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Class: TE9-B-25

Subject: DWM

Experiment No. 8

Title: Demonstrate Classification, Clustering, Association using WEKA.

Aim: Perform data Pre-processing task and demonstrate Classification, Clustering, Association algorithm on data sets using data mining tool WEKA.

Introduction: Data mining is the process of extracting useful patterns from large datasets. WEKA is a powerful open-source tool that supports various data mining techniques through an easy-to-use interface. In this experiment, we use WEKA to demonstrate three key tasks:

- **Classification:** Predicting predefined class labels (e.g., spam detection).
- **Clustering:** Grouping similar data without prior labels.
- **Association:** Finding relationships between items (e.g., market basket analysis).

Before applying these algorithms, data preprocessing is done to clean and prepare the data for better accuracy.

Procedure:

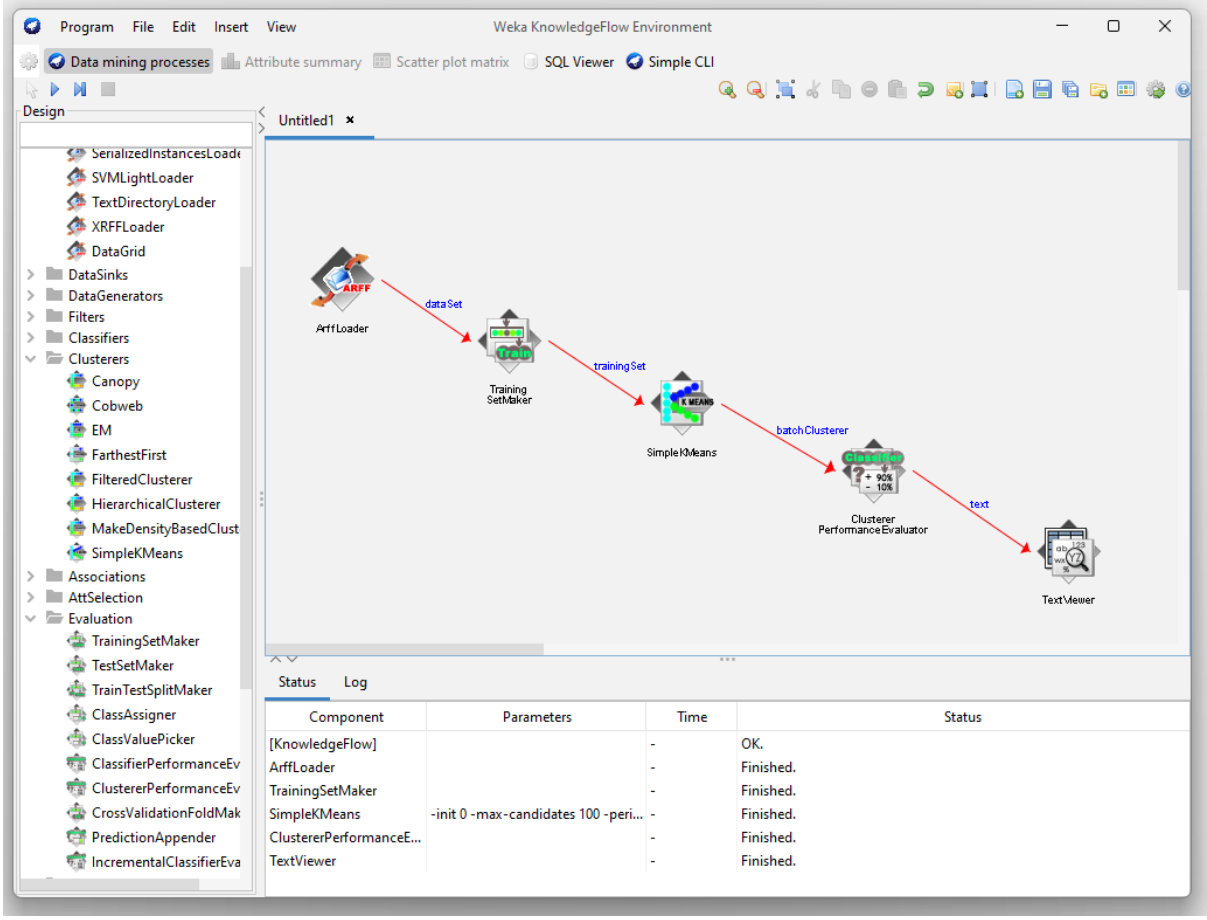
1. **Open Weka Knowledge Flow:**
    - Go to **Program Files** on your **PC** and launch **Weka 3.6**.
    - Choose the **Knowledge Flow** environment from the initial menu (Explorer, Experimenter, Knowledge Flow, etc.).
2. **Load Dataset Using Arff Loader:**
    - Drag the **ArffLoader** from the "Data Sources" section into the canvas.

