WEEK 7 ASSIGNMENT

📊✨ Project Insights: Iris Flower Classification Model Deployment Using Streamlit

🔍 1. Dataset Understanding & Problem Statement

The Iris dataset is a classic and widely-used dataset in machine learning and statistics. It contains 150 samples divided into three flower species: Setosa, Versicolor, and Virginica.

Each sample has four features: Sepal Length, Sepal Width, Petal Length, and Petal Width.

🎯 Goal: Build a machine learning model to predict the species based on these features and deploy it using Streamlit.

🧪 2. Data Preprocessing & Exploration

✅ The dataset was clean with no missing values.

📈 Exploratory Data Analysis (EDA) revealed strong correlation between petal dimensions and flower species.

📊 Visualizations like pairplots, heatmaps, and countplots provided clear separability among classes.

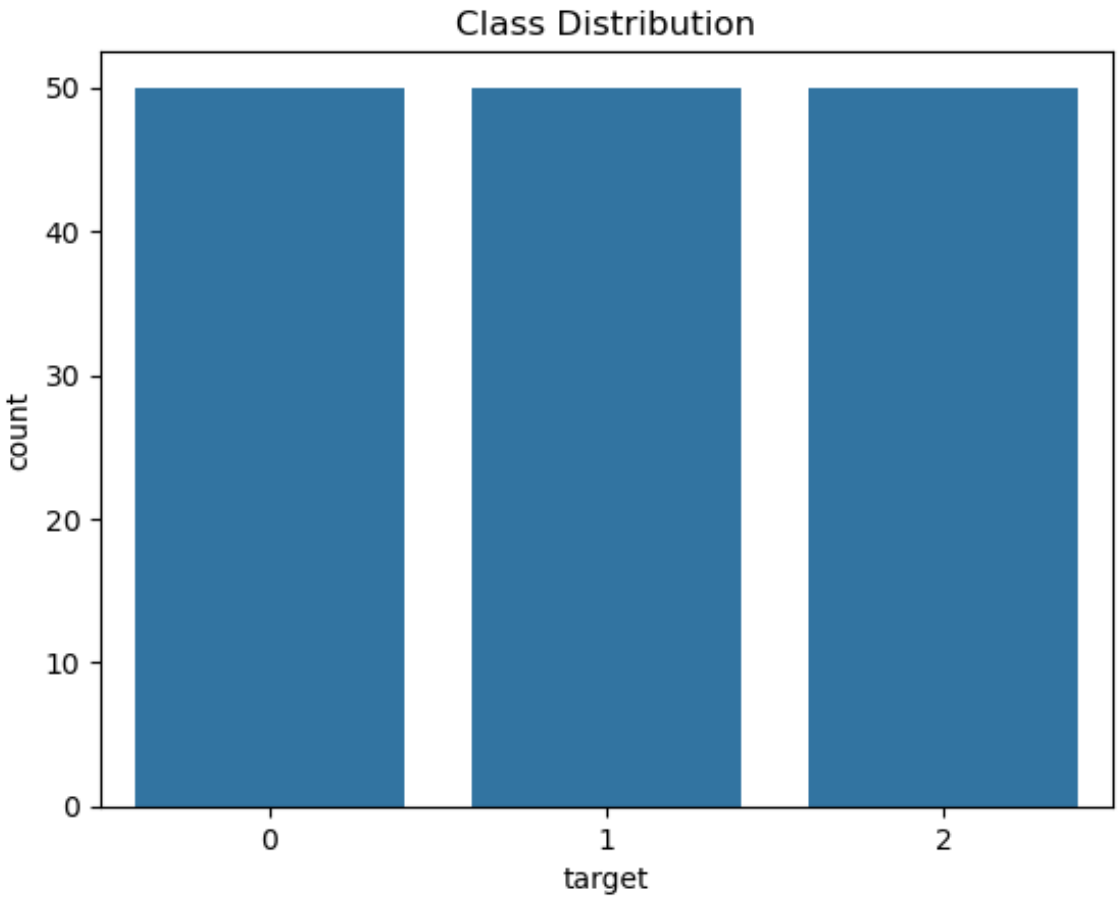
	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

```
target
0    50
1    50
2    50
Name: count, dtype: int64
```

