margin-top: 40px;
    padding: 20px;
    background-color: #1e81b0;
    color: white;
  }
 </style>
</head>
<body style="background-color: greenyellow; font-family: cursive ;">

<div class="login" style="background-color: aqua">
 <h1 style="color: black;">Stock Price Predictor</h1>
 <h2 style="color: black;">Welcome, {{ username }}!</h2>

 <form action="{{ url_for('dashboard') }}" method="post">
   <input type="number" name="Open" placeholder="Opening Price" class="form-control mb-3" required>
    <input type="number" name="High" placeholder="Highest Price" class="form-control mb-3" required>
  <input type="number" name="Low" placeholder="Lowest Price" class="form-control mb-3" required>
   <input type="number" name="Volume" placeholder="Volume" class="form-control mb-3" required>
   <button type="submit" class="btn btn-primary w-100" style= "background-color: green;
```

```
color: black;">Predict</button>
  </form>

  <br>
  <h4 class="text-success" style="background-color: white; color: black;">{{ prediction_text
}}</h4>
</div>

<div class="footer-dark">
  <footer>
    <div class="container">
      <p class="copyright">Stock Price Predictor © 2025</p>
    </div>
  </footer>
</div>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

Home.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Stock Price Prediction</title>
                                                    <link                    rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css"/>
                <link        rel="stylesheet"        href="https://cdnjs.cloudflare.com/ajax/libs/font-
awesome/6.4.2/css/all.min.css">
    <style>
        .head {
            color: #1e81b0;
        }
        .bt {
            background-color: #1e81b0;
        }
        html {
            scroll-behavior: smooth;
```

```
    }
  </style>
      <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet">
</head>
<body style="background-color: greenyellow; font-family: cursive;">

  <!-- Header Section -->
  <div class="container">
    <header class="d-flex flex-wrap justify-content-center py-3 mb-4 border-bottom">
      <a href="/" class="d-flex align-items-center mb-3 mb-md-0 me-md-auto link-body-
emphasis text-decoration-none">
        <img src="/static/image/stock_icon.png" width="50px" height="50px"
class="rounded shadow-lg" alt="">
        <span class="fs-3 m-3 fw-bold head" style="color: red"><i class="fas fa-chart-
line"></i> Stock Price Prediction</span>
      </a>

      <ul class="nav nav-pills">
        <li class="nav-item"><a href="{{ url_for('home') }}" class="nav-link link-light"
style="background-color: red">Home</a></li>
        <li class="nav-item"><a href="#features" class="nav-link"
style="color:red">Features</a></li>
        <li class="nav-item"><a href="#about" class="nav-link"
style="color:red">About</a></li>
        <li class="nav-item"><a href="{{ url_for('register') }}" class="nav-link"
style="color:red">Register</a></li>
        <li class="nav-item"><a href="{{ url_for('login') }}" class="nav-link"
style="color:red">Login</a></li>
        <li class="nav-item"><a href="{{ url_for('login') }}" class="btn btn-lg text-light
fw-bold" style="background-color: green">Get Started</a></li>
      </ul>
    </header>
  </div>

  <!-- Hero Section -->
  <div class="container col-xxl-8">
    <div class="row flex-lg-row-reverse align-items-center g-5 py-5">
      <div class="col-10 col-sm-8 col-lg-6 animate__animated animate__zoomIn">
        <img src="/static/image/stock.png" class="d-block mx-lg-auto img-fluid"
```

```
alt="Stock Market" width="700" height="500" loading="lazy">
        </div>
        <div class="col-lg-6 animate__animated animate__slideInLeft" style="color: black;">
                <h1 class="display-5 fw-bold lh-1 mb-3" style="color: red">Stock Price Prediction</h1>
              <p class="lead">Stock Price Prediction estimates stock values using machine learning models based on features like opening price, highest price, lowest price, volume, and market trends.</p>
            <div class="d-grid gap-2 d-md-flex justify-content-md-start">
                <a href="/login"><button type="button" class="btn btn-lg px-4 me-md-2 text-light fw-bold" style="background-color:green">Get Started</button></a>
            </div>
        </div>
    </div>
  </div>

