**Assignment No. 02**

**Submission Due Date: 30 Nov 2023**

**Marks: 05**

**Instructions:**

* The assignment contains ***01 question*** to be answered.
* Before submission, attach provided ***cover sheet*** on top.
* ***Plagiarism is strictly discouraged***. Write in your own words, as similarity will reduce marks.
* Rename file as: **NAME-ENROLLMENTNUMBER.**

***Question 1: [CLO2, PLO3, C3]* [5 Marks]**

**Build** a k-nearest neighbors (k-NN) classifier by using Euclidean distance as the distance measure, to predict the fuel efficiency of a new, unseen car based on its engine size, horsepower, and fuel efficiency. This given dataset contains information about various cars, with three features.

* Engine Size
* Horsepower
* Fuel Efficiency (in miles per gallon)

| Engine Size | Horsepower | Fuel Efficiency (mpg) |

|----------------------|------------|------------------------|

| 2.0 | 180 | 25 |

| 3.5 | 250 | 20 |

| 2.5 | 200 | 30 |

| 4.0 | 300 | 18 |

| 1.8 | 150 | 35 |

| 3.0 | 220 | 22 |

| 2.2 | 170 | 28 |

| 3.8 | 280 | 17 |

The dataset includes a target variable indicating whether each car is classified as "Fuel Efficient" or "Not Fuel Efficient."

**Make use of** the following to implement a KNN classifier.

* Load the dataset and split it into training and testing sets.
* Normalize the features to ensure fair contribution from each feature.
* Implement a k-NN classifier with a variable value for k.
* Evaluate the classifier's performance on the testing set using an appropriate metric (e.g., accuracy, precision, recall).
* Experiment with different values of k and observe how it affects the classifier's performance.
* Discuss the impact of the choice of k on the model's ability to generalize to new data.
* Feel free to use any programming language or tool of your choice to solve this problem.