**Exercise 4 (16 points) – individual work**

* The answers can be typed or handwritten (handwriting must be clear and readable), in this exercise sheet or your own sheet (put your name & ID at the top of the sheet). All answers must be saved to only 1 PDF file.
* Some questions also require the submission of processes/workflows (file.rmp or file.ipynb).
* In case of re-submission (after first grading) or submission after solution is given, your points will be weighted by 0.5.

**-------------------------------------------------------------------------------------------------------------------------------------------------------**

Two classifiers are used to classify 60 customer records whether they would buy sedan, pickup, or SUV. Their confusion matrices are

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier 1 | | | |  | Classifier 2 | | | |
|  | Predicted  Sedan | Predicted  Pickup | Predicted  SUV |  |  | Predicted  Sedan | Predicted  Pickup | Predicted  SUV |
| Actual  Sedan | 15 | 4 | 5 |  | Actual  Sedan | 18 | 3 | 3 |
| Actual  Pickup | 4 | 14 | 2 |  | Actual  Pickup | 3 | 10 | 7 |
| Actual  SUV | 3 | 3 | 10 |  | Actual  SUV | 6 | 2 | 8 |

**Answer all questions except (2.7) and (3.7) in 4 decimal places.**

1. (Total 2 points) Consider overall performance.

|  |  |
| --- | --- |
| 1.1 Overall accuracy of classifier 1 = | 1.2 Overall accuracy of classifier 2 = |

2. (Total 7 points) Consider performance of predicting class **Sedan**.

|  |  |
| --- | --- |
| 2.1 Precision of classifier 1 = | 2.4 Precision of classifier 2 = |
| 2.2 Recall of classifier 1 = | 2.5 Recall of classifier 2 = |
| 2.3 F-measure of classifier 1 = | 2.6 F-measure of classifier 2 = |

2.7 By considering only precision, recall, and F-measure in (2.1)-(2.6), which classifier is better at predicting Sedan?

3. (Total 7 points) Consider performance of predicting class **Pickup**

|  |  |
| --- | --- |
| 3.1 Sensitivity of classifier 1 = | 3.4 Sensitivity of classifier 2 = |
| 3.2 Specificity of classifier 1 = | 3.5 Specificity of classifier 2 = |
| 3.3 Youden’s J index of classifier 1 = | 3.6 Youden’s J index of classifier 2 = |

3.7 By considering only sensitivity, specificity, and Youden’s J index in (3.1)-(3.6), which classifier is better at predicting Pickup?