25.Question 2: Decision Tree for Iris Flower Classification

You are analyzing the famous Iris flower dataset to classify iris flowers into three species based on

their sepal and petal dimensions. You want to use a Decision Tree classifier to accomplish this task.

Write a Python program that loads the Iris dataset from scikit-learn, and allows the user to input the

sepal length, sepal width, petal length, and petal width of a new flower. The program should then

use the Decision Tree classifier to predict the species of the new flower.

Code:

import pandas as pd

from sklearn.model\_selection import train\_test\_split

from sklearn.tree import DecisionTreeClassifier

from sklearn import metrics

from sklearn.datasets import load\_iris

iris = load\_iris()

iris\_df = pd.DataFrame(iris.data, columns=iris.feature\_names)

iris\_df['species'] = iris.target

iris\_df['species'] = iris\_df['species'].map({0: 'setosa', 1: 'versicolor', 2: 'virginica'})

dataset\_path = r"C:\Users\vara prasad\Downloads\iris\_dataset.csv"

iris\_df.to\_csv(dataset\_path, index=False)

df = pd.read\_csv(dataset\_path)

X = df.drop('species', axis=1)

y = df['species']

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2, random\_state=42)

model = DecisionTreeClassifier()

model.fit(X\_train, y\_train)

y\_pred = model.predict(X\_test)

print(f"Accuracy: {metrics.accuracy\_score(y\_test, y\_pred)}")

print("\nEnter the following details of a new flower to predict the species:")

sepal\_length = float(input("Sepal length (cm): "))

sepal\_width = float(input("Sepal width (cm): "))

petal\_length = float(input("Petal length (cm): "))

petal\_width = float(input("Petal width (cm): "))

new\_data = pd.DataFrame([[sepal\_length, sepal\_width, petal\_length, petal\_width]],

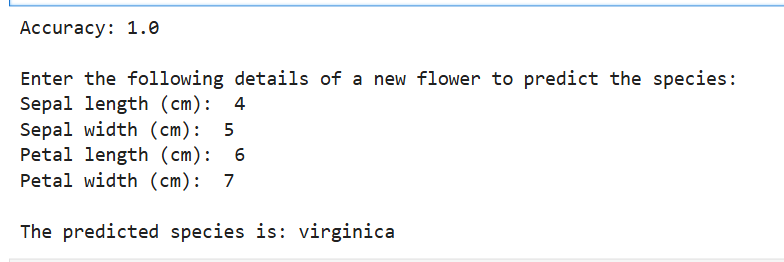
columns=["sepal length (cm)", "sepal width (cm)", "petal length (cm)", "petal width (cm)"])

prediction = model.predict(new\_data)

species = prediction[0]

print(f"\nThe predicted species is: {species}")

output:



