

Programming Assignment #2 Results

Overview

For this assignment, we were tasked with creating a program that would find the approximate nearest neighbor of a query point, given a graph of connected points. The zip file provided contains the classes, fvecs files, and text files needed to run the program, as well as including this file documenting the results of the assignment.

Results

Through running the Find1NN method, I found that there was no clear correlation between the size of S, and the time it took to find the one nearest neighbor(1NN), with the size of S to run time given below. In these examples, I used the small query file and the small base file to find my results.

Size of S	Average Runtime
10	3.11ms
25	2.83ms
100	4.63ms
10000	2.86ms

Due to a lack of time, I was unable to finish the accuracy portion of the code for the main method of the GraphA1NN file, so I wasn't able to measure the accuracy of the program when finding the 1NN. But when running the program, I can see that many of the points match the 1NN of the correct K nearest neighbors file that was given, I just couldn't find a way to automate it without errors. I included a commented out section in the main method to show the code I had until this point in time.

Due to lack of accuracy data, I was unable to make the graphs showing the relation between the size of S and the accuracy of the A1NN. But, I was able to print the data to the terminal showing the A1NN for each point and its average runtime.

Data Printed From The Terminal

```
java GraphA1NN 100 10 siftsmall_base.fvecs siftsmall_query.fvecs
```

Nearest neighbors of points 0 to 99:

K value: 100

S value: 10

0: 2176

1: 2781

2: 2707

3: 9553

4: 4719

5: 1097

6: 3609

7: 5447

8: 9628

9: 5404

10: 1218

11: 4697

12: 9914

13: 463

14: 797

15: 2665

16: 3935

17: 7867

18: 2768

19: 3247

20: 8436

21: 4623

22: 7825

23: 7817

24: 7760

25: 5947

26: 8279

27: 1915

28: 4472

29: 5453

30: 3871

31: 5961

32: 538

33: 6620

34: 6800

35: 8578

36: 2179
37: 3179
38: 8048
39: 5074
40: 4614
41: 2598
42: 5641
43: 3304
44: 9793
45: 8979
46: 8327
47: 4082
48: 7201
49: 3878
50: 5012
51: 5464
52: 5163
53: 2914
54: 737
55: 7204
56: 290
57: 9396
58: 3870
59: 7706
60: 9213
61: 6353
62: 8780
63: 7915
64: 7980
65: 6410
66: 8817
67: 4377
68: 1795
69: 1131
70: 9762
71: 6395
72: 5309
73: 1710
74: 3731
75: 3484
76: 116
77: 9064
78: 8469
79: 4818

80: 5352
81: 7495
82: 7175
83: 3409
84: 341
85: 6051
86: 7918
87: 2241
88: 9397
89: 2726
90: 3479
91: 6849
92: 9029
93: 7602
94: 5095
95: 6815
96: 6913
97: 8346
98: 3417
99: 9537

Average time to find the A1NN of a point: 3.11ms

java GraphA1NN 100 25 siftsmall_base.fvecs siftsmall_query.fvecs

Nearest neighbours of points 0 to 99:

K value: 100

S value: 25

0: 2176
1: 2492
2: 2707
3: 2743
4: 4719
5: 4943
6: 3856
7: 5447
8: 9628
9: 9443
10: 3336
11: 2394
12: 2477

13: 8209
14: 797
15: 3150
16: 3487
17: 6238
18: 1638
19: 1793
20: 5557
21: 7718
22: 7780
23: 9117
24: 9203
25: 268
26: 9899
27: 4027
28: 2553
29: 6197
30: 3501
31: 4195
32: 3903
33: 1016
34: 1169
35: 3247
36: 6782
37: 8537
38: 7623
39: 9414
40: 485
41: 2188
42: 9130
43: 4102
44: 8353
45: 9390
46: 2451
47: 7236
48: 798
49: 2743
50: 5653
51: 6343
52: 6765
53: 1926
54: 2120
55: 6993
56: 8590

