Flask Deployment, Week 4 Project

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Project Report: Titanic Survival Prediction Web Application

Objective

The primary goal of this project was to develop a predictive web application that determines whether a passenger aboard the Titanic would have survived based on certain input features. The project leverages machine learning, Python, Flask for API creation, and a web-based front-end for user interaction.

Key Components

1. **Machine Learning Model**:
    - A pre-trained Logistic Regression model (titanic_model.pkl) was used to make survival predictions.
    - The model was trained using features such as:
        - Passenger Class (Pclass)
        - Gender (Sex)
        - Age
        - Number of Siblings/Spouse aboard (SibSp)
        - Number of Parents/Children aboard (Parch)
        - Fare paid (Fare).
2. **Flask API**:
    - A Flask application was built to host the predictive model.
    - The /predict endpoint accepts POST requests with passenger data in JSON format and returns predictions in JSON form.

- The home route (/) serves as a connection point for static files and basic API confirmation.

3. **Web Interface**:
    - An interactive HTML front-end allows users to input passenger data through a form and receive predictions in real time.
    - The background of the page features an image of the Titanic to enhance user experience.
    - JavaScript handles form submission and interacts with the Flask API for predictions.
4. **File Organization**:
    - The Titanic image file is stored in a static folder and linked in the HTML file to ensure proper rendering.
    - Flask was configured to serve static files and correctly route requests to the titanic.html front-end.

Steps Taken

1. **Data Preparation and Model Training**:
    - A Logistic Regression model was trained using the Titanic dataset, exported as titanic_model.pkl.
2. **Backend Development**:
    - A Flask app was created to load the model, define prediction logic, and serve the front-end.
3. **Front-End Design**:
    - A responsive HTML file was developed to capture user inputs and display predictions.
4. **Integration and Deployment**:
    - The Flask app was tested locally, with HTML and static assets linked properly.
    - End-to-end functionality was confirmed with accurate predictions based on sample inputs.

Sample Input and Output

Input:

- Pclass: 1
- Sex: Female (0)
- Age: 25
- SibSp: 0
- Parch: 1
- Fare: 50.0

Output:

- JSON Response: { "Survived": 1 }
- Display: "Survived: Yes"

Challenges and Solutions

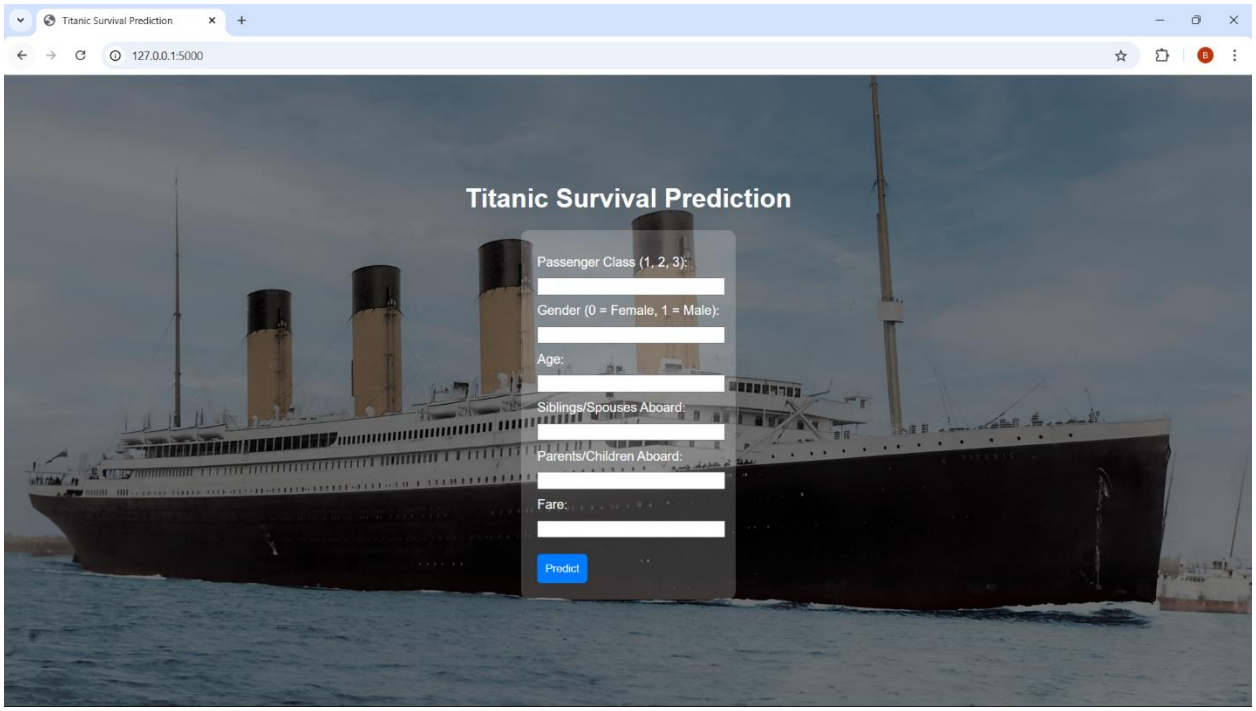
1. **File Path Issues**:
    - Correct paths were set for the model and image files to ensure seamless execution across platforms.
2. **CORS and API Testing**:
    - Proper headers and debugging tools were used to ensure smooth interaction between front-end and back-end.
3. **Model Compatibility**:
    - The pre-trained model was updated to align with the current version of scikit-learn.