Dataset:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sepal length (cm) | sepal width (cm) | petal length (cm) | petal width (cm) | species |
| 5.1 | 3.5 | 1.4 | 0.2 | setosa |
| 4.9 | 3 | 1.4 | 0.2 | setosa |
| 4.7 | 3.2 | 1.3 | 0.2 | setosa |
| 4.6 | 3.1 | 1.5 | 0.2 | setosa |
| 5 | 3.6 | 1.4 | 0.2 | setosa |
| 5.4 | 3.9 | 1.7 | 0.4 | setosa |
| 4.6 | 3.4 | 1.4 | 0.3 | setosa |
| 5 | 3.4 | 1.5 | 0.2 | setosa |
| 4.4 | 2.9 | 1.4 | 0.2 | setosa |
| 4.9 | 3.1 | 1.5 | 0.1 | setosa |
| 5.4 | 3.7 | 1.5 | 0.2 | setosa |
| 4.8 | 3.4 | 1.6 | 0.2 | setosa |
| 4.8 | 3 | 1.4 | 0.1 | setosa |
| 4.3 | 3 | 1.1 | 0.1 | setosa |
| 5.8 | 4 | 1.2 | 0.2 | setosa |
| 5.7 | 4.4 | 1.5 | 0.4 | setosa |
| 5.4 | 3.9 | 1.3 | 0.4 | setosa |
| 5.1 | 3.5 | 1.4 | 0.3 | setosa |
| 5.7 | 3.8 | 1.7 | 0.3 | setosa |
| 5.1 | 3.8 | 1.5 | 0.3 | setosa |
| 5.4 | 3.4 | 1.7 | 0.2 | setosa |
| 5.1 | 3.7 | 1.5 | 0.4 | setosa |
| 4.6 | 3.6 | 1 | 0.2 | setosa |
| 5.1 | 3.3 | 1.7 | 0.5 | setosa |
| 4.8 | 3.4 | 1.9 | 0.2 | setosa |
| 5 | 3 | 1.6 | 0.2 | setosa |
| 5 | 3.4 | 1.6 | 0.4 | setosa |
| 5.2 | 3.5 | 1.5 | 0.2 | setosa |
| 5.2 | 3.4 | 1.4 | 0.2 | setosa |
| 4.7 | 3.2 | 1.6 | 0.2 | setosa |
| 4.8 | 3.1 | 1.6 | 0.2 | setosa |
| 5.4 | 3.4 | 1.5 | 0.4 | setosa |
| 5.2 | 4.1 | 1.5 | 0.1 | setosa |
| 5.5 | 4.2 | 1.4 | 0.2 | setosa |
| 4.9 | 3.1 | 1.5 | 0.2 | setosa |
| 5 | 3.2 | 1.2 | 0.2 | setosa |
| 5.5 | 3.5 | 1.3 | 0.2 | setosa |
| 4.9 | 3.6 | 1.4 | 0.1 | setosa |
| 4.4 | 3 | 1.3 | 0.2 | setosa |
| 5.1 | 3.4 | 1.5 | 0.2 | setosa |
| 5 | 3.5 | 1.3 | 0.3 | setosa |
| 4.5 | 2.3 | 1.3 | 0.3 | setosa |
| 4.4 | 3.2 | 1.3 | 0.2 | setosa |
| 5 | 3.5 | 1.6 | 0.6 | setosa |
| 5.1 | 3.8 | 1.9 | 0.4 | setosa |
| 4.8 | 3 | 1.4 | 0.3 | setosa |
| 5.1 | 3.8 | 1.6 | 0.2 | setosa |
| 4.6 | 3.2 | 1.4 | 0.2 | setosa |
| 5.3 | 3.7 | 1.5 | 0.2 | setosa |
| 5 | 3.3 | 1.4 | 0.2 | setosa |
| 7 | 3.2 | 4.7 | 1.4 | versicolor |
| 6.4 | 3.2 | 4.5 | 1.5 | versicolor |
| 6.9 | 3.1 | 4.9 | 1.5 | versicolor |
| 5.5 | 2.3 | 4 | 1.3 | versicolor |
| 6.5 | 2.8 | 4.6 | 1.5 | versicolor |
| 5.7 | 2.8 | 4.5 | 1.3 | versicolor |
| 6.3 | 3.3 | 4.7 | 1.6 | versicolor |
| 4.9 | 2.4 | 3.3 | 1 | versicolor |
| 6.6 | 2.9 | 4.6 | 1.3 | versicolor |
| 5.2 | 2.7 | 3.9 | 1.4 | versicolor |
| 5 | 2 | 3.5 | 1 | versicolor |
| 5.9 | 3 | 4.2 | 1.5 | versicolor |
| 6 | 2.2 | 4 | 1 | versicolor |
| 6.1 | 2.9 | 4.7 | 1.4 | versicolor |
| 5.6 | 2.9 | 3.6 | 1.3 | versicolor |
| 6.7 | 3.1 | 4.4 | 1.4 | versicolor |
| 5.6 | 3 | 4.5 | 1.5 | versicolor |
| 5.8 | 2.7 | 4.1 | 1 | versicolor |
| 6.2 | 2.2 | 4.5 | 1.5 | versicolor |
| 5.6 | 2.5 | 3.9 | 1.1 | versicolor |
| 5.9 | 3.2 | 4.8 | 1.8 | versicolor |
| 6.1 | 2.8 | 4 | 1.3 | versicolor |
| 6.3 | 2.5 | 4.9 | 1.5 | versicolor |
| 6.1 | 2.8 | 4.7 | 1.2 | versicolor |
| 6.4 | 2.9 | 4.3 | 1.3 | versicolor |
