TITANIC SURVIVAL PREDICTION WEB APP IN GOOGLE COLAB USING GRADIO — COLAB

🧠 What Is This Project?

It's a **Machine Learning + Web App** project that:

1. Trains a model on the **Titanic dataset**.
2. Predicts if a passenger would survive based on personal details.
3. Provides a **user-friendly web interface** (via Gradio) where anyone can input data and see predictions live.

🔍 Code Breakdown & Purpose

1. Install Libraries

!pip install gradio scikit-learn pandas joblib

- Installs the tools required:
  - pandas for data handling.
  - scikit-learn for ML model.
  - gradio to make the web app.
  - joblib to save/load model.

2. Load and Preprocess the Dataset

df = pd.read_csv("https://.../titanic.csv")

- Loads the Titanic dataset (passenger info).
- Cleans missing values.
- Converts categorical data like "Sex" and "Embarked" into numeric values.
- Drops unnecessary columns like Name, Ticket, and Cabin.

🧹 **Why?** Machine learning models work only with numeric and clean data.

3. Split Data & Train the Model

X_train, X_test, y_train, y_test = train_test_split(...)
model = RandomForestClassifier(...)
model.fit(X_train, y_train)

- Splits the data into training and testing sets.
- Trains a **Random Forest** model (a powerful classifier).
- Learns from the data who survives and who doesn’t.

📈 **Why?** To predict survival using patterns in the data.

4. Evaluate the Model

print(accuracy_score(...))

- Shows how well the model performs using accuracy and other metrics.

📊 **Why?** To verify that the model is actually learning correctly.

5. Save the Model

joblib.dump(model, "titanic_model.pkl")

- Saves the trained model to use later without retraining.

💾 **Why?** So you don’t have to retrain every time the app is run.

6. Define Prediction Function

```
def predict_survival(...):
    ...
    return "Survived" or "Did not survive"
```

- Takes user inputs (age, fare, sex, etc.).
- Processes them and predicts the outcome using the model.

🤖 **Why?** This is the core function behind the web app.

7. Create Gradio Web Interface

gr.Interface(...).launch()

- Launches a simple, interactive **web app UI** using Gradio.
- Users can select values (like age, sex, fare) and see predictions instantly.

🌐 **Why?** Makes our machine learning project usable for anyone, even non-programmers.

☑ WHAT HAS BEEN BUILT

I have built a **working machine learning app** with:

- Real dataset
- Trained predictive model
- Clean interface

- No frontend code needed

Example: Survived

Field	Value
Passenger Class	1 (1st class)
Sex	Female
Age	28
Siblings/Spouses Aboard	0
Parents/Children Aboard	0
Fare	100
Embarked From	Cherbourg

Example: Did Not Survive

Field	Value
Passenger Class	3 (3rd class)
Sex	Male
Age	45
Siblings/Spouses Aboard	1

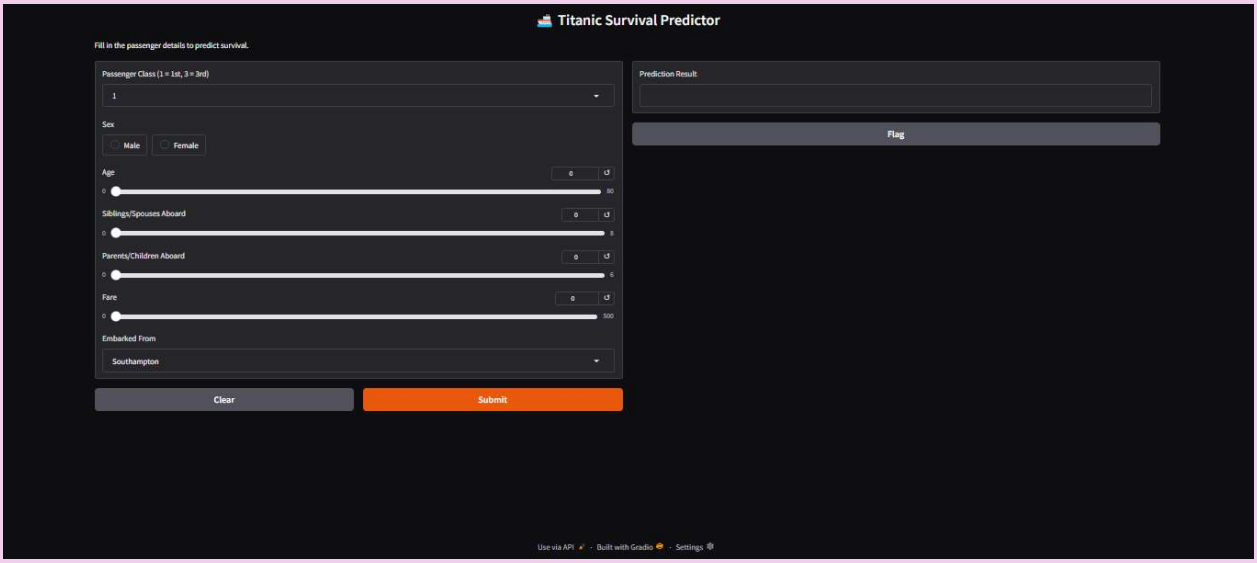
Parents/Children Aboard	0
Fare	8
Embarked From	Southampton

