

**Practical Machine Learning**

**ECEN 478/878**

**Assignment 1**

**Fall 2024**

**Data Exploration and A Study of the k-Nearest Neighbors Model**

ECEN 478: 100 points

ECEN 878: 120 points

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Last Name: Swanson

First Name: Zachary

NUID: 88795124

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Obtained Score:**

Use the following two tables in the report. Add more rows, as required.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Train Accuracy | Test Accuracy | Test Precision | Test Recall | Test F1 |
| Experiment 1 |  | 1.000 | 0.768 | 0.523 | 0.444 | 0.480 |
| Experiment 2 |  | 1.000 | 0.836 | 0.701 | 0.561 | 0.623 |
| Experiment 3 | Opt thresh = 0.43 | 1.000 | 0.836 | 0.661 | 0.660 | 0.660 |
| Experiment 4 | Non-opt thresh | 0.856 | 0.852 | 0.807 | 0.509 | 0.625 |
| Opt thresh = 0.32 | 0.852 | 0.849 | 0.774 | 0.528 | 0.628 |
| Experiment 5 | Subset 1 features: | 0.855 | 0.844 | 0.714 | 0.593 | 0.648 |
| Subset 2 features: | 0.857 | 0.851 | 0.731 | 0.604 | 0.662 |
| Subset 3 features: | 0.788 | 0.785 | 0.549 | 0.610 | 0.578 |
| Subset 4 features: | 0.854 | 0.841 | 0.712 | 0.575 | 0.636 |
| Experiment 6 |  | 0.535 | 0.38 | 0.46 | 0.38 | 0.37 |

Show the optimal hyperparameters in the following table in the report.

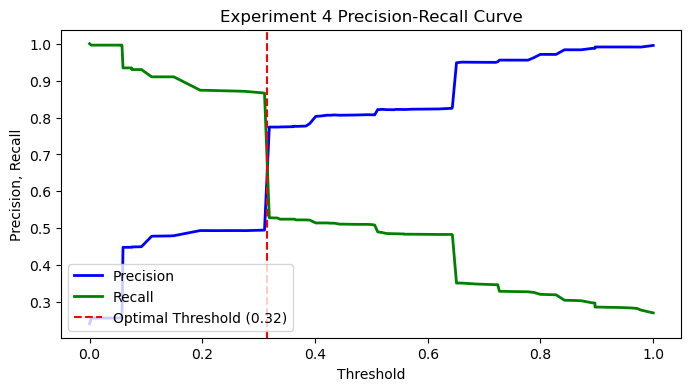
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | n\_neighbors | p | weights |
| Experiment 1 |  | 3 | 1 | distance |
| Experiment 2 |  | 51 | 1 | distance |
| Experiment 3 | Opt thresh = 0.43 | 51 | 1 | distance |
| Experiment 4 | Opt thresh = 0.32 | 87 | 1 | distance |
| Experiment 5 | Subset 1 features: | 17 | 1 | uniform |
| Subset 2 features: | 21 | 2 | uniform |
| Subset 3 features: | 83 | 2 | uniform |
| Subset 4 features: | 17 | 50 | uniform |
| Experiment 6 |  | 5 | 1 | uniform |

**A graph of a curve

Description automatically generated**

**A diagram of a graph

Description automatically generated**

****