  <!-- Features Section -->
  <div class="container py-5" id="features">
      <h2 class="text-center head animate__animated animate__fadeInDown" style="color: red;">Features</h2>
    <div class="row text-center">
      <div class="col-md-4 animate__animated animate__zoomIn">
              <h4 style="color: blueviolet"><i class="fas fa-chart-line"></i> Accurate Predictions</h4>
          <p>Our model uses advanced machine learning algorithms to estimate stock prices with high accuracy.</p>
      </div>
      <div class="col-md-4 animate__animated animate__zoomIn">
        <h4 style="color: blueviolet;"><i class="fas fa-clock"></i> Real-Time Data</h4>
        <p>Stay updated with real-time stock market trends and price changes.</p>
      </div>
      <div class="col-md-4 animate__animated animate__zoomIn">
        <h4 style="color: blueviolet;"><i class="fas fa-user"></i> User-Friendly</h4>
        <p>Easy-to-use interface for investors, traders, and analysts.</p>
      </div>
    </div>
  </div>

  <!-- About Section -->
  <div class="container py-5" id="about">
```

```
        <h2 class="text-center head animate__animated animate__fadeInLeft" style="color: red;">About Us</h2>
      <div class="row align-items-center">
        <div class="col-md-6">
          <p>Stock Price Prediction is a tool that utilizes machine learning to estimate stock values based on key features like historical data, market trends, and economic indicators. Our goal is to provide reliable and insightful predictions to help investors make informed decisions.</p>
        </div>
        <div class="col-md-6 animate__animated animate__fadeInRight">
          <img src="/static/image/stock_llllll.avif" class="img-fluid rounded " alt="About Us">
        </div>
      </div>
  </div>

  <!-- Footer Section -->
  <div class="container">
    <footer class="py-3 my-4">
      <p class="text-center text-body-secondary">&copy; 2025 Company, Inc</p>
    </footer>
  </div>


                                                                    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

Login.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Login</title>
      <link    href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css" rel="stylesheet">
  <style>
    body {
      height: 100vh;
      display: flex;
```

```
        align-items: center;
        justify-content: center;
      }
      .login-container {
        border-radius: 10px;
        overflow: hidden;
      }
    </style>
</head>
<body style="background-color: greenyellow;">
    <div class="container">
      <div class="row login-container" >
        <!-- Left Side Image -->
        <div class="col-md-6" style="margin-top: 50px;" >
          <img src="/static/image/reg.jpg" class="w-100">
        </div>

        <!-- Right Side Form -->
        <div class="col-md-6 p-5" >
              <div class="shadow-lg p-5 m-5 bordered rounded" style="background-color:
aqua;">
            <h2 class="text-center mb-4" style="font-family: cursive;">Login</h2>
            <form action="/login" method="post">
              <div class="mb-3">
                  <label for="username" class="form-label" style="color: blue; font-family:
cursive;">Username</label>
                  <input type="text" class="form-control" name="username" id="username"
placeholder="Enter your username" required>
              </div>
              <div class="mb-3">
                  <label for="password" class="form-label" style="color: blue; font-family:
cursive;">Password</label>
                          <input type="password" class="form-control" name="password"
id="password" placeholder="Enter your password" required>
              </div>
              <div class="d-grid">
                  <button type="submit" class="btn" style="background-color: green; font-
family: cursive;">Login</button>
              </div>
              <div class="text-center mt-3" style="font-family: cursive;">
```

```
                    <p>Don't have an account? <a href="Register.html" class="text-primary"
>Register</a></p>
                </div>
            </form>
        </div>
    </div>
</div>



                                                                    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

Register.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Register</title>
        <link    href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/css/bootstrap.min.css"
rel="stylesheet">
    <style>
        body {
            height: 100vh;
            display: flex;
            align-items: center;
            justify-content: center;

        }
        .register-container {

            border-radius: 10px;
            overflow: hidden;

        }

    </style>
</head>
```

```
<body style="background-color: greenyellow; font-family: cursive;">
  <div class="container">
    <div class="row register-container">
      <!-- Left Side Image -->
      <div class="col-md-6" style="margin-top: 150px;">
        <img src="/static/image/reg.jpg" class="w-100" >
      </div>

