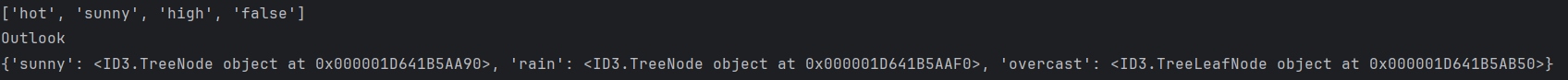
Part1) In part1 both for information gain and gain ratio criterion, the accuracy results in %100, I think this is happening because the dataset is small. I print the tree paths that is followed in the execution that shows:



The first row is the current sample, the second row is the attribute that is selected for that node and third row is the corresponding nodes according to the possible values of that attribute.

Part2)

Dataset1:

Hyperparameter Conf = C: 1 kernel: rbf

A graph of a diagram

Description automatically generated with medium confidence

Hyperparameter Conf = C: 1 kernel: linear

A graph of a spiraling circle

Description automatically generated with medium confidence

Hyperparameter Conf = C: 10 kernel: rbf

A graph showing a diagram of a circle

Description automatically generated with medium confidence

Hyperparameter Conf = C: 10 kernel: linear

A graph of a diagram

Description automatically generated with medium confidence

Dataset2)

|  |  |  |  |
| --- | --- | --- | --- |
| PARAMETER CONFIGURATION | MEAN SCORES | STD SCORES | CONFIDENCE INTERVAL |
| 'svm\_\_C': 1, 'svm\_\_kernel': 'rbf' | 0.91866667 | 0.05856051 | [0.9092950332503998, 0.9280383000829334] |
| 'svm\_\_C': 1, 'svm\_\_kernel': 'sigmoid' | 0.81866667 | 0.08436956 | [0.8051647254509527, 0.8321686078823806] |
| 'svm\_\_C': 10, 'svm\_\_kernel': 'rbf' | 0.948 | 0.05702241 | [0.9388745134112486, 0.9571254865887513] |
| 'svm\_\_C': 10, 'svm\_\_kernel': ‘sigmoid’ | 0.77866667 | 0.08266667 | [0.7654372447314216, 0.7918960886019116] |

A black background with white text

Description automatically generated

Best Hypermarater configuration is 'svm\_\_C': 10, 'svm\_\_kernel': 'rbf' with a accuracy score 97.3.

PART3)

A screen shot of a computer

Description automatically generated

In the upper part there are the final overall accuracy and f1 scores of the best hyperparameter configuration for each model. Below there are the mean test and confidence interval scores for each hyperparameter configuration for each model.

Decision Tree Feature Importance:

1 0.1521110597401312

2 0.09345603517985202

3 0.0490406643072764

4 0.07535286552679687

5 0.1805762902958859

6 0.036962787847838685

7 0.04379640180295388

8 0.024223320107681575

9 0.024979488512885954

10 0.034591708133214584

11 0.04210263833245199

12 0.04019984899314354

13 0.09474942196139756

14 0.02314447474076234

15 0.013457177742892025

16 0.01965095023799597

17 0.025461271532700093

18 0.015032483893028099

19 0.007936507936507933

20 0.0031746031746031733

The 1st and 5th attribute seems to be the most important attributes which are “Status of existing checking account” and “Credit amount” respectively.

SVM support vectors :

There are a total of 294 + 312 support vectors so it is impossible to fit them here but I deep dived and looked at them in the terminal and see a similarity beetween them. Also there are 63 feature names encountered in fitting. Kernel is “rbf”.

A screenshot of a computer program

Description automatically generated

Commonalities:

Positive class Support Vector example:

A screenshot of a computer

Description automatically generated

Negative class Support Vector example:

A screenshot of a computer code

Description automatically generated

In some support vectors for both classes, the 22th value is very high and this result repeats frequently in the support vector results.