

## Lab Assignment #5

**Due Date:** Mid-night (11.59 pm) Wednesday 20<sup>th</sup> April 2022

**Marks/Weightage:** 16/10%

**End Date:** Mid-night (11.59 pm) Saturday, 23<sup>rd</sup> April 2022, with 20% deductions/penalty. After this date, assignment will not be accepted. NO EXCEPTIONS

**Purpose:** The purpose of this Lab assignment is to:

- Understand the ML.NET pipeline
- Identify the type of problems that can be solved with ML.NET

### **References:**

*Read the lecture notes/ppts and code examples. This material provides the necessary information that you need to complete the exercises.*

**Submission Instructions:** Be sure to read the following general instructions carefully:

This lab should be completed individually by all the students. You will have to demonstrate your solution in a scheduled lab session and submitting the assignment through drop box link on e-Centennial on or before the due date.

**At the start, you must name your Visual Studio 2019 solution name according to the following rule:**

FirstName-LastName\_COMP212\_ SectionNumber \_Labnumber

*For Example: John-Smith\_COMP212\_Sec007\_Lab05 ( say if your section number is 007 )*

**>> And your project name should be as follows: FirstName-LastName\_ExerciseNumber**

*For Example: John-Smith\_Exercise01*

**>> If your lab assignment has more than one exercise, then each subsequent exercise should be added as new project to the same solution created above and named as firstname-last-name\_Exercise2, firstname-last-name\_Exercise3 etc.**

**>> After you complete coding and testing the assignment, exit Visual Studio and go to solution folder, zip it up and you will get the following zip file. For example: John\_Smith\_COMP212- Sec007\_Lab05.zip (if your section is 007..) and upload it to Assignment /Dropbox Folder in e-centennial.**

**>> Apply the naming conventions for variables, methods, classes, and namespaces:**

- variable names start with a lowercase character for the first word and uppercase for every other word
- classes start with an uppercase character of every word
- namespace use only lowercase characters
- methods start with an uppercase character for the first word and uppercase for every other word

**Note: You must implement exception handling and writing comments in the code. 4 marks deduction for not doing it.**

**Question 1****[6 marks]**

- 1.1 In your own words, list two problems that regression algorithms can be used to solve and why, based on their characteristics. [1 mark]
- 1.2 In your own words, List two problems that belong to classification problem and why, based on their characteristics. [1 mark]
- 1.3 In your own words, List two problems that can be solved by using clustering algorithm(s) and why, based on their characteristics. [1 mark]
- 1.4 In your own words, what is anomaly detection? [1 mark]
- 1.5 Use an app example to illustrate what the ML.NET pipeline is [2 marks]

**Question 2****[5 marks]**

Implement C# application to predict the medical cost by using ML.NET based on the dataset insurance.csv

**Question 3****[5 marks]**

Implement C# application to predict student's knowledge level by using ML.NET based on the dataset Student.csv and readme.txt

[Hint] you can do it by mimicking the tutorial at <https://docs.microsoft.com/en-us/dotnet/machine-learning/tutorials/iris-clustering>

**Rubric**

|           | Functionality                                 | Marks |
|-----------|---|-------|
| <b>Q1</b> | 1.1 Regression algorithm                      | 1     |
|           | 1.2 Classification                            | 1     |
|           | 1.3 Clustering                                | 1     |
|           | 1.4 Anomaly detection                         | 1     |
|           | 1.5 ML.NET pipeline                           | 2     |
|           |   |       |
|           |   |       |
| <b>Q2</b> | 2.1 Generate cost prediction regression model | 3     |
|           | 2.2 Consume the generated model               | 2     |
|           |   |       |

|           |  |   |
|-----------|--|---|
| <b>Q3</b> | 3.1 Student class and ClusterPrediction class                              | 1 |
|           | 3.2 Customize options for K-Means  | 1 |
|           | 3.3 Create the pipeline  | 1 |
|           | 3.4 Instantiate an instance of Student class                               | 1 |
|           | 3.5 Create the prediction engine from the model and perform the prediction | 1 |