      <!-- Right Side Form -->
      <div class="col-md-6 p-5 " >
            <div class="shadow-lg p-5 m-5 bordered rounded" style="background-color:
aqua;">
        <h2 class="text-center mb-4" style="color: black">Register</h2>
        <form action="/Register" method="post">
          <div class="mb-3" >
            <label for="name" class="form-label" style="color: blue;">Name</label>
                  <input type="text" class="form-control" name="username" id="name"
placeholder="Enter your name" required>
          </div>
          <div class="mb-3">
            <label for="gender" class="form-label" style="color: blue;">Gender</label>
            <select class="form-control" name="gender" id="gender" required>
              <option value="">Select Gender</option>
              <option value="Male">Male</option>
              <option value="Female">Female</option>
              <option value="Other">Other</option>
            </select>
          </div>
          <div class="mb-3">
            <label for="age" class="form-label" style="color: blue;">Age</label>
                  <input type="number" class="form-control" name="age" id="age"
placeholder="Enter your age" required>
          </div>
          <div class="mb-3">
                        <label for="password" class="form-label" style="color:
blue;">Password</label>
                  <input type="password" class="form-control" name="password"
id="password" placeholder="Enter password" required>
          </div>
          <div class="d-grid">
```

```
                        <button type="submit" class="btn" style="background-color: green;">Register</button>
                </div>
                <div class="text-center mt-3">
                        <p>Already have an account? <a href="/login" class="text-primary">Sign In</a></p>
                </div>
            </form>
            </div>
        </div>
    </div>
  </div>


                                                                                <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.3/dist/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

