# 🌸 Iris Flower Classification using K-Nearest Neighbors (KNN)

This project demonstrates a simple yet powerful machine learning algorithm — K-Nearest Neighbors (KNN) — to classify iris flowers into different species based on their sepal and petal dimensions.  
  
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## 📘 Project Overview  
  
The Iris dataset is one of the most popular datasets in machine learning and pattern recognition.  
In this notebook, we:  
- Load and explore the Iris dataset using scikit-learn.  
- Visualize the data using pandas and matplotlib.  
- Train a KNN classifier model.  
- Evaluate its accuracy and make predictions on new data.  
  
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## ⚙️ Requirements  
  
Make sure you have the following Python libraries installed:  
  
pip install numpy pandas matplotlib scikit-learn mglearn  
  
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## 🚀 How to Run  
  
1. Clone or download this repository.  
2. Open the project folder in Jupyter Notebook or JupyterLab.  
3. Run each cell step-by-step to understand the workflow.  
  
Example command:  
jupyter notebook 7433ffad-0abd-43e6-9045-92ddca711455.ipynb  
  
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## 🧠 Core Concepts  
  
This project introduces several fundamental machine learning and data science concepts that form the basis for more advanced topics:  
  
### 📊 1. Data Exploration and Preprocessing  
- Loading and inspecting datasets using scikit-learn.  
- Converting data into pandas DataFrames for easy handling.  
- Understanding features (inputs) and labels (outputs).  
  
### 🧩 2. Data Visualization  
- Plotting relationships between features using scatter matrix plots.  
- Observing patterns and separability between classes.  
  
### 🧮 3. Model Building with K-Nearest Neighbors (KNN)  
- Training the model with the KNeighborsClassifier from scikit-learn.  
- Learning how the KNN algorithm classifies data points based on proximity.  
  
### ⚙️ 4. Model Evaluation  
- Using a train/test split to evaluate model accuracy.  
- Understanding the difference between training and testing data.  
  
### 🔍 5. Making Predictions  
- Predicting new, unseen data points.  
- Mapping numerical predictions to class labels (like setosa, versicolor, virginica).  
  
### 🧠 6. Key Machine Learning Skills Practiced  
- Working with datasets in numpy and pandas  
- Building and training ML models using scikit-learn  
- Visualizing and interpreting model performance  
  
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Enthusiastic about Artificial Intelligence, Machine Learning, and Data Science.  
Always exploring how machines can learn from data and make intelligent decisions.  
  
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“Every great machine learning engineer starts with small experiments — consistency turns curiosity into mastery.”  
— Israr Baig