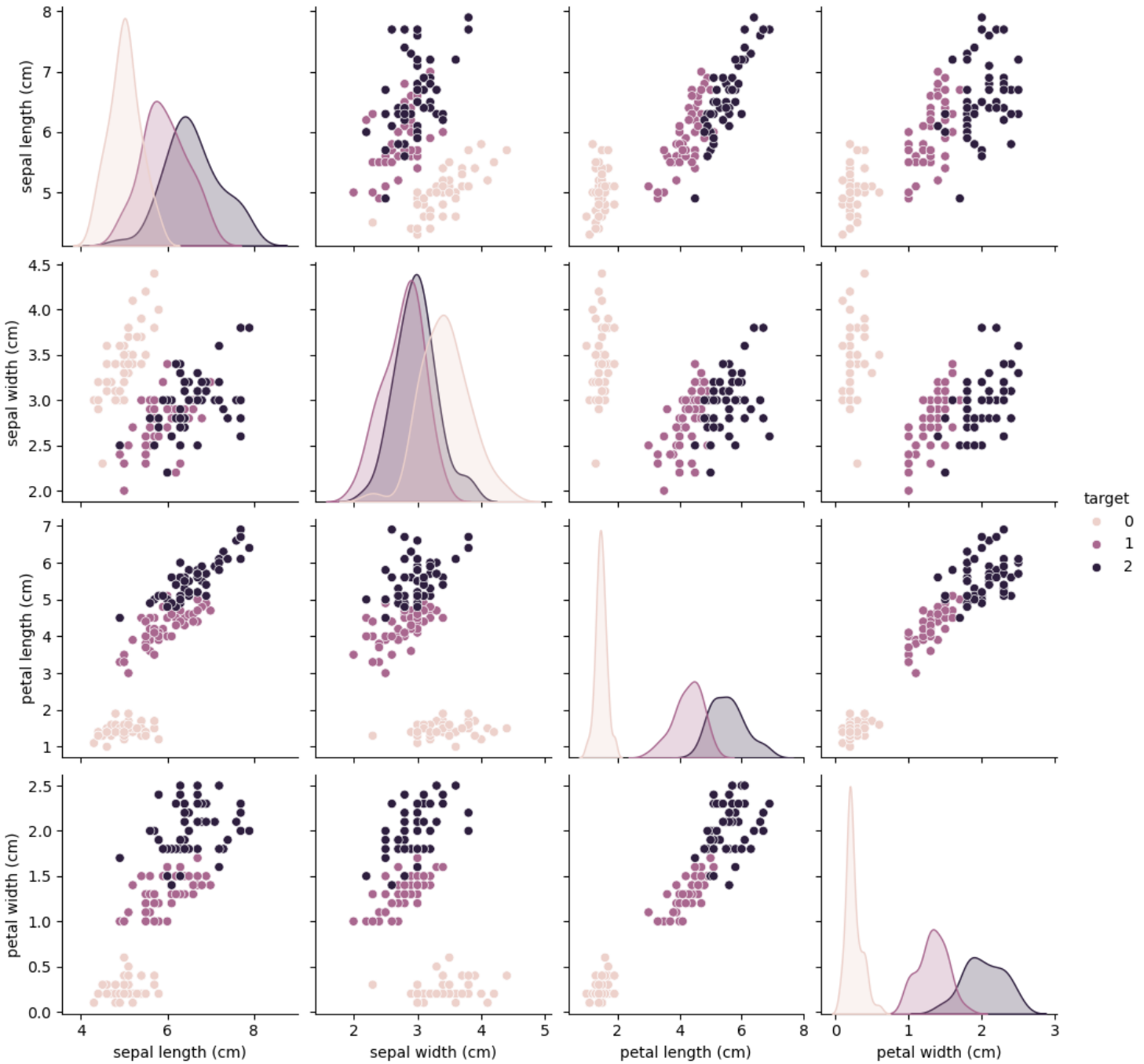
📌 Basic Stats

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333	1.000000
std	0.828066	0.435866	1.765298	0.762238	0.819232
min	4.300000	2.000000	1.000000	0.100000	0.000000
25%	5.100000	2.800000	1.600000	0.300000	0.000000
50%	5.800000	3.000000	4.350000	1.300000	1.000000
75%	6.400000	3.300000	5.100000	1.800000	2.000000
max	7.900000	4.400000	6.900000	2.500000	2.000000