Style.css

```
@import url(https://fonts.googleapis.com/css?family=Open+Sans);
.btn { display: inline-block; *display: inline; *zoom: 1; padding: 4px 10px 4px; margin-bottom: 0; font-size: 13px; line-height: 18px; color: #333333; text-align: center;text-shadow: 0 1px 1px rgba(255, 255, 255, 0.75); vertical-align: middle; background-color: #f5f5f5; background-image: -moz-linear-gradient(top, #ffffff, #e6e6e6); background-image: -ms-linear-gradient(top, #ffffff, #e6e6e6); background-image: -webkit-gradient(linear, 0 0, 0 100%, from(#ffffff), to(#e6e6e6)); background-image: -webkit-linear-gradient(top, #ffffff, #e6e6e6); background-image: -o-linear-gradient(top, #ffffff, #e6e6e6); background-image: linear-gradient(top, #ffffff, #e6e6e6); background-repeat: repeat-x; filter: progid:dximagetransform.microsoft.gradient(startColorstr=#ffffff, endColorstr=#e6e6e6, GradientType=0); border-color: #e6e6e6 #e6e6e6 #e6e6e6; border-color: rgba(0, 0, 0, 0.1) rgba(0, 0, 0, 0.1) rgba(0, 0, 0, 0.25); border: 1px solid #e6e6e6; -webkit-border-radius: 4px; -moz-border-radius: 4px; border-radius: 4px; -webkit-box-shadow: inset 0 1px 0 rgba(255, 255, 255, 0.2), 0 1px 2px rgba(0, 0, 0, 0.05); -moz-box-shadow: inset 0 1px 0 rgba(255, 255, 255, 0.2), 0 1px 2px rgba(0, 0, 0, 0.05); box-shadow: inset 0 1px 0 rgba(255, 255, 255, 0.2), 0 1px 2px rgba(0, 0, 0, 0.05); cursor: pointer; *margin-left: .3em; }
.btn:hover, .btn:active, .btn.active, .btn.disabled, .btn[disabled] { background-color: #e6e6e6; }
.btn-large { padding: 9px 14px; font-size: 15px; line-height: normal; -webkit-border-radius: 5px; -moz-border-radius: 5px; border-radius: 5px; }
.btn:hover { color: #333333; text-decoration: none; background-color: #e6e6e6; background-position: 0 -15px; -webkit-transition: background-position 0.1s linear; -moz-transition:
```

```
background-position 0.1s linear; -ms-transition: background-position 0.1s linear; -o-transition: background-position 0.1s linear; transition: background-position 0.1s linear; }
.btn-primary, .btn-primary:hover { text-shadow: 0 -1px 0 rgba(0, 0, 0, 0.25); color: #ffffff; }
.btn-primary.active { color: rgba(255, 255, 255, 0.75); }
.btn-primary { background-color: #4a77d4; background-image: -moz-linear-gradient(top, #6eb6de, #4a77d4); background-image: -ms-linear-gradient(top, #6eb6de, #4a77d4); background-image: -webkit-gradient(linear, 0 0, 0 100%, from(#6eb6de), to(#4a77d4)); background-image: -webkit-linear-gradient(top, #6eb6de, #4a77d4); background-image: -o-linear-gradient(top, #6eb6de, #4a77d4); background-image: linear-gradient(top, #6eb6de, #4a77d4); background-repeat: repeat-x; filter: progid:dximagetransform.microsoft.gradient(startColorstr=#6eb6de, endColorstr=#4a77d4, GradientType=0); border: 1px solid #3762bc; text-shadow: 1px 1px 1px rgba(0,0,0,0.4); box-shadow: inset 0 1px 0 rgba(255, 255, 255, 0.2), 0 1px 2px rgba(0, 0, 0, 0.5); }
.btn-primary:hover, .btn-primary:active, .btn-primary.active, .btn-primary.disabled, .btn-primary[disabled] { filter: none; background-color: #4a77d4; }
.btn-block { width: 100%; display:block; }

* { -webkit-box-sizing:border-box; -moz-box-sizing:border-box; -ms-box-sizing:border-box; -o-box-sizing:border-box; box-sizing:border-box; }

html { width: 100%; height:100%; overflow:hidden; }

body {
   width: 100%;
   height:100%;
   font-family: 'Open Sans', sans-serif;
   background: #1e81b0;
   color: #fff;
   font-size: 18px;
   text-align:center;
   letter-spacing:1.2px;
        filter: progid:DXImageTransform.Microsoft.gradient( startColorstr='#3E1D6D', endColorstr='#092756',GradientType=1 );

}
.login {
   position: absolute;
   top: 40%;
   left: 50%;
   margin: -150px 0 0 -150px;
```

```
    width:400px;
    height:400px;
}

.login h1 { color: #fff; text-shadow: 0 0 10px rgba(0,0,0,0.3); letter-spacing:1px; text-
align:center; }

input {
    width: 100%;
    margin-bottom: 10px;
    background: rgba(0,0,0,0.3);
    border: none;
    outline: none;
    padding: 10px;
    font-size: 13px;
    color: #fff;
    text-shadow: 1px 1px 1px rgba(0,0,0,0.3);
    border: 1px solid rgba(0,0,0,0.3);
    border-radius: 4px;
    box-shadow: inset 0 -5px 45px rgba(100,100,100,0.2), 0 1px 1px rgba(255,255,255,0.2);
    -webkit-transition: box-shadow .5s ease;
    -moz-transition: box-shadow .5s ease;
    -o-transition: box-shadow .5s ease;
    -ms-transition: box-shadow .5s ease;
    transition: box-shadow .5s ease;
}
input:focus { box-shadow: inset 0 -5px 45px rgba(100,100,100,0.4), 0 1px 1px
rgba(255,255,255,0.2); }

.footer-dark .copyright {
    text-align:center;
    padding-top:24px;
    opacity:0.3;
    font-size:13px;
    margin-bottom:0;
  }
```