Future Enhancements

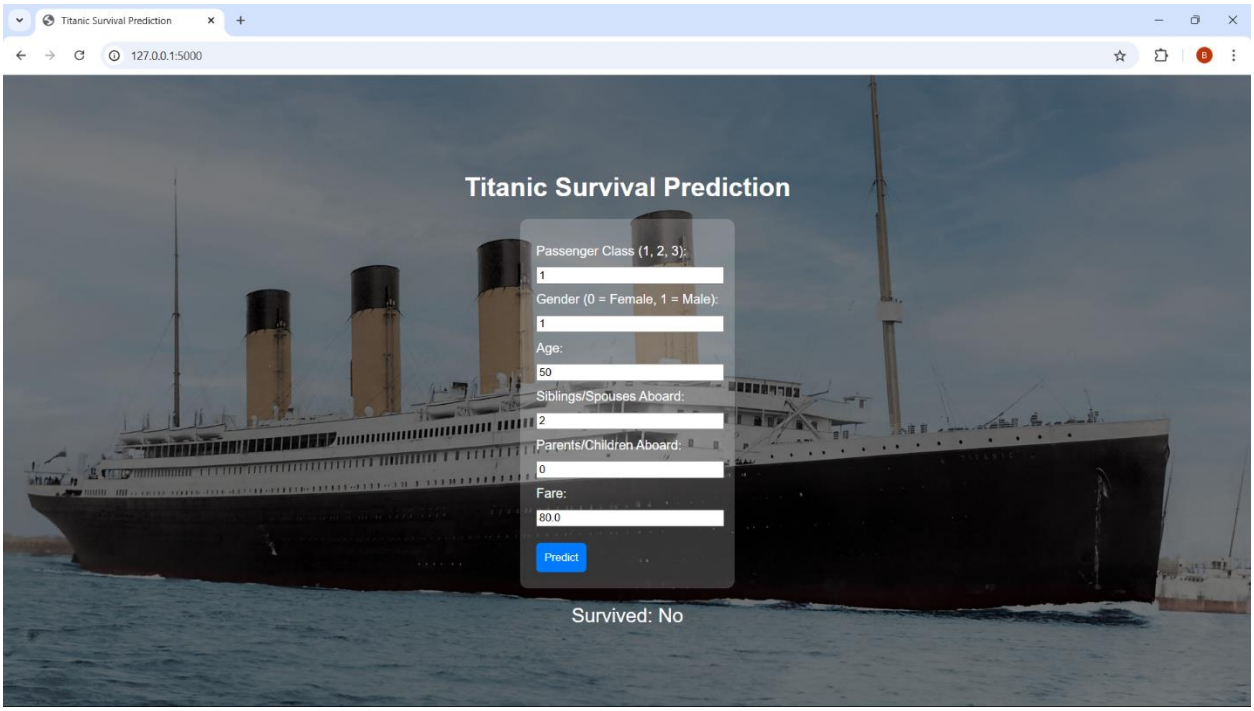
- Deployment of the app to a public platform like AWS, Heroku, or Azure.
- Addition of more advanced machine learning models.
- Implementation of visual analytics for better insights into survival probabilities.