| 6.6 | 3 | 4.4 | 1.4 | versicolor |
| 6.8 | 2.8 | 4.8 | 1.4 | versicolor |
| 6.7 | 3 | 5 | 1.7 | versicolor |
| 6 | 2.9 | 4.5 | 1.5 | versicolor |
| 5.7 | 2.6 | 3.5 | 1 | versicolor |
| 5.5 | 2.4 | 3.8 | 1.1 | versicolor |
| 5.5 | 2.4 | 3.7 | 1 | versicolor |
| 5.8 | 2.7 | 3.9 | 1.2 | versicolor |
| 6 | 2.7 | 5.1 | 1.6 | versicolor |
| 5.4 | 3 | 4.5 | 1.5 | versicolor |
| 6 | 3.4 | 4.5 | 1.6 | versicolor |
| 6.7 | 3.1 | 4.7 | 1.5 | versicolor |
| 6.3 | 2.3 | 4.4 | 1.3 | versicolor |
| 5.6 | 3 | 4.1 | 1.3 | versicolor |
| 5.5 | 2.5 | 4 | 1.3 | versicolor |
| 5.5 | 2.6 | 4.4 | 1.2 | versicolor |
| 6.1 | 3 | 4.6 | 1.4 | versicolor |
| 5.8 | 2.6 | 4 | 1.2 | versicolor |
| 5 | 2.3 | 3.3 | 1 | versicolor |
| 5.6 | 2.7 | 4.2 | 1.3 | versicolor |
| 5.7 | 3 | 4.2 | 1.2 | versicolor |
| 5.7 | 2.9 | 4.2 | 1.3 | versicolor |
| 6.2 | 2.9 | 4.3 | 1.3 | versicolor |
| 5.1 | 2.5 | 3 | 1.1 | versicolor |
| 5.7 | 2.8 | 4.1 | 1.3 | versicolor |
| 6.3 | 3.3 | 6 | 2.5 | virginica |
| 5.8 | 2.7 | 5.1 | 1.9 | virginica |
| 7.1 | 3 | 5.9 | 2.1 | virginica |
| 6.3 | 2.9 | 5.6 | 1.8 | virginica |
| 6.5 | 3 | 5.8 | 2.2 | virginica |
| 7.6 | 3 | 6.6 | 2.1 | virginica |
| 4.9 | 2.5 | 4.5 | 1.7 | virginica |
| 7.3 | 2.9 | 6.3 | 1.8 | virginica |
| 6.7 | 2.5 | 5.8 | 1.8 | virginica |
| 7.2 | 3.6 | 6.1 | 2.5 | virginica |
| 6.5 | 3.2 | 5.1 | 2 | virginica |
| 6.4 | 2.7 | 5.3 | 1.9 | virginica |
| 6.8 | 3 | 5.5 | 2.1 | virginica |
| 5.7 | 2.5 | 5 | 2 | virginica |
| 5.8 | 2.8 | 5.1 | 2.4 | virginica |
| 6.4 | 3.2 | 5.3 | 2.3 | virginica |
| 6.5 | 3 | 5.5 | 1.8 | virginica |
| 7.7 | 3.8 | 6.7 | 2.2 | virginica |
| 7.7 | 2.6 | 6.9 | 2.3 | virginica |
| 6 | 2.2 | 5 | 1.5 | virginica |
| 6.9 | 3.2 | 5.7 | 2.3 | virginica |
| 5.6 | 2.8 | 4.9 | 2 | virginica |
| 7.7 | 2.8 | 6.7 | 2 | virginica |
| 6.3 | 2.7 | 4.9 | 1.8 | virginica |
| 6.7 | 3.3 | 5.7 | 2.1 | virginica |
| 7.2 | 3.2 | 6 | 1.8 | virginica |
| 6.2 | 2.8 | 4.8 | 1.8 | virginica |
| 6.1 | 3 | 4.9 | 1.8 | virginica |
| 6.4 | 2.8 | 5.6 | 2.1 | virginica |
| 7.2 | 3 | 5.8 | 1.6 | virginica |
| 7.4 | 2.8 | 6.1 | 1.9 | virginica |
| 7.9 | 3.8 | 6.4 | 2 | virginica |
| 6.4 | 2.8 | 5.6 | 2.2 | virginica |
| 6.3 | 2.8 | 5.1 | 1.5 | virginica |
| 6.1 | 2.6 | 5.6 | 1.4 | virginica |
| 7.7 | 3 | 6.1 | 2.3 | virginica |
| 6.3 | 3.4 | 5.6 | 2.4 | virginica |
| 6.4 | 3.1 | 5.5 | 1.8 | virginica |
| 6 | 3 | 4.8 | 1.8 | virginica |
| 6.9 | 3.1 | 5.4 | 2.1 | virginica |
| 6.7 | 3.1 | 5.6 | 2.4 | virginica |
| 6.9 | 3.1 | 5.1 | 2.3 | virginica |
| 5.8 | 2.7 | 5.1 | 1.9 | virginica |
| 6.8 | 3.2 | 5.9 | 2.3 | virginica |
| 6.7 | 3.3 | 5.7 | 2.5 | virginica |
| 6.7 | 3 | 5.2 | 2.3 | virginica |
| 6.3 | 2.5 | 5 | 1.9 | virginica |
| 6.5 | 3 | 5.2 | 2 | virginica |
| 6.2 | 3.4 | 5.4 | 2.3 | virginica |
| 5.9 | 3 | 5.1 | 1.8 | virginica |
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