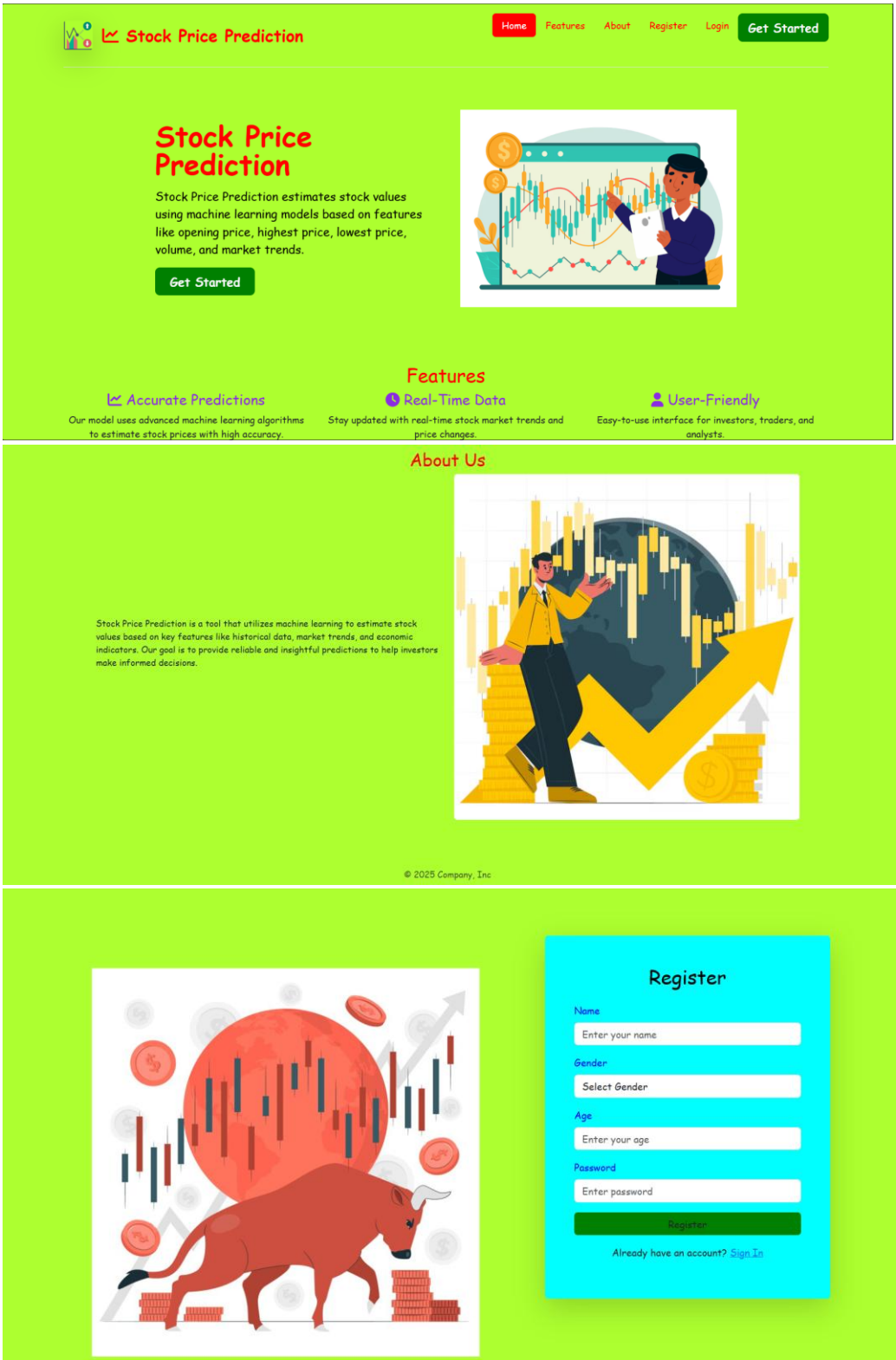
App.py

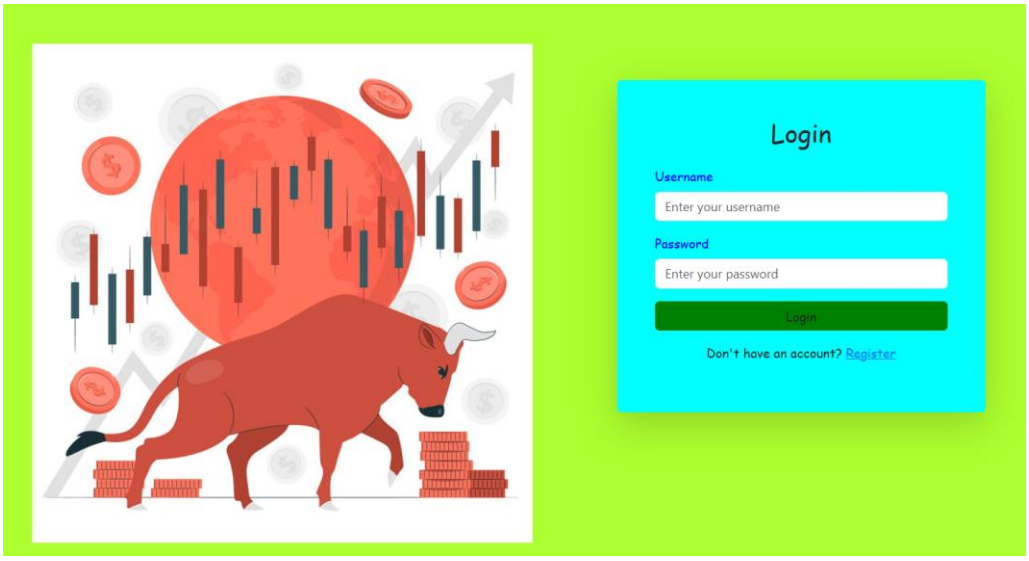
```
from flask import Flask, render_template, request, redirect, url_for, flash
from flask_sqlalchemy import SQLAlchemy
from flask_login import LoginManager, UserMixin, login_user, login_required, logout_user,
```

```
current_user

app = Flask(__name__)
app.config['SECRET_KEY'] = '1233444545555'
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///site.db'
db = SQLAlchemy(app)

login_manager = LoginManager(app)
login_manager.login_view = 'login'

# --- Models ---
class User(UserMixin, db.Model):
    id = db.Column(db.Integer, primary_key=True)
    username = db.Column(db.String(150), unique=True, nullable=False)
    password = db.Column(db.String(150), nullable=False)

@login_manager.user_loader
def load_user(user_id):
    return User.query.get(int(user_id))

# --- Routes ---
@app.route('/')
def home():
    return render_template('home.html')

@app.route('/Register', methods=['GET', 'POST'])
def register():
    if request.method == 'POST':
        username = request.form['username']
        password = request.form['password']
        existing = User.query.filter_by(username=username).first()
        if existing:
            flash('User already exists', 'error')
            return redirect(url_for('register'))
        user = User(username=username, password=password)
        db.session.add(user)
        db.session.commit()
        flash('Registered successfully', 'success')
        return redirect(url_for('login'))
    return render_template('Register.html')
```

```
@app.route('/login', methods=['GET', 'POST'])
def login():
    if request.method == 'POST':
        username = request.form['username']
        password = request.form['password']
        user = User.query.filter_by(username=username, password=password).first()
        if user:
            login_user(user)
            return redirect(url_for('dashboard'))
        flash('Invalid credentials', 'error')
    return render_template('Login.html')