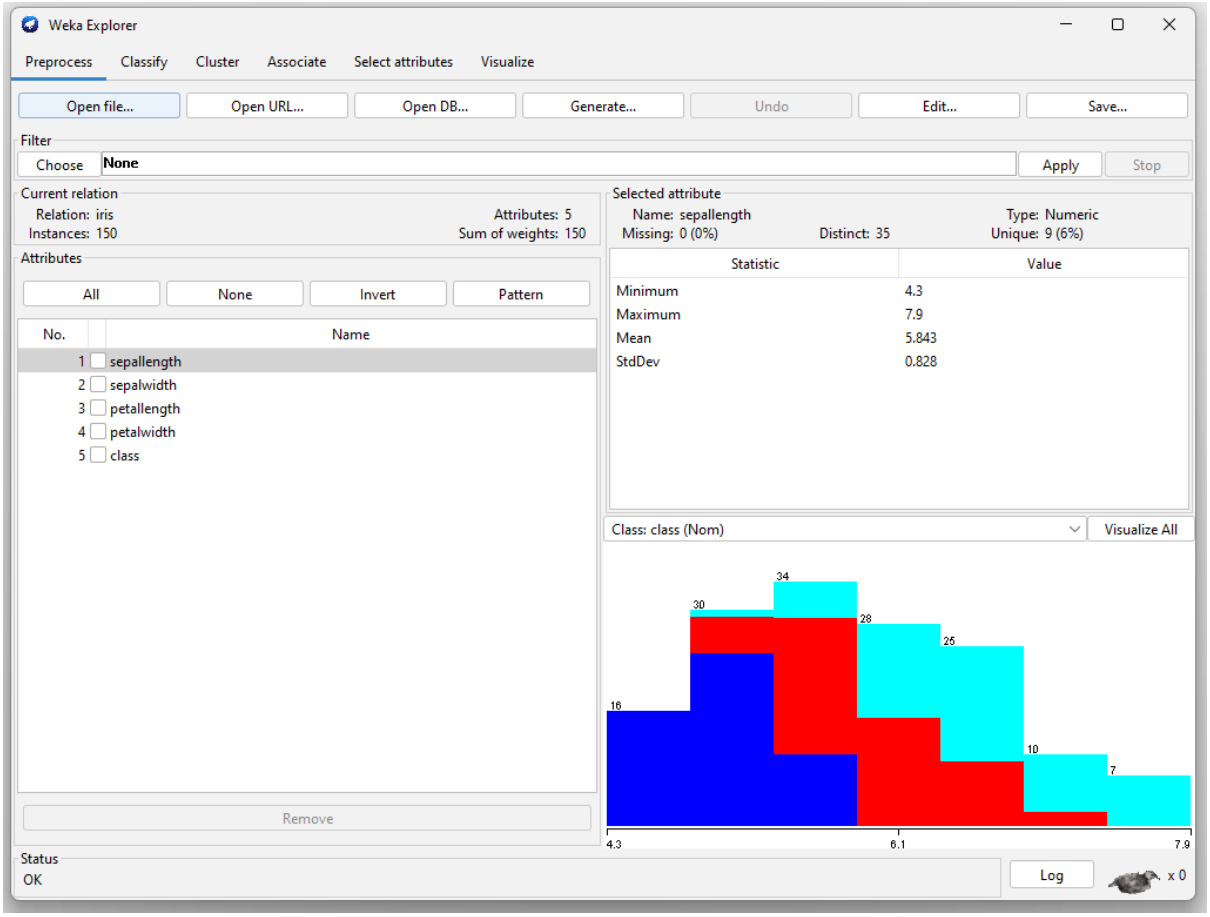
- Right-click → **Configure**, then click **Browse** and select a dataset (e.g., from the **Data** folder like iris.arff).
- This loads your data into the flow.