SOURCE CODE

```
# Step 1: Install dependencies
!pip install gradio scikit-learn pandas joblib

# Step 2: Import libraries
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, classification_report,
confusion_matrix
import gradio as gr
import joblib

# Step 3: Load and preprocess the data
df =
pd.read_csv("https://raw.githubusercontent.com/datasciencedojo/datasets/master/ti
tanic.csv")
df['Age'] = df['Age'].fillna(df['Age'].median())
df['Embarked'] = df['Embarked'].fillna(df['Embarked'].mode()[0])
df['Fare'] = df['Fare'].fillna(df['Fare'].median())
df.drop(['Name', 'Ticket', 'Cabin', 'PassengerId'], axis=1, inplace=True)
df['Sex'] = df['Sex'].map({'male': 0, 'female': 1})
df['Embarked'] = df['Embarked'].map({'S': 0, 'C': 1, 'Q': 2})

# Step 4: Split features and target
X = df.drop('Survived', axis=1)
y = df['Survived']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
random_state=42)

# Step 5: Train the model
```

```
model = RandomForestClassifier(n_estimators=100, random_state=42)
model.fit(X_train, y_train)

# Step 6: Evaluate and print metrics
predictions = model.predict(X_test)
print("🎯 Accuracy:", accuracy_score(y_test, predictions))
print("\n📊 Classification Report:\n", classification_report(y_test,
predictions))
print("📉 Confusion Matrix:\n", confusion_matrix(y_test, predictions))

# Step 7: Save the model
joblib.dump(model, "titanic_model.pkl")

# Step 8: Define prediction function for web app
def predict_survival(Pclass, Sex, Age, SibSp, Parch, Fare, Embarked):
    sex = 0 if Sex == "Male" else 1
    embark = {"Southampton": 0, "Cherbourg": 1, "Queenstown": 2}.get(Embarked, 0)
    input_data = pd.DataFrame([[Pclass, sex, Age, SibSp, Parch, Fare, embark]],
columns=X.columns)
    model = joblib.load("titanic_model.pkl")
    prediction = model.predict(input_data)[0]
    return "🟢 Survived" if prediction == 1 else "🔴 Did not survive"

# Step 9: Launch Gradio interface
gr.Interface(
    fn=predict_survival,
    inputs=[
        gr.Dropdown([1, 2, 3], label="Passenger Class (1 = 1st, 3 = 3rd)"),
        gr.Radio(["Male", "Female"], label="Sex"),
        gr.Slider(0, 80, label="Age"),
        gr.Slider(0, 8, step=1, label="Siblings/Spouses Aboard"),
        gr.Slider(0, 6, step=1, label="Parents/Children Aboard"),
        gr.Slider(0, 500, label="Fare"),
        gr.Dropdown(["Southampton", "Cherbourg", "Queenstown"], label="Embarked
From")
    ],
    outputs=gr.Text(label="Prediction Result"),
    title="🚢 Titanic Survival Predictor",
    description="Fill in the passenger details to predict survival."
).launch()
```

OUTPUT:



OUTPUT IMAGE-1

```
Collecting gradio
  Downloading gradio-5.31.0-py3-none-any.whl.metadata (16 kB)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.11/dist-packages (1.6.1)
Requirement already satisfied: pandas in /usr/local/lib/python3.11/dist-packages (2.2.2)
Requirement already satisfied: joblib in /usr/local/lib/python3.11/dist-packages (1.5.0)
Collecting aiofiles<25.0,>=22.0 (from gradio)
  Downloading aiofiles-24.1.0-py3-none-any.whl.metadata (10 kB)
Requirement already satisfied: anyio<5.0,>=3.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (4.9.0)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.12-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.10.1 (from gradio)
  Downloading gradio_client-1.10.1-py3-none-any.whl.metadata (7.1 kB)
Collecting groovy~=0.1 (from gradio)
  Downloading groovy-0.1.2-py3-none-any.whl.metadata (6.1 kB)
Requirement already satisfied: httpx>=0.24.1 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.28.1)
Requirement already satisfied: huggingface-hub>=0.28.1 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.31.2)
Requirement already satisfied: jinja2<4.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.1.6)
Requirement already satisfied: markupsafe<4.0,>=2.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.0.2)
Requirement already satisfied: numpy<3.0,>=1.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (2.0.2)
Requirement already satisfied: orjson~=3.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (3.10.18)
Requirement already satisfied: packaging in /usr/local/lib/python3.11/dist-packages (from gradio) (24.2)
Requirement already satisfied: pillow<12.0,>=8.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (11.2.1)
Requirement already satisfied: pydantic<2.12,>=2.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (2.11.4)
Collecting pydub (from gradio)
  Downloading pydub-0.25.1-py2.py3-none-any.whl.metadata (1.4 kB)
Collecting python-multipart>=0.0.18 (from gradio)
  Downloading python_multipart-0.0.20-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: pyyaml<7.0,>=5.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (6.0.2)
Collecting ruff>=0.9.3 (from gradio)
  Downloading ruff-0.11.11-py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (25 kB)
Collecting safehttpx<0.2.0,>=0.1.6 (from gradio)
  Downloading safehttpx-0.1.6-py3-none-any.whl.metadata (4.2 kB)
Collecting semantic-version~=2.0 (from gradio)
  Downloading semantic_version-2.10.0-py2.py3-none-any.whl.metadata (9.7 kB)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.46.2-py3-none-any.whl.metadata (6.2 kB)
Collecting tomlkit<0.14.0,>=0.12.0 (from gradio)
  Downloading tomlkit-0.13.2-py3-none-any.whl.metadata (2.7 kB)
Requirement already satisfied: typer<1.0,>=0.12 in /usr/local/lib/python3.11/dist-packages (from gradio) (0.15.3)
Requirement already satisfied: typing-extensions~=4.0 in /usr/local/lib/python3.11/dist-packages (from gradio) (4.13.2)
```

