Prepared By: Akhil Chawathe

Date: 03-Dec-2022

Programming Assignment 2 Report

**Exp1:**

|  |  |  |
| --- | --- | --- |
| Point | Test Results | Number of points |
| 1 | Passed Test, Points not in the same order. | 5 |
| 2 | Passed Test, Files are Identical. | 2 |
| 3 | Passed Test, Files are identical. | 1 |
| 4 | Passed Test, Points not in the same order. | 17 |
| 5 | Passed Test, Files are identical. | 2 |
| 6 | Passed Test, Files are identical. | 2 |

\*Passed Test means that NearestNeighborsKD yeilds the same points as NearestNeighbors, and it is indicated whether the 2 files are identical and the total number of points in each file. Note that the point number correlates to the point number given in the handout.

In the above table, it is evident that the test results verify that the implementation of NearestNeighborsKD yields the same result as NearestNeighbors.

**Exp 2:**

|  |  |  |
| --- | --- | --- |
| File Tested | Average Time Taken per Cluster with Linear (ms) | Average Time Taken per Cluster with KDTree (ms) |
| Point\_Cloud\_1.csv | 0.149565 | 0.016189 |
| Point\_Cloud\_2.csv | 0.247426 | 0.026728 |
| Point\_Cloud\_3.csv | 0.20302 | 0.017117 |

All files above were tested with an eps of 0.05 and a step of 10. Each file tested is indicated on the left-most column of the chart with the average time taken per cluster for each method indicated in each cell. The compute times are as expected, with KDTree algorithm performing much faster (on average) than the linear algorithm.

**Exp 3:**

|  |  |  |
| --- | --- | --- |
| File Tested | Total Time Taken with Linear (ms) | Total Time Taken with KDTree (ms) |
| Point\_Cloud\_1.csv | 11249 | 1646 |
| Point\_Cloud\_2.csv | 11106 | 5154 |
| Point\_Cloud\_3.csv | 11249 | 2868 |

All files above were tested with an eps of 1.2 and a Minpoints of 10. Each file tested is indicated on the left-most column of the chart with the total time taken per cluster for each method indicated in each cell. The Time taken with the KDTree implementation is much faster than the time taken with the linear implemetation. The KDTree had the same results as the Linear function, with the same number of clusters, but with the points shuffled around. As seen from experiment 1, this is a normal occurrence.

All these tests were conducted on a Macbook Pro 14” with an M1 Pro processor and 16GB ram.