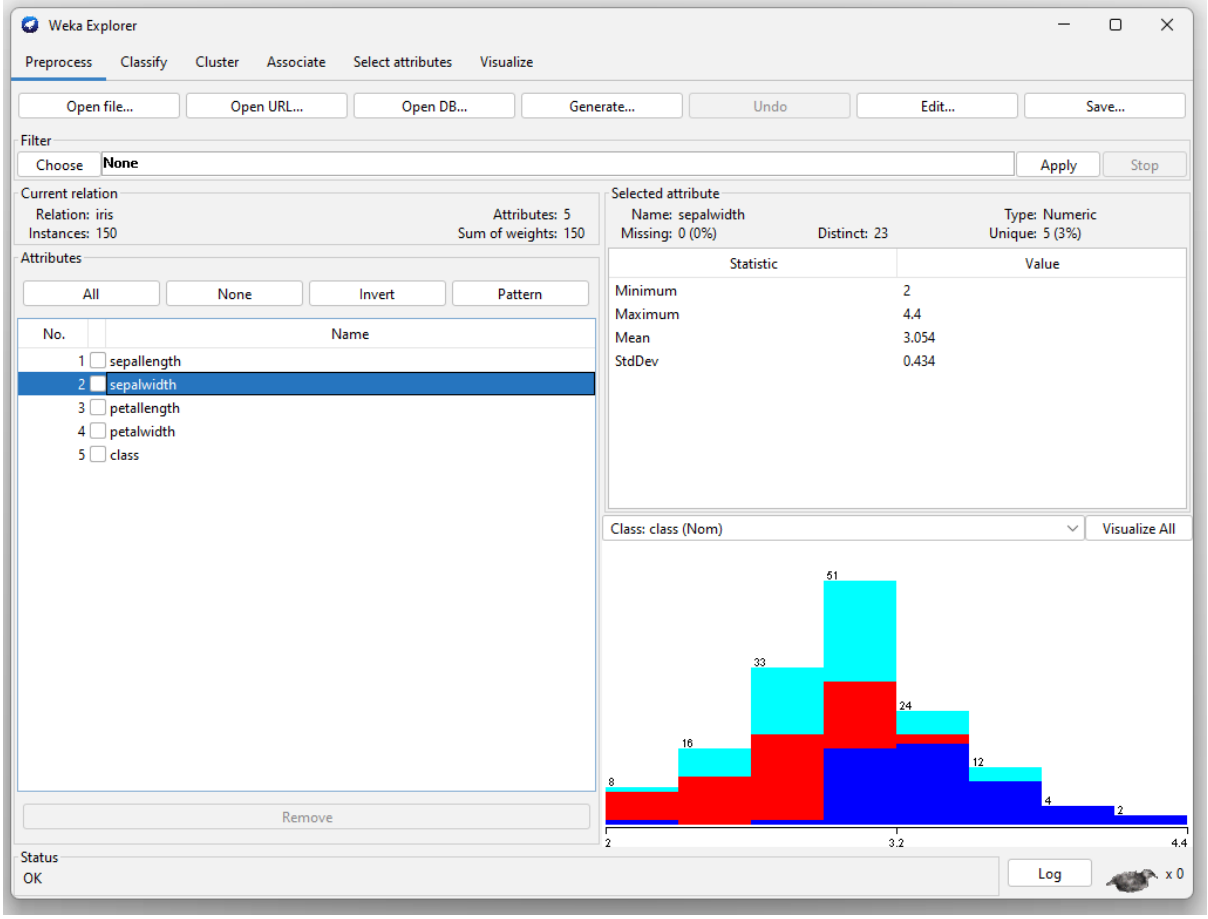
3. **Configure Evaluation Component:**
   - Add the **Evaluation** component to evaluate the clustering model.
   - Set the evaluation type to **Static** for using the dataset as-is.
4. **Prepare the Training Format:**
   - Add a **TrainingSetMaker** component.
   - This prepares your data in a format suitable for training.
   - Connect it to the output of the ArffLoader.
5. **Add and Configure Clusterer:**
   - Drag the **Clusterer** component into the workspace.
   - Choose **SimpleKMeans** as the clustering algorithm.
   - Configure it (e.g., set number of clusters, distance function, etc.).
6. **Analyze Clustering Performance:**
   - Add the **ClustererPerformanceEvaluator** component.
   - Connect it to the output of the Clusterer to measure model effectiveness.
7. **Add Output Viewers:**
   - Drag in a **TextViewer** to view textual output (e.g., cluster assignments, summary).
   - Add a **Visualization** component for graphical display of cluster distribution.
8. **Connect Components and Run Flow:**
   - Right-click on each component to **Connect** them in order: ArffLoader → TrainingSetMaker → Clusterer → ClustererPerformanceEvaluator → TextViewer/Visualization

