**IRIS FLOWER CLASSIFICATION**

**Project Overview: Iris Flower Classification**

**Overview**

I developed a machine learning model to classify Iris flowers into three species (setosa, versicolor, and virginica) based on their sepal and petal measurements. This project involved various stages including data exploration, preprocessing, feature engineering, model selection, evaluation, and deployment using R and key data science packages. The goal was to build an accurate and efficient predictive model to identify the species of Iris flowers based on their measurements.

**Problem Statement**

The objective of this project was to predict the species of Iris flowers based on their sepal length, sepal width, petal length, and petal width using machine learning techniques.

**Tools & Technologies**

**- R:** The primary programming language used.

**- tidyverse:** For data manipulation and visualization.

**- caret:** For building and evaluating machine learning models.

**- shiny:** For deploying the model as an interactive web application.

**Data Preparation**

**- Data Loading:** Loaded the Iris dataset using the `datasets` package in R.

- **Feature Engineering:** Utilized all four features (sepal length, sepal width, petal length, petal width) for model training.

- **Encoding Categorical Variables:** The target variable (species) was already a factor.

**Exploratory Data Analysis (EDA)**

**- Visualizations:**

- Created pair plots to visualize the relationships between features.

- Used ggplots to understand the distribution of features.

**Model Development**

**- Algorithm Selection:** Used Random Forest

- **Evaluation Metrics:** Assessed models using accuracy to ensure balanced and robust performance.

**Results**

**- Performance:** The final model achieved:

- **Accuracy:** 93.33%

- **Key Insights:**

- **Petal Length and Width:** These features were the most significant in predicting the species.

- **Sepal Length and Width:** These features were less significant compared to petal measurements.

**Deployment**

**- Interactive Web Application:** Deployed the model using Shiny, allowing users to input flower measurements and get real-time species predictions.

**- User Interface:** Designed a simple and intuitive interface for users to enter sepal and petal measurements and obtain predictions.

**Key Learnings**

**- Data Preprocessing:** The importance of feature scaling and understanding the impact of different features on model accuracy.

**- Model Evaluation:** Understanding the trade-offs between different performance metrics and selecting the best model based on balanced performance.

**- Deployment:** Gaining practical experience in deploying a machine learning model and creating an interactive user interface for real-world applications.

**GitHub Repository**

Explore the complete project and code here:

<https://github.com/sravanthi224/IRIS-FLOWER-CLASSIFICATION.git>