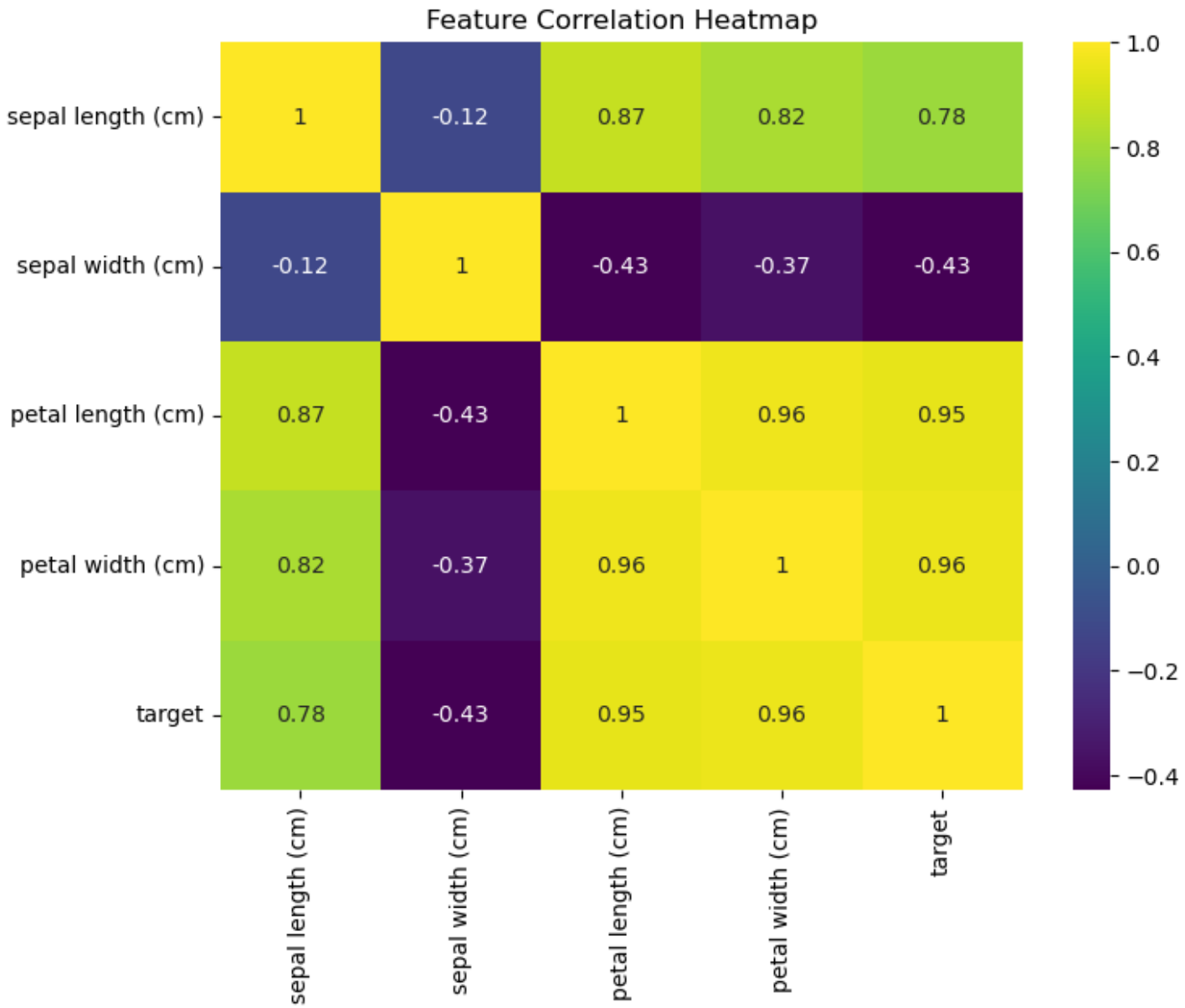
📌 Class Distribution



Pairplot



Correlation Heatmap



🧠 3. Model Training & Evaluation

A Random Forest Classifier was trained using the scaled feature set with an 80-20 train-test split.

📌 Model achieved over 96% accuracy.

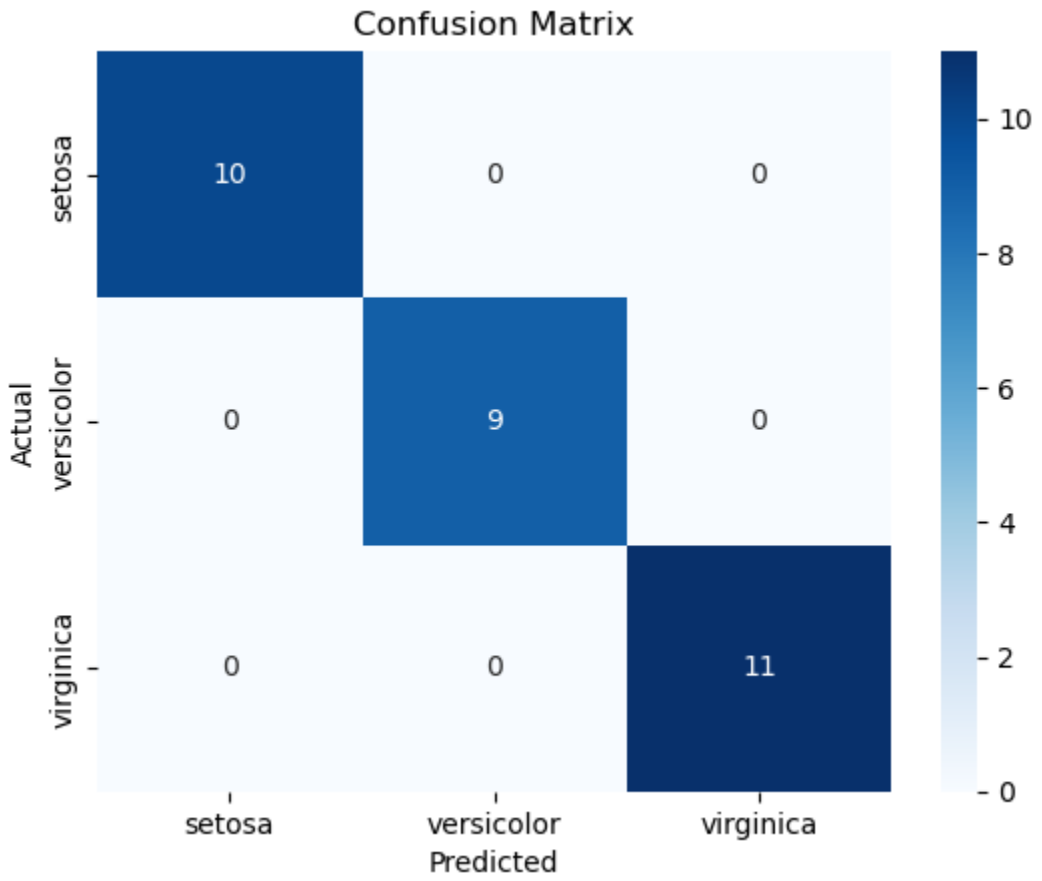
📉 Evaluation via classification report and confusion matrix confirmed strong predictive performance across all three classes.

```
RandomForestClassifier
RandomForestClassifier(random_state=42)
```

```
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      1.00      1.00         9
           2       1.00      1.00      1.00        11

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30
```



💾 4. Model Saving & Streamlit UI Development

🧠 The trained model and scaler were serialized using joblib.