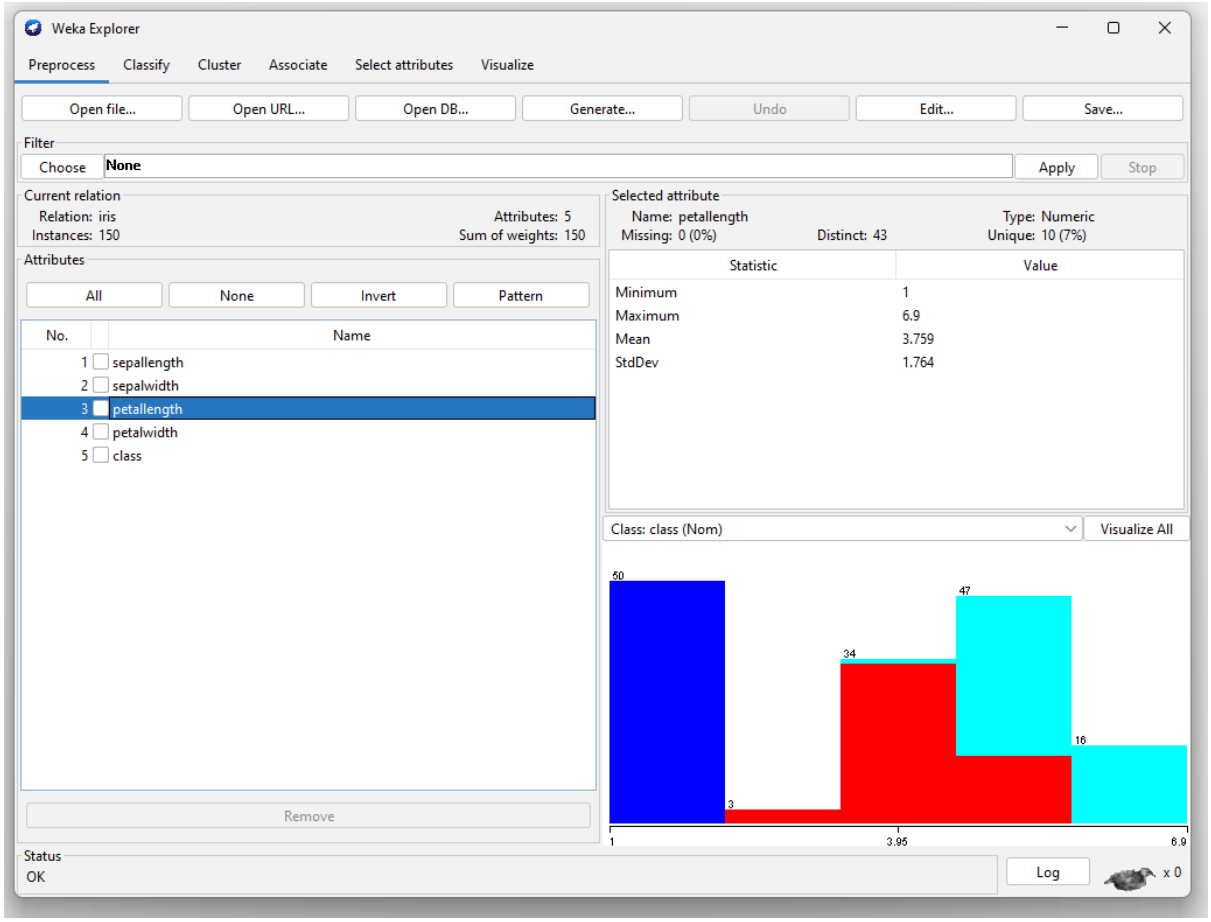
- Finally, right-click the **last component** and choose **Start Execution** to run the workflow.

