**Cover sheet for submission of**

**work for assessment**

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| **UNIT DETAILS** | | | | | | | | | | |
| Unit name | | Data Science Principles | | | | | | Class day/time | Monday | Office use only |
| Unit code | | COS10022 | | | Assignment no. | | 1 | Due date | Sunday, 01 June At 23:59 (VN Time) |  |
| Name of lecturer/teacher | | | | Mr. Hoang Anh Minh | | | | | |  |
| Tutor/marker’s name | | | .Mr. Hoang Anh Minh | | | | | | | Faculty or school date stamp |
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**COS10022 Data Science Principles**

Assignment 1 - *Semester 1, 2025*

**Assessment Title**: Predictive Model Creation and Evaluation

## Assessment Weighting: 20%

**Due Date**: Sunday, 01 June at 23:59 (VN Time)

**Assessable Item:**

* One (1) piece of a written report no more than 10-page long with the signed Assignment Cover Sheet.
* The submitted report must be checked by Turnitin, and the similarity from **not the template** **part** should be less than 12%.

The submitted report should answer all questions listed in the assignment task section in sequence.

You must include a digitally signed Assignment Cover Sheet with your submission.

1. Follow the instructions above to split the source data into training and test sets. Answer the following questions after splitting the data. **[10 marks in total]**
   1. Submit the workflow of Assignment 1 via Assignment 1.1. **[2.5 marks]**

Ans: Check Assignment 1.1 for the KNIME workflow file.

* 1. How many tuples are included in the training set? **[2.5 marks]**

Ans: There are 120 tuples in the training set.

* 1. How many species are included in the test set? **[2.5 marks]**

Ans: According to ***Figure 1***, there are 30 tuples in the test set.

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AI-generated content may be incorrect.***A screenshot of a computer

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***Figure 2***

* 1. Do species “Whitefish” and “Smelt” have the same number of tuples included in the test set?   
     **[2.5 marks]**

Ans: No, because Whitefish” has two tuples while “Smelt” has three tuples in the test set

1. Build a Linear Regression Model using **all** available attributes to predict the value of the “Weight\_of\_Fish\_in\_Gram”. Answer the following questions after completing the model training and test. **[40 marks in total]**
2. What is the value of your test result? **[5 marks]**

Ans: The value of your test result is 0.873 in the test result (***Figure 3***)

***Figure 3***  
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1. Give the screenshot of the scatter plot result of your test output using “Weight\_of\_Fish\_in\_Gram” on the x-axis and the prediction value on the y-axis. Assign different colours to the data points based on the “species.” **[15 marks]**

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***Figure 4***

1. Which species has the heaviest predicted weight in your test result? **[5 marks]**

Ans: The heaviest predicted weight in my test result is “Perch”.

1. How many prediction results are infeasible in your test result? **[5 marks]**

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AI-generated content may be incorrect.Ans: According to ***Figure 5 ,*** there are 5 infeasible results in my test results because weight cannot be negative number.

***Figure 5***

1. Looking at your source data before splitting them, which species can be easily separated from others if looking at the “Height\_in\_cm” and “Diagonal\_Length\_in\_cm” attributes? Post your visualisation result on data observation in the report. **[5 marks]**

Ans: Based on ***Figure 6***, species include “Bream’,”Smelt”, “Roach”, and “Parkki” can be easily seperated from others if looking at the Height\_in\_cm” and “Diagonal\_Length\_in\_cm” attributes.

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***Figure 6***

1. Draw a doughnut chart of the original input data with 0.55 as the doughnut hole ratio before splitting it into training and test sets. Use different colours for each species and show the percentage of data in the pie chart. **[5 marks]**

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***Figure 7***

1. Build a Logistic Regression Model with **all** attributes and use “Smelt” as the reference category. The maximal number of epochs and epsilon should be set to **10,000** and **0.00001**, respectively. Use “LineSearch” as the learning rate strategy. Use **9214** as the seed in the logistic regression node. Answer the following questions after completing the model training and test. **[40 marks in total]**

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***Figure 8***

1. Which species have/has no “True Positive (TP)” case in the prediction result? **[5 marks]**

Ans: Based on the prediction result, the “Whitefish” has no “True Positive” case. (TP).

1. For the species with no TP case, which species will be misplaced? **[5 marks]**

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AI-generated content may be incorrect.Ans: For the “Whitefish” with no TP case, “Pike” and ‘Perch” will ne misplaced.

1. What is the overall accuracy of the prediction result? **[5 marks]**

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AI-generated content may be incorrect.Ans: The overall accurancy of the prediction result is 0.9 (90%)

***Figure 9***

1. List all species names with 100% correctly classified test results. **[15 marks]**

Ans: Species with 100% correctly classified test results including “Pike”, “Smelt”, “Parkki”,”Bream”, and ”Roach” because their TrueNegatives is 0, based on ***Figure 9.***

1. Which species has a 33.33% chance of being misplaced into another species in the test result? **[5 marks]**

Ans: Based on ***Figure 9***, none of the species have a 33.33% chance of being misplaced into another species in the test result

1. In the test result, what percentage of the species “Perch” is misplaced into others? **[5 marks]**

Ans: In the test result as ***Figure 9,*** the percentage of species “Perch” misplaces into others is 6.7% because we have the formula FNR (False Negative Rate) = 1 – Sensitivity/Recall = 1 – 0.933 = 0.067

1. Build a new linear regression model different from the one built when answering question 2. This time, let’s focus on the species “Perch” only. You are limited to using three attributes in the input to predict the “Weight\_of\_Fish\_in\_Gram.” Use a “Scatter Matrix (local)” node to observe your data and decide the suitable attributes to be included. The linear regression model should be the same as the one used in question 2 except for the input attributes. Build, train, and test the model and then answer the questions below. **[10 marks in total]**

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***Figure 10***

1. Give the reasons for each eliminated attribute and why they are not selected as the input. **[5 marks]**

Ans: From my perspective, “Diagonal\_Length\_in\_cm” and “Vertical\_Length\_in\_cm” are not selected as the input because three remainings attributes including “Vertical\_Length\_in\_cm”, “Cross\_Length\_in\_cm”, and “Diagonal\_Width\_in\_cm” demonstrate strong linear correlation while two exclude attributes do not create collinearity which reduces the regression model’s statistical strength with each other.

1. List the of your test result and compare it with the one in question 2. Reveal both values obtained in question 2 and in question 4. If you can improve the model, you get the mark. **[5 marks]**

Ans:

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***Figure 11***

As the ***Figure 11*** mentioned above, a higher value showcases that the accurancy of the prediction results is improved. Additionally, the model accurancy is improved by 0.07, highlighting eliminates unsuitable attributes to reduce the dimensionof the input data train the model. As a result, the model will be more accurancy.