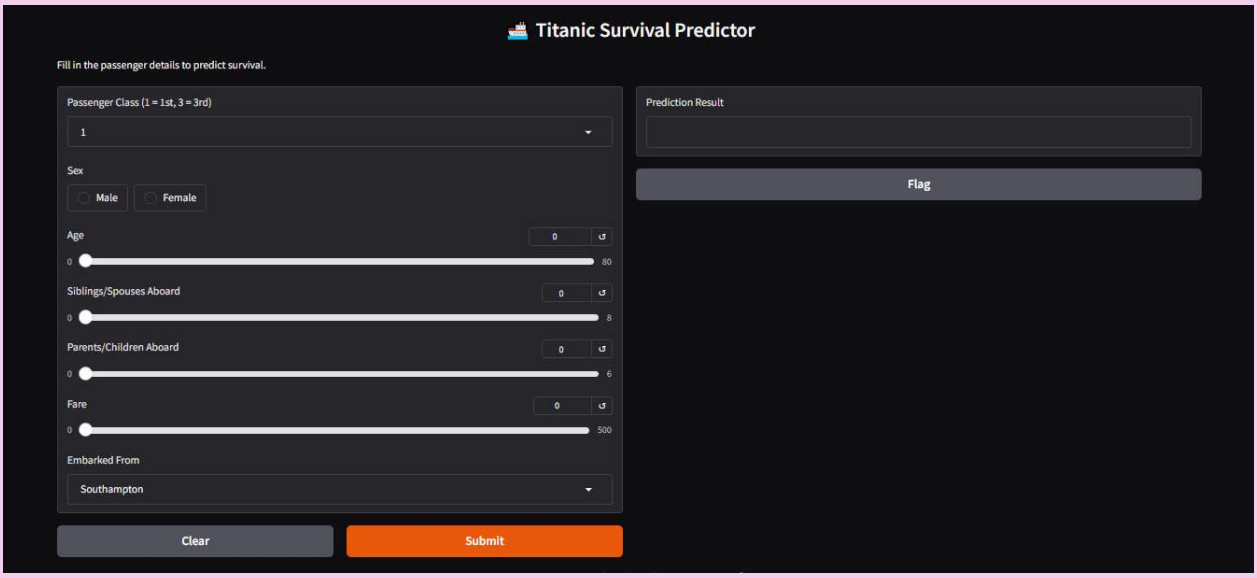
OUTPUT IMAGE-2

```
Collecting uvicorn>=0.14.0 (from gradio)
  Downloading uvicorn-0.34.2-py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: fsspec in /usr/local/lib/python3.11/dist-packages (from gradio-client==1.10.1->gradio) (2025.3.2)
Requirement already satisfied: websockets<16.0,>=10.0 in /usr/local/lib/python3.11/dist-packages (from gradio-client==1.10.1->gradio) (15.0.1)
Requirement already satisfied: scipy>=1.6.0 in /usr/local/lib/python3.11/dist-packages (from scikit-learn) (1.15.3)
Requirement already satisfied: threadpoolctl>=3.1.0 in /usr/local/lib/python3.11/dist-packages (from scikit-learn) (3.6.0)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.11/dist-packages (from pandas) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-packages (from pandas) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages (from pandas) (2025.2)
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.11/dist-packages (from anyio<5.0,>=3.0->gradio) (3.10)
Requirement already satisfied: sniffio>=1.1 in /usr/local/lib/python3.11/dist-packages (from anyio<5.0,>=3.0->gradio) (1.3.1)
Requirement already satisfied: certifi in /usr/local/lib/python3.11/dist-packages (from httpx>=0.24.1->gradio) (2025.4.26)
Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.11/dist-packages (from httpx>=0.24.1->gradio) (1.0.9)
Requirement already satisfied: h11>=0.16 in /usr/local/lib/python3.11/dist-packages (from httpcore==1.*->httpx>=0.24.1->gradio) (0.16.0)
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (3.18.0)
Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (2.32.3)
Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.28.1->gradio) (4.67.1)
Requirement already satisfied: annotated-types>=0.6.0 in /usr/local/lib/python3.11/dist-packages (from pydantic<2.12,>=2.0->gradio) (0.7.0)
Requirement already satisfied: pydantic-core==2.33.2 in /usr/local/lib/python3.11/dist-packages (from pydantic<2.12,>=2.0->gradio) (2.33.2)
Requirement already satisfied: typing-inspection>=0.4.0 in /usr/local/lib/python3.11/dist-packages (from pydantic<2.12,>=2.0->gradio) (0.4.0)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.11/dist-packages (from python-dateutil>=2.8.2->pandas) (1.17.0)
Requirement already satisfied: click>=8.0.0 in /usr/local/lib/python3.11/dist-packages (from typer<1.0,>=0.12->gradio) (8.2.0)
Requirement already satisfied: shellingham>=1.3.0 in /usr/local/lib/python3.11/dist-packages (from typer<1.0,>=0.12->gradio) (1.5.4)
Requirement already satisfied: rich>=10.11.0 in /usr/local/lib/python3.11/dist-packages (from typer<1.0,>=0.12->gradio) (13.9.4)
Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/local/lib/python3.11/dist-packages (from rich>=10.11.0->typer<1.0,>=0.12->gradio) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /usr/local/lib/python3.11/dist-packages (from rich>=10.11.0->typer<1.0,>=0.12->gradio) (2.19.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub>=0.28.1->gradio) (3.4.2)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub>=0.28.1->gradio) (2.4.0)
Requirement already satisfied: mdurl~=0.1 in /usr/local/lib/python3.11/dist-packages (from markdown-it-py>=2.2.0->rich>=10.11.0->typer<1.0,>=0.12->gradio) (0.1.2)
Downloading gradio-5.31.0-py3-none-any.whl (54.2 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 54.2/54.2 MB 12.9 MB/s eta 0:00:00
Downloading gradio_client-1.10.1-py3-none-any.whl (323 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 323.1/323.1 kB 25.8 MB/s eta 0:00:00
Downloading aiofiles-24.1.0-py3-none-any.whl (15 kB)
Downloading fastapi-0.115.12-py3-none-any.whl (95 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 95.2/95.2 kB 9.4 MB/s eta 0:00:00
Downloading groovy-0.1.2-py3-none-any.whl (14 kB)
Downloading python_multipart-0.0.20-py3-none-any.whl (24 kB)
Downloading ruff-0.11.11-py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (11.5 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 11.5/11.5 MB 145.0 MB/s eta 0:00:00
Downloading safehttpx-0.1.6-py3-none-any.whl (8.7 kB)
Downloading semantic_version-2.10.0-py2.py3-none-any.whl (15 kB)
Downloading starlette-0.46.2-py3-none-any.whl (72 kB)
```