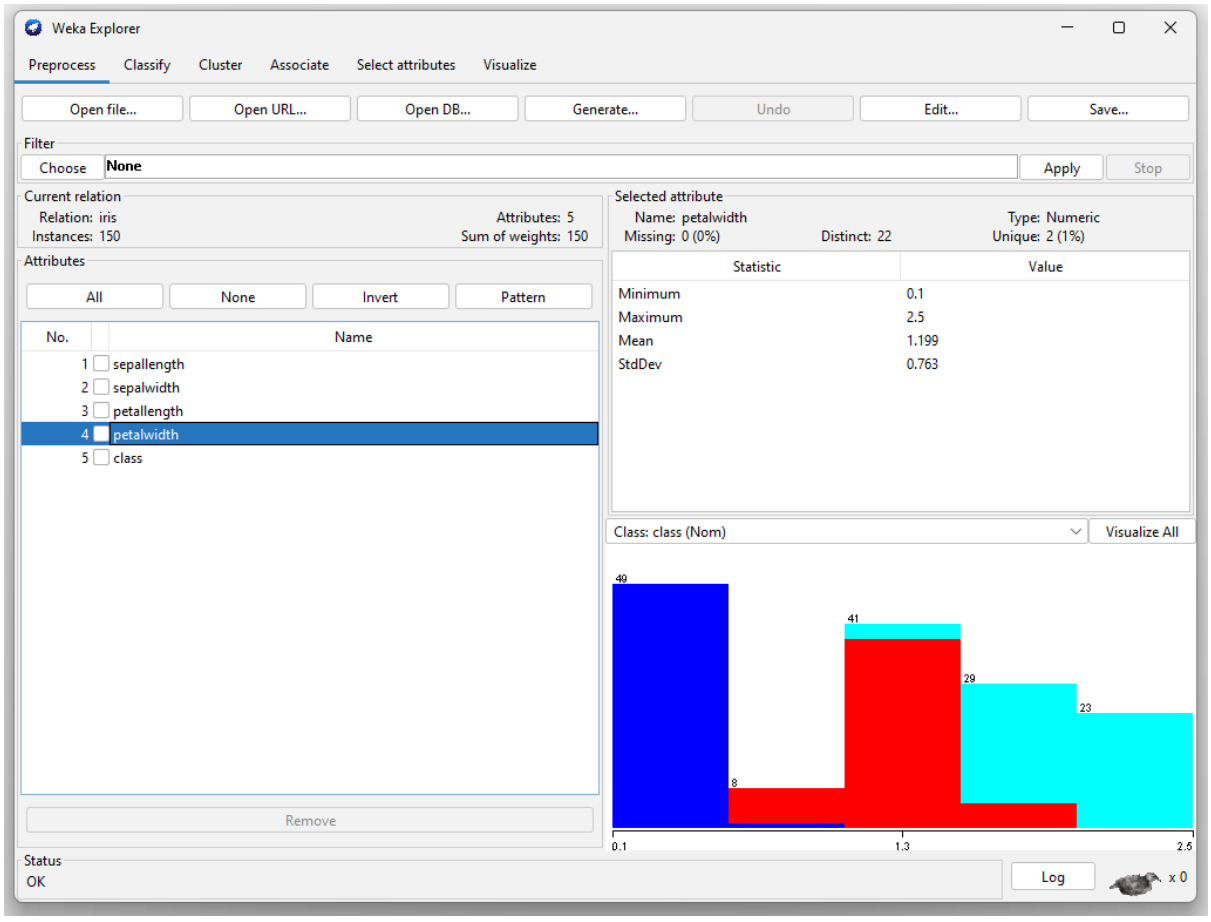
Implementation/Outputs:

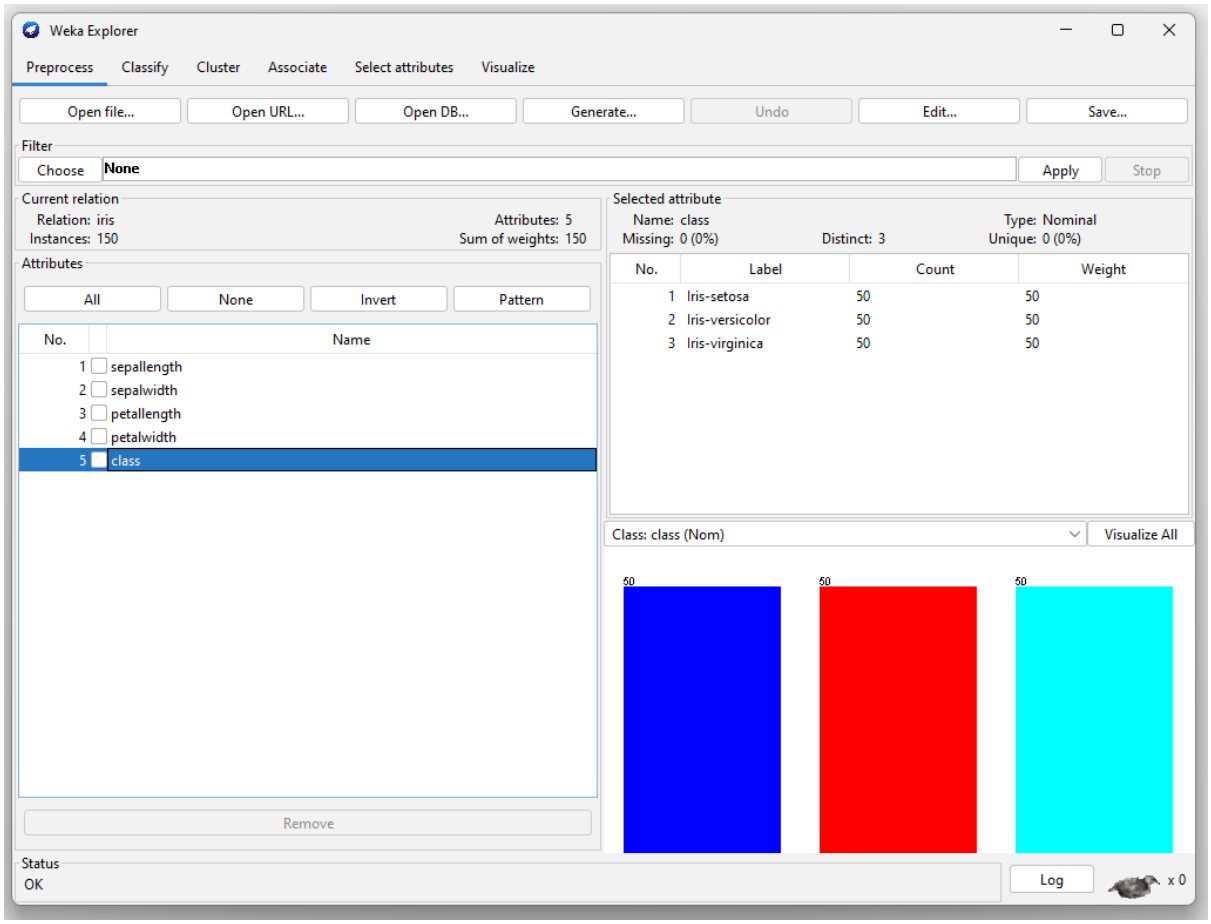


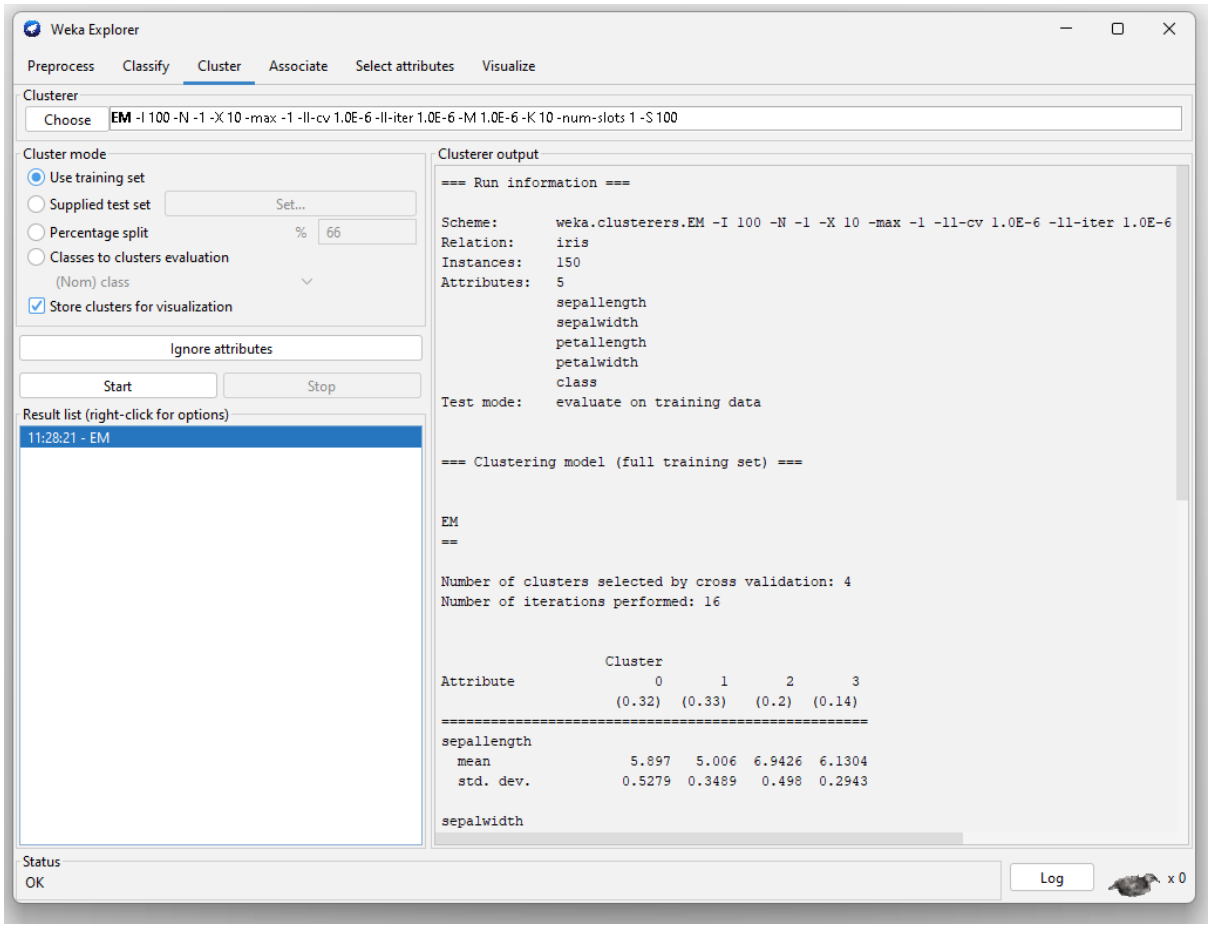

Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Open file...
Open URL...
Open DB...
Generate...
Undo
Edit...
Save...
Filter
Choose
None
Apply
Stop
Current relation
Relation: iris
Instances: 150
Attributes: 5
Sum of weights: 150
Attributes
All
None
Invert
Pattern
No.
Name
1 sepallength
2 sepalwidth
3 petallength
4 petalwidth
5 class
Remove
Selected attribute
Name: sepallength
Missing: 0 (0%)
Distinct: 35
Type: Numeric
Unique: 9 (6%)
Statistic
Value
Minimum 4.3
Maximum 7.9
Mean 5.843
StdDev 0.828
Class: class (Nom)
Visualize All
34
30
28
26
16
10
7
4.3
6.1
7.9
Status
OK
Log
x 0