🖥️ A user-friendly web interface was built using Streamlit that allows real-time predictions through slider inputs.

🎛️ The interface displays prediction results, feature comparison, and model reasoning.

💾 Step 9: Save the Model and Scaler

```
joblib.dump(model, "iris_model.pkl")
joblib.dump(scaler, "scaler.pkl")
```

```
['scaler.pkl']
```

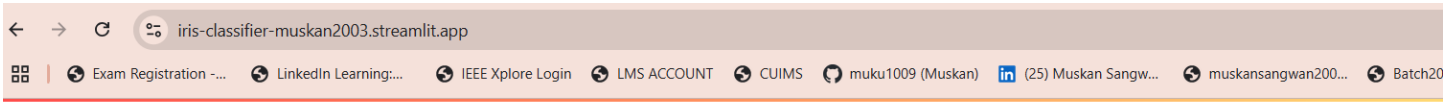
🖥️ 5. Streamlit Application Features

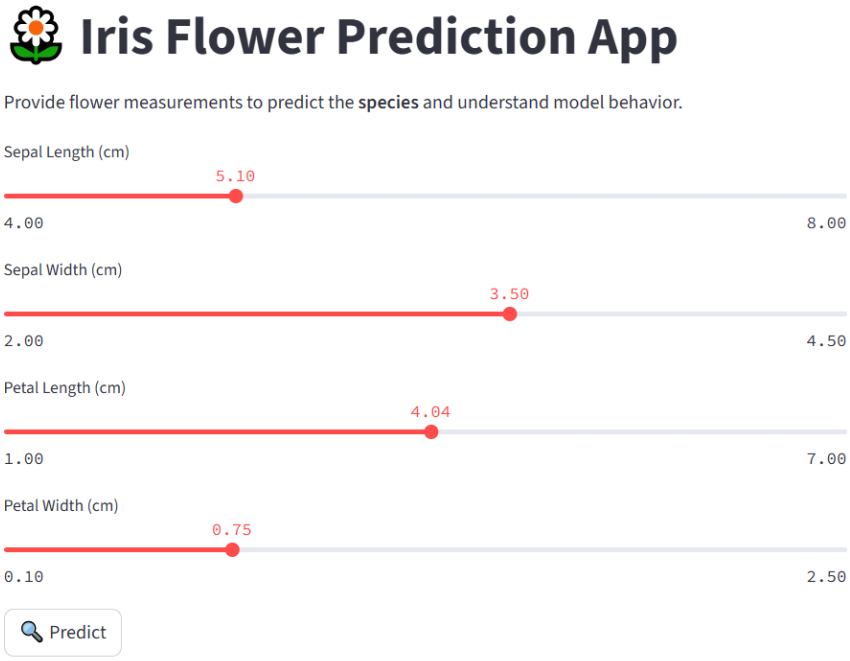
🌸 Interactive sliders for Sepal and Petal features.

🔮 Accepts user input and displays real-time species prediction.

📊 Compares user input with dataset averages.

📌 Feature importance chart helps understand model decisions.





🚀 6. Final Output & Deployment Value

✅ A fully functional Streamlit web app that classifies Iris species based on input.

🌐 Provides intuitive, visual feedback for non-technical users.

📈 Transforms a basic ML model into an interactive, accessible product.

