**Cover sheet for submission of**

**work for assessment**

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| **UNIT DETAILS** | | | | | | | | | | |
| Unit name | | Data Science Principles | | | | | | Class day/time | THU12:30 | Office use only |
| Unit code | | COS10022 | | | Assignment no. | | 1 | Due date | 26/03/2023 |  |
| Name of lecturer/teacher | | | | Teja Gowda | | | | | |  |
| Tutor/marker’s name | | |  | | | | | | | Faculty or school date stamp |
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# Swinburne University of Technology Hawthorn Campus Dept. of Computer Science and Software Engineering

**COS10022 Data Science Principles**

Assignment 1 - *Semester 1, 2023*

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

## Assessment Weighting: 20%

**Due Date**: Saturday, 26th March 2023 at 11.59 pm (AEDT)

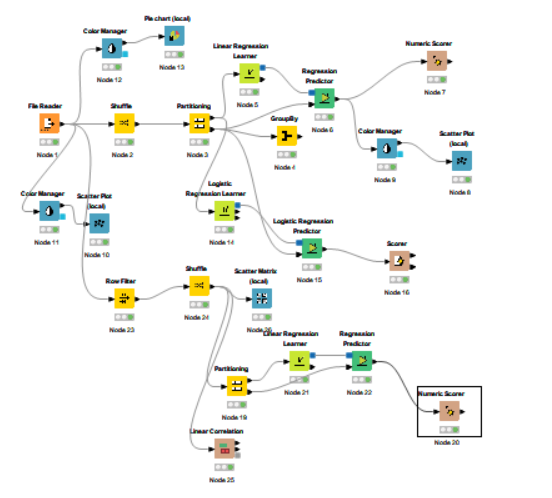
**Assessable Item:**

* One (1) piece of a written report no more than 10-page long with the signed Assignment Cover Sheet.
* A unit peer must review your submission before it can be marked.

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. Past a clear screenshot of the whole workflow of assignment 1 in the report. **[2.5 marks]**



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

Ans: 120

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

Ans: 7

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

Ans: Yes

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: 0.918

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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Description automatically generated

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

Ans: Pike

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

Ans: 3

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

Ans: Bream and Pakki

1. Draw a pie chart of the original input data 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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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 **0.0001**, respectively. Use **3122** as the seed in the logistic regression node. Answer the following questions after completing the model training and test. **[40 marks in total]**
2. Which species has no “True Positive (TP)” case in the prediction result? **[5 marks]**

Ans: Whitefish

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

Ans: Perch

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

Ans: 0.867

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

Ans: Bream, Parkki, Pike, Smelt, Perch

1. Which species has a 50% chance of being misplaced into another species in the test result? **[5 marks]**

Ans: Roach

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

Ans: 0%

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

Ans: Select: Cross\_Length\_in\_cm, Height\_in\_cm, Diagonal\_width\_in\_cm because they have higher correlation to rest of the attributes.

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: Previous model: 0.918

New model: 0.948

The model has been improved