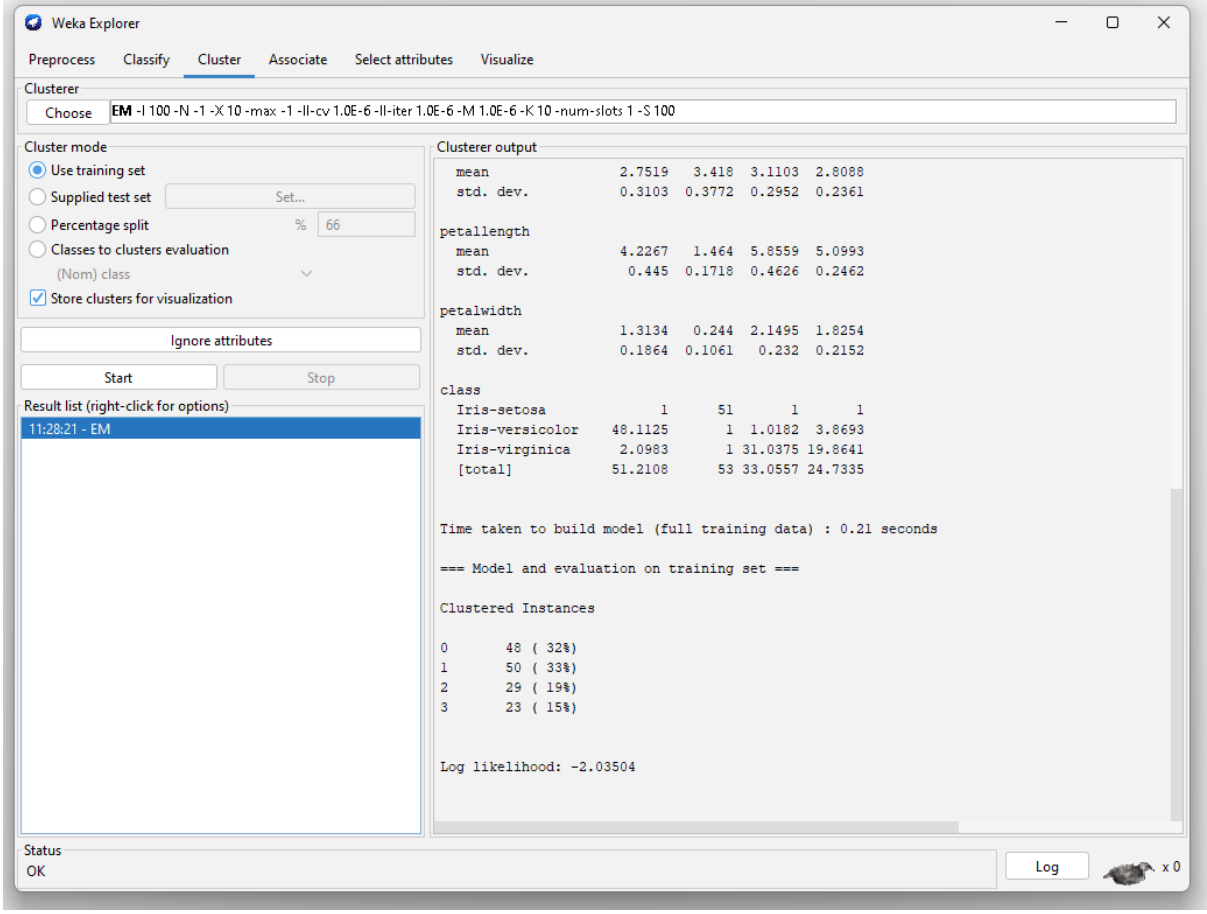

Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Open file...
Open URL...
Open DB...
Generate...
Undo
Edit...
Save...
Filter
Choose
None
Apply
Stop
Current relation
Relation: iris
Instances: 150
Attributes: 5
Sum of weights: 150
Attributes
All
None
Invert
Pattern
No.
Name
1 sepallength
2 sepalwidth
3 petallength
4 petalwidth
5 class
Remove
Selected attribute
Name: sepalwidth
Missing: 0 (0%)
Distinct: 23
Type: Numeric
Unique: 5 (3%)
Statistic
Value
Minimum 2
Maximum 4.4
Mean 3.054
StdDev 0.434
Class: class (Nom)
Visualize All
51
33
24
16
12
8
4
2
2
3.2
4.4
Status
OK
Log
x 0


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Open file...
Open URL...
Open DB...
Generate...
Undo
Edit...
Save...
Filter
Choose
None
Apply
Stop
Current relation
Relation: iris
Instances: 150
Attributes: 5
Sum of weights: 150
Attributes
All
None
Invert
Pattern
No.
Name
1 sepallength
2 sepalwidth
3 petallength
4 petalwidth
5 class
Remove
Selected attribute
Name: petallength
Missing: 0 (0%)
Distinct: 43
Type: Numeric
Unique: 10 (7%)
Statistic
Value
Minimum 1
Maximum 6.9
Mean 3.759
StdDev 1.764
Class: class (Nom)
Visualize All
50
3
34
47
16
1
3.95
6.9
Status
OK
Log
x 0


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Open file...
Open URL...
Open DB...
Generate...
Undo
Edit...
Save...
Filter
Choose
None
Apply
Stop
Current relation
Relation: iris
Instances: 150
Attributes: 5
Sum of weights: 150
Attributes
All
None
Invert
Pattern
No.
Name
1 sepallength
2 sepalwidth
3 petallength
4 petalwidth
5 class
Remove
Selected attribute
Name: petalwidth
Missing: 0 (0%)
Distinct: 22
Type: Numeric
Unique: 2 (1%)
Statistic
Value
Minimum 0.1
Maximum 2.5
Mean 1.199
StdDev 0.763
Class: class (Nom)
Visualize All
49
8
41
29
23
0.1
1.3
2.5
Status
OK
Log
x 0


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Open file...
Open URL...
Open DB...
Generate...
Undo
Edit...
Save...
Filter
Choose
None