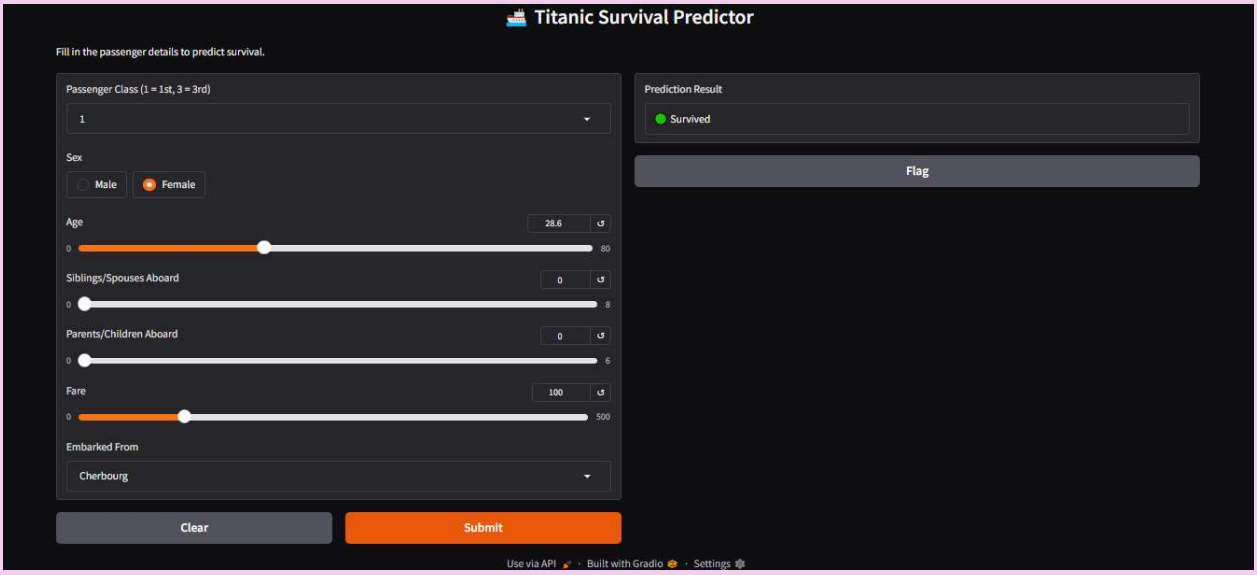
OUTPUT IMAGE-3

```
Downloading gradio_client-1.10.1-py3-none-any.whl (323 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 323.1/323.1 kB 25.8 MB/s eta 0:00:00
Downloading aiofiles-24.1.0-py3-none-any.whl (15 kB)
Downloading fastapi-0.115.12-py3-none-any.whl (95 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 95.2/95.2 kB 9.4 MB/s eta 0:00:00
Downloading groovy-0.1.2-py3-none-any.whl (14 kB)
Downloading python_multipart-0.0.20-py3-none-any.whl (24 kB)
Downloading ruff-0.11.11-py3-none-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (11.5 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 11.5/11.5 MB 145.0 MB/s eta 0:00:00
Downloading safehttpx-0.1.6-py3-none-any.whl (8.7 kB)
Downloading semantic_version-2.10.0-py2.py3-none-any.whl (15 kB)
Downloading starlette-0.46.2-py3-none-any.whl (72 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 72.0/72.0 kB 7.3 MB/s eta 0:00:00
Downloading tomlkit-0.13.2-py3-none-any.whl (37 kB)
Downloading uvicorn-0.34.2-py3-none-any.whl (62 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 62.5/62.5 kB 5.6 MB/s eta 0:00:00
Downloading ffmpy-0.5.0-py3-none-any.whl (6.0 kB)
Downloading pydub-0.25.1-py2.py3-none-any.whl (32 kB)
Installing collected packages: pydub, uvicorn, tomlkit, semantic-version, ruff, python-multipart, groovy, ffmpy, aiofiles, starlette, safehttpx, gradio-client, fastapi, gradio
Successfully installed aiofiles-24.1.0 fastapi-0.115.12 ffmpy-0.5.0 gradio-5.31.0 gradio-client-1.10.1 groovy-0.1.2 pydub-0.25.1 python-multipart-0.0.20 ruff-0.11.11 safehttpx-0.1.6 semantic-version-2.10.0 starlette-0.46.2 tomlkit-0.13.2 uvicorn-0.34.2
🎯 Accuracy: 0.8268156424581006

📊 Classification Report:
              precision    recall  f1-score   support

           0       0.84      0.88      0.86       105
           1       0.81      0.76      0.78        74

    accuracy                           0.83       179
   macro avg       0.82      0.82      0.82       179
weighted avg       0.83      0.83      0.83       179

🔍 Confusion Matrix:
 [[92 13]
 [18 56]]
It looks like you are running Gradio on a hosted a Jupyter notebook. For the Gradio app to work, sharing must be enabled. Automatically setting `share=True` (you can turn this off by setting `share=False` in `launch()` explicitly).

Colab notebook detected. To show errors in colab notebook, set debug=True in launch()
* Running on public URL: https://c75f68c70011f7341d.gradio.live

This share link expires in 1 week. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working directory to deploy to Hugging Face Spaces (https://huggingface.co/spaces)
```

