**Iris Flower Classification - Task Completion Report**

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**Task Overview:**  
The objective of this task was to develop a machine learning model that classifies iris flowers into three species (Setosa, Versicolor, and Virginica) based on their measurements. The dataset used includes features such as sepal length, sepal width, petal length, and petal width.

**Implementation Details**

**1. Importing Required Libraries**

The necessary Python libraries were imported, including:

* **NumPy & Pandas** for data handling
* **Matplotlib** for visualization
* **Scikit-learn** for model training and evaluation

**2. Loading and Preprocessing Data**

* The **Iris dataset** was read from a CSV file.
* Features (X) and target labels (y) were separated.
* The dataset was split into training (67%) and testing (33%) sets using train\_test\_split().

**3. Model Selection & Hyperparameter Tuning**

A **Decision Tree Classifier** was implemented with GridSearchCV to find optimal parameters. The hyperparameters tuned were:

* max\_depth: [2, 3, 4, 5, None]
* criterion: ['gini', 'entropy']
* min\_samples\_split: [2, 5, 10]

**4. Model Training & Prediction**

* The best model from GridSearchCV was trained on the dataset.
* Predictions were made on the test set.

**5. Model Evaluation**

* Accuracy Score was computed to evaluate the model’s performance.
* The final accuracy achieved was **100%**, indicating excellent classification but requiring further validation to check for overfitting.

**Results**

* **Final Accuracy Score:** 100%
* **Best Model Parameters:** Extracted from GridSearchCV
* **Future Improvements:**
  + Perform additional validation using **cross-validation**.
  + Test model on **noisy or unseen data** to check generalization.

**Task Completed Successfully!**