Experiment 2: Classification Using J48 Decision Tree Algorithm

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Aim:

To demonstrate **classification** using the **J48 Decision Tree algorithm** on the Weather dataset and predict **Play** for a given test instance.

Theory:

- **J48** is a decision tree algorithm in WEKA (implementation of **C4.5**).
- It selects the **best attribute** to split at each node using **Information Gain**.
- Helps in **predicting class labels** based on input attributes.

Dataset (weather.arff)

@relation weather

@attribute Outlook {Sunny, Overcast, Rain}

@attribute Temperature numeric

@attribute Humidity numeric

@attribute Windy {True, False}

@attribute Play {Yes, No}

@data

Sunny,85,85,False,No

Sunny,80,90,True,No

Overcast,83,78,False,Yes

Rain,70,96,False,Yes

Rain,68,80,False,Yes

Rain,65,70,True,No

Overcast,64,65,True,Yes

Sunny,72,95,False,No

Sunny,69,70,False,Yes

Rain,75,80,False,Yes

Sunny,75,70,True,Yes

Overcast,72,90,True,Yes

Overcast,81,75,False,Yes

Rain,71,91,True,No

Class Attribute: Play (Yes/No)

Procedure (Using WEKA):

1. Open **WEKA → Explorer**.
2. Click **Open File** → select **weather.arff**.
3. Go to **Classify tab**.
4. Choose **Classifier → trees → J48**.
5. Click **Start** to build the decision tree.
6. Observe output:
    - Generated decision tree
    - Correctly classified instances
    - Confusion matrix
7. Predict **Play** for a new test instance (e.g., Outlook = Sunny, Temperature = 72, Humidity = 90, Windy = False) using the tree.

Result (Sample / Expected):

Generated J48 Decision Tree (Simplified):

Outlook = Sunny

| Humidity <= 75 : Yes

| Humidity > 75 : No

Outlook = Overcast : Yes

Outlook = Rain

| Windy = False : Yes

| Windy = True : No

Prediction Example:

- Test instance: Outlook = Sunny, Temperature = 72, Humidity = 90, Windy = False → **Play = No**

Conclusion:

- J48 Decision Tree effectively classifies the Weather dataset.
- The model can predict **Play** for new instances accurately.
- Using WEKA, building and visualizing decision trees is **quick and easy**.