Apply
Stop
Current relation
Relation: iris
Instances: 150
Attributes: 5
Sum of weights: 150
Attributes
All
None
Invert
Pattern
No.
Name
1 sepallength
2 sepalwidth
3 petallength
4 petalwidth
5 class
Remove
Selected attribute
Name: class
Missing: 0 (0%)
Distinct: 3
Type: Nominal
Unique: 0 (0%)
No.
Label
Count
Weight
1 Iris-setosa 50 50
2 Iris-versicolor 50 50
3 Iris-virginica 50 50
Class: class (Nom)
Visualize All
50
50
50
Status
OK
Log
x 0


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
EM -I 100 -N -1 -X 10 -max -1 -ll-cv 1.0E-6 -ll-iter 1.0E-6 -M 1.0E-6 -K 10 -num-slots 1 -S 100
Cluster mode
Use training set
Supplied test set
Set...
Percentage split
%
66
Classes to clusters evaluation
(Nom) class
Store clusters for visualization
Ignore attributes
Start
Stop
Result list (right-click for options)
11:28:21 - EM
Clusterer output
=== Run information ===
Scheme: weka.clusterers.EM -I 100 -N -1 -X 10 -max -1 -ll-cv 1.0E-6 -ll-iter 1.0E-6
Relation: iris
Instances: 150
Attributes: 5
sepallength
sepalwidth
petallength
petalwidth
class
Test mode: evaluate on training data
=== Clustering model (full training set) ===
EM
==
Number of clusters selected by cross validation: 4
Number of iterations performed: 16
Cluster
Attribute 0 1 2 3
(0.32) (0.33) (0.2) (0.14)
sepallength
mean 5.897 5.006 6.9426 6.1304
std. dev. 0.5279 0.3489 0.498 0.2943
sepalwidth
Status
OK
Log
x 0



Conclusion: We successfully demonstrated data preprocessing and applied key data mining techniques—Classification, Clustering, and Association—using the WEKA tool. WEKA's intuitive interface and built-in algorithms made it easy to load datasets, configure models, and visualize results. Through this practical approach, we understood how to classify data, group it into clusters, and discover hidden associations, all of which are essential in real-world data analysis and decision-making.

GitHub Link: https://github.com/suyashkatkam/DWM.git