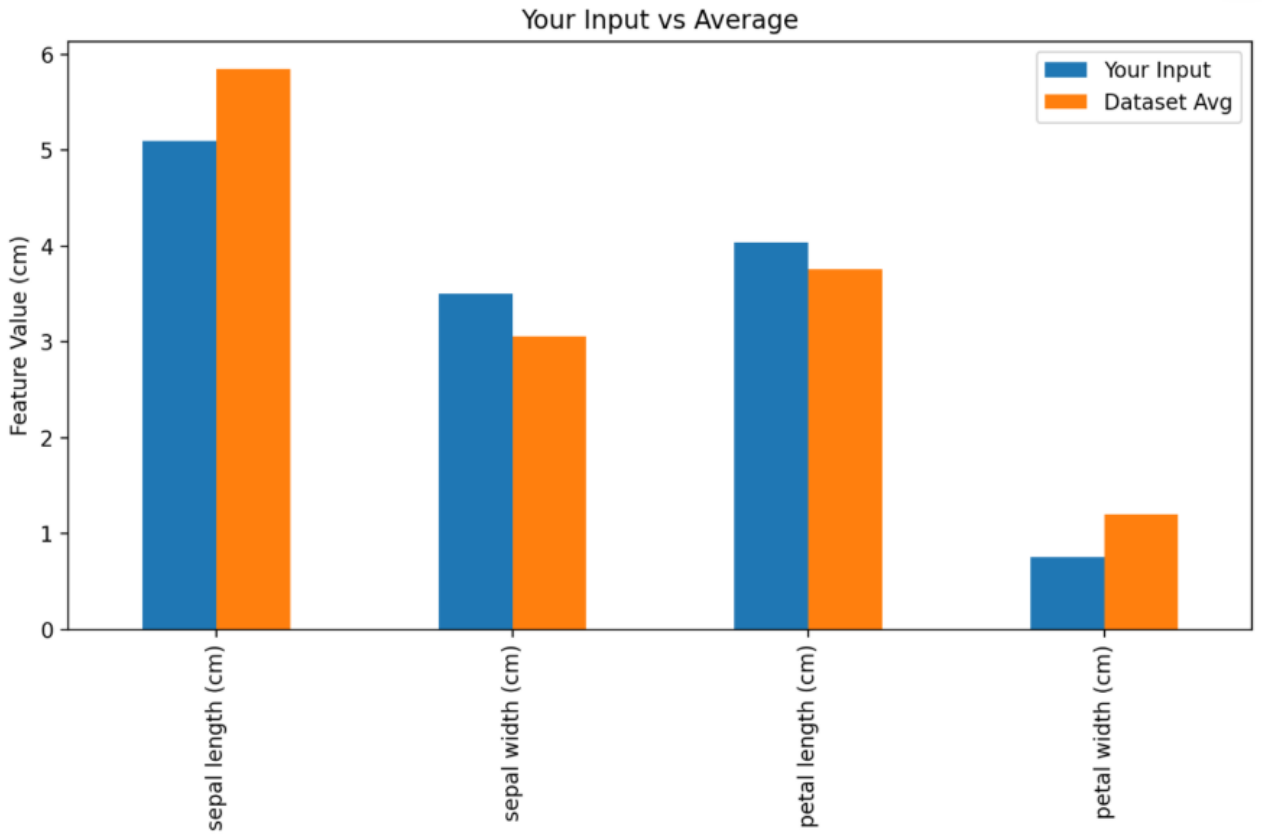
🔍 Predict

🌸 **Predicted Species:** Versicolor

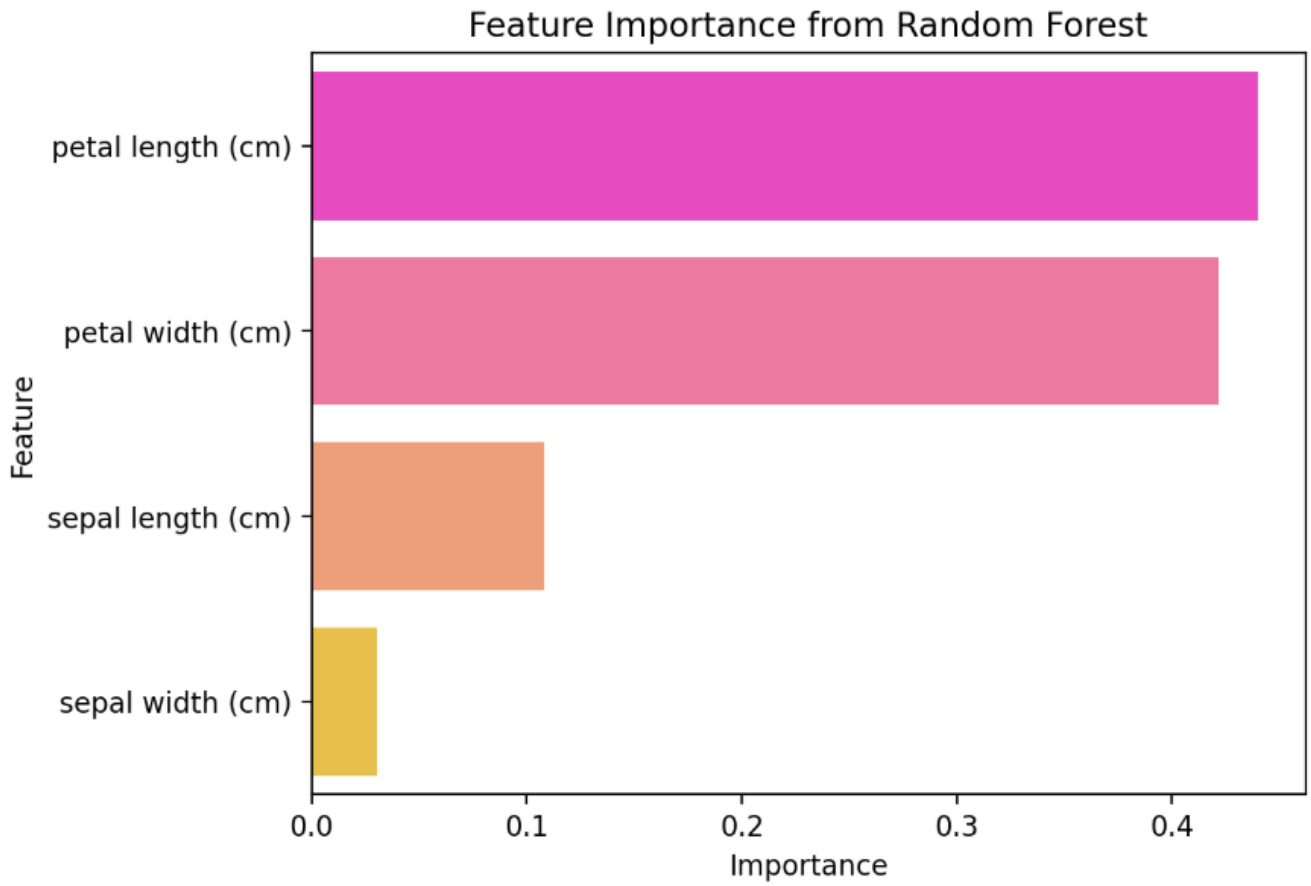
📊 Your Input vs Dataset Averages

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
Your Input	5.1	3.5	4.04	0.75
Dataset Avg	5.8433	3.0573	3.758	1.1993

📈 Feature Comparison



📌 Feature Importance (Model's Decision Basis)



☑️ Conclusion

This project seamlessly integrates model development, evaluation, and deployment. It provides a practical understanding of building real-world ML systems and makes machine learning accessible and interpretable to everyone. Streamlit serves as a powerful tool to quickly deploy models with professional and interactive user interfaces.

🌐 Deployed Streamlit Application

🔗 Visit the live application here: https://iris-classifier-muskan2003.streamlit.app/