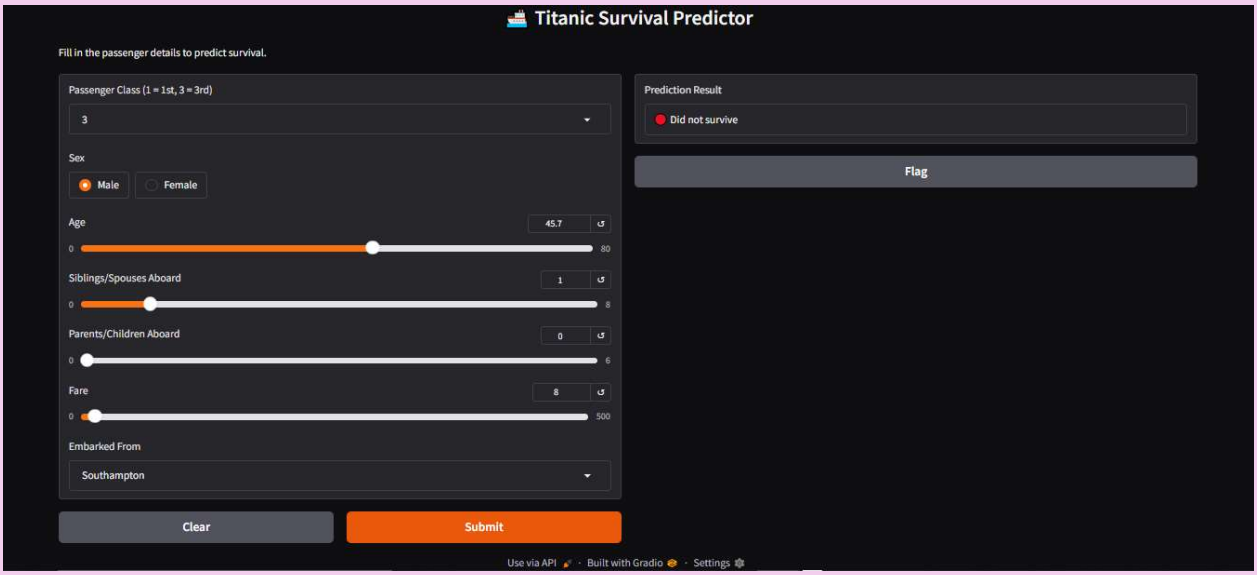
OUTPUT IMAGE-4



OUTPUT IMAGE-5



OUTPUT IMAGE-6



OUTPUT IMAGE-7