@app.route('/dashboard', methods=['GET', 'POST'])
@login_required
def dashboard():
    prediction_text = ""
    if request.method == 'POST':
        open_price = request.form['Open']
        high = request.form['High']
        low = request.form['Low']
        volume = request.form['Volume']
        # Dummy logic (replace with your ML model)
        predicted_price = (float(open_price) + float(high) + float(low)) / 3
        prediction_text = f"Predicted Stock Price: ₹{predicted_price:.2f}"
                return render_template('index.html', username=current_user.username,
prediction_text=prediction_text)

@app.route('/logout')
@login_required
def logout():
    logout_user()
    return redirect(url_for('login'))

with app.app_context():
    db.create_all()

if __name__ == '__main__':
    app.run(debug=True)
```

OUTPUT:


Stock Price Prediction
Home
Features
About
Register
Login
Get Started
Stock Price Prediction
Stock Price Prediction estimates stock values using machine learning models based on features like opening price, highest price, lowest price, volume, and market trends.
Get Started
Features
Accurate Predictions
Our model uses advanced machine learning algorithms to estimate stock prices with high accuracy.
Real-Time Data
Stay updated with real-time stock market trends and price changes.
User-Friendly
Easy-to-use interface for investors, traders, and analysts.
About Us
Stock Price Prediction is a tool that utilizes machine learning to estimate stock values based on key features like historical data, market trends, and economic indicators. Our goal is to provide reliable and insightful predictions to help investors make informed decisions.
© 2025 Company, Inc
Register
Name
Enter your name
Gender
Select Gender
Age
Enter your age
Password
Enter password
Register
Already have an account? Sign In



RESULT:

The Linear Regression model was successfully trained and used to predict stock prices. The predicted values closely followed the actual prices, showing that the model effectively captured the overall trend of the stock data.