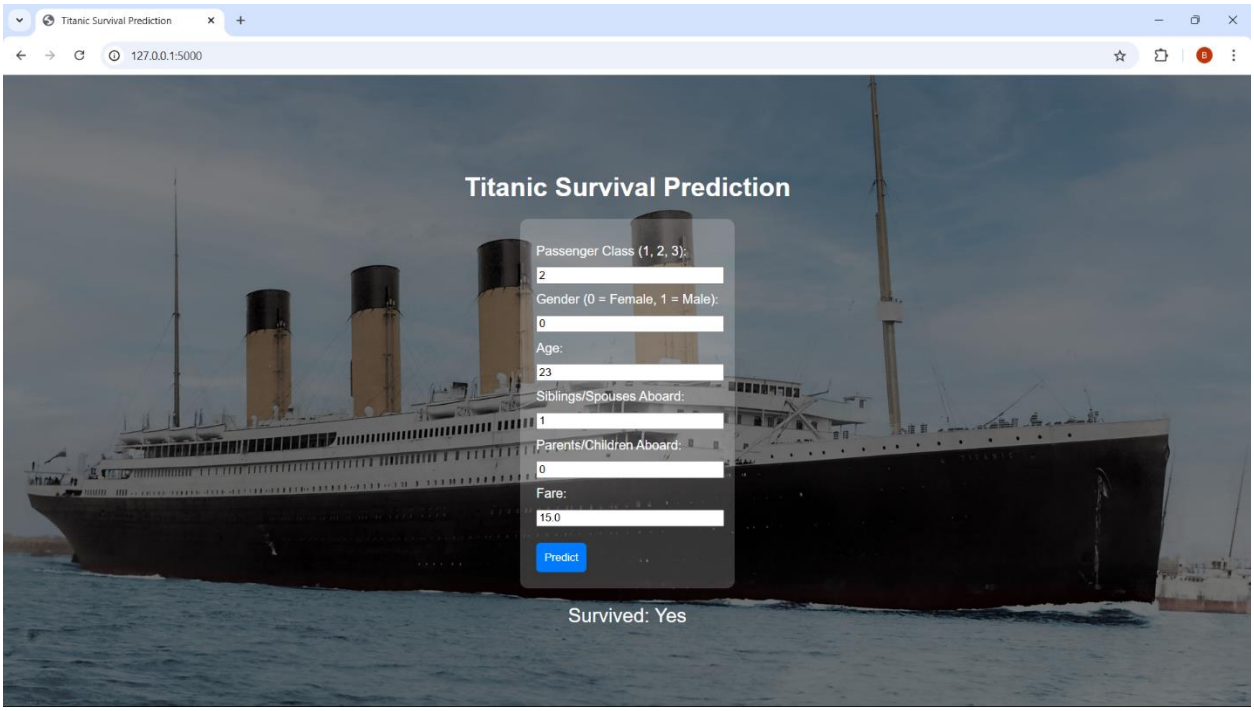
Conclusion

The Titanic Survival Prediction Web App successfully integrates machine learning with a user-friendly interface to make survival predictions. This project demonstrates the end-to-end development of a predictive system, from model training to deployment, offering valuable hands-on experience with Python, Flask, and web technologies.



Note for Readers: There are two other additional Titanic-related images below


Titanic Survival Prediction
127.0.0.1:5000
Titanic Survival Prediction
Passenger Class (1, 2, 3):
1
Gender (0 = Female, 1 = Male):
1
Age:
50
Siblings/Spouses Aboard:
2
Parents/Children Aboard:
0
Fare:
80.0
Predict
Survived: No


Titanic Survival Prediction
127.0.0.1:5000
Titanic Survival Prediction
Passenger Class (1, 2, 3):
2
Gender (0 = Female, 1 = Male):
0
Age:
23
Siblings/Spouses Aboard:
1
Parents/Children Aboard:
0
Fare:
15.0
Predict
Survived: Yes