57: 7258
58: 4394
59: 6515
60: 1008
61: 8769
62: 7786
63: 6840
64: 592
65: 821
66: 1690
67: 6175
68: 3296
69: 7640
70: 9470
71: 2414
72: 4535
73: 4244
74: 7915
75: 2741
76: 9746
77: 266
78: 1303
79: 8303
80: 4758
81: 7735
82: 4419
83: 9462
84: 9348
85: 7745
86: 5926
87: 7761
88: 4189
89: 1668
90: 7886
91: 1605
92: 581
93: 6204
94: 3447
95: 5389
96: 4371
97: 1106
98: 5140
99: 6810

Average time to find the A1NN of a point: 2.83ms

```
java GraphA1NN 100 100 siftsmall_base.fvecs siftsmall_query.fvecs
```

Nearest neighbours of points 0 to 99:

K value: 100

S value: 100

0: 2176
1: 2781
2: 2707
3: 3640
4: 4719
5: 1097
6: 4248
7: 5447
8: 9628
9: 4596
10: 1863
11: 4697
12: 2114
13: 1805
14: 4151
15: 5813
16: 9132
17: 2113
18: 1714
19: 579
20: 7027
21: 8528
22: 9352
23: 7092
24: 1343
25: 245
26: 6701
27: 6461
28: 6265
29: 1022
30: 1649
31: 492
32: 9617

33: 638
34: 7160
35: 8592
36: 8534
37: 2569
38: 8162
39: 9321
40: 3741
41: 9714
42: 3484
43: 8507
44: 4201
45: 8440
46: 7530
47: 774
48: 7046
49: 7607
50: 4192
51: 1279
52: 2160
53: 8915
54: 6747
55: 8136
56: 6859
57: 5851
58: 237
59: 8704
60: 1608
61: 2565
62: 8861
63: 1671
64: 2242
65: 2264
66: 2616
67: 7430
68: 4429
69: 2113
70: 9811
71: 8180
72: 2342
73: 5782
74: 1685
75: 3424
76: 7350

77: 8395
78: 9312
79: 2486
80: 6673
81: 4705
82: 8630
83: 4038
84: 1761
85: 8204
86: 684
87: 6295
88: 2000
89: 1530
90: 3765
91: 7392
92: 2242
93: 8083
94: 4601
95: 6723
96: 3770
97: 4923
98: 9712
99: 2310

Average time to find the A1NN of a point: 4.63ms

```
java GraphA1NN 100 10000 siftsmall_base.fvecs siftsmall_query.fvecs
```

Nearest neighbours of points 0 to 99:

K value: 100

S value: 10000

0: 2176
1: 3408
2: 2707
3: 4163
4: 4719
5: 3112
6: 8690
7: 7237
8: 9628
9: 4596

10: 2960
11: 7949
12: 3650
13: 2100
14: 69
15: 7431
16: 969
17: 6958
18: 891
19: 9133
20: 2505
21: 3772
22: 2395
23: 6023
24: 3898
25: 4793
26: 8296
27: 5999
28: 5368
29: 4166
30: 2521
31: 1121
32: 8436
33: 2967
34: 6553
35: 5841
36: 6450
37: 8526
38: 9450
39: 2593
40: 9137
41: 6721
42: 5698
43: 8406
44: 3927
45: 485
46: 2290
47: 8975
48: 7441
49: 7239
50: 7899
51: 3838
52: 8016
53: 5109

54: 2511
55: 8300
56: 4354
57: 9396
58: 7912
59: 8379
60: 9369
61: 4028
62: 3998
63: 9183
64: 2799
65: 8219
66: 2058
67: 5605
68: 1216
69: 1220
70: 247
71: 4040
72: 5020
73: 9607
74: 8680
75: 6873
76: 3266
77: 6731
78: 6697
79: 2016
80: 2247
81: 614
82: 4311
83: 5693
84: 3617
85: 1450
86: 4675
87: 7562
88: 7419
89: 3443
90: 2055
91: 8847
92: 8928
93: 2796
94: 1895
95: 1866
96: 3609
97: 7503

98: 5286

99: 3178

Average time to find the A1NN of a point: 2.86ms
