Danny Tan

AI Fall 2018

HW # 10

Problem 1:

First iteration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Point | x | y | cluster | distance to 1st | distance to 2nd | distance to 3rd | Closest Cluster | Cost |
| A | 1 | 6 | 1 | 545.5155564 | 402.9858868 | 871.7360712 | 2 | 297587.2222 |
| B | 1002 | 20 | 1 | 542.1883642 | 803.6430333 | 277.642656 | 3 | 293968.2222 |
| C | 498 | 651 | 1 | 425.3397335 | 411.5915755 | 530.4191215 | 2 | 180913.8889 |
| D | 6 | 10 | 2 | 539.3306551 | 396.728024 | 865.8345364 | 2 | 157393.125 |
| E | 510 | 622 | 2 | 396.451202 | 396.1150401 | 500.5890974 | 2 | 156907.125 |
| F | 503 | 632 | 2 | 406.3420836 | 399.4641724 | 512.7271312 | 2 | 159571.625 |
| G | 4 | 9 | 2 | 541.5636825 | 398.7651251 | 868.0309774 | 2 | 159013.625 |
| H | 1010 | 25 | 3 | 547.7474073 | 809.2518922 | 278.4369069 | 3 | 77527.11111 |
| I | 1006 | 30 | 3 | 542.203119 | 803.718312 | 272.0345158 | 3 | 74002.77778 |
| J | 502 | 680 | 3 | 454.3363903 | 437.6095577 | 550.4714141 | 2 | 303018.7778 |
|  |  |  |  |  |  |  | Total Cost | 1859903.5 |

|  |  |  |
| --- | --- | --- |
|  | x | y |
| Cluster 1 Centroid | 500.3333333 | 225.6666667 |
| Cluster 2 Centroid | 255.75 | 318.25 |
| Cluster 3 Centroid | 839.3333333 | 245 |

Second iteration

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Point | x | y | cluster | distance to 2nd | distance to 3rd | Closest Cluster | Cost |
| A | 1 | 6 | 2 | 466.4873732 | 1005.179586 | 2 | 217610.4694 |
| B | 1002 | 20 | 3 | 795.4077378 | 6.403124237 | 3 | 41 |
| C | 498 | 651 | 2 | 347.8286289 | 806.1885636 | 2 | 120984.7551 |
| D | 6 | 10 | 2 | 460.2555634 | 1000.112494 | 2 | 211835.1837 |
| E | 510 | 622 | 2 | 332.9414976 | 776.1604216 | 2 | 110850.0408 |
| F | 503 | 632 | 2 | 335.9909195 | 788.3260747 | 2 | 112889.898 |
| G | 4 | 9 | 2 | 462.2753177 | 1002.127736 | 2 | 213698.4694 |
| H | 1010 | 25 | 3 | 800.3996578 | 4 | 3 | 16 |
| I | 1006 | 30 | 3 | 794.6289598 | 5 | 3 | 25 |
| J | 502 | 680 | 2 | 373.6909123 | 826.4629453 | 2 | 139644.898 |
|  |  |  |  |  |  | Total Cost | 1127595.714 |

|  |  |  |
| --- | --- | --- |
|  | x | y |
| Cluster 2 Centroid | 289.1428571 | 372.8571429 |
| Cluster 3 Centroid | 1006 | 25 |

Problem 2:

A)

|  |  |  |  |
| --- | --- | --- | --- |
| Points | x | y | total |
| A | 2 | 4 | 6 |
| B | 11 | 6 | 17 |
| C | 10 | 11 | 21 |
| D | 4 | 5 | 9 |
| E | 10 | 11 | 21 |
| F | 10 | 11 | 21 |
| G | 4 | 5 | 9 |
| H | 11 | 6 | 17 |
| I | 11 | 6 | 17 |
| J | 10 | 11 | 21 |
|  |  | Total bits | 159 |

B)

|  |  |  |  |
| --- | --- | --- | --- |
| Cluster | x | y | total |
| P1 | 4 | 5 | 9 |
| P2 | 11 | 6 | 17 |
| P3 | 10 | 11 | 21 |
|  |  | total bits | 47 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Points | delta x | delta y | x bit | y bit | cluster bit | total |
| A | -3 | -2 | 3 | 3 | 2 | 8 |
| B | -4 | -5 | 4 | 4 | 2 | 10 |
| C | -5 | 5 | 4 | 4 | 2 | 10 |
| D | 2 | 2 | 3 | 3 | 2 | 8 |
| E | 7 | -24 | 4 | 6 | 2 | 12 |
| F | 0 | -14 | 1 | 5 | 2 | 8 |
| G | 0 | 1 | 1 | 2 | 2 | 5 |
| H | 4 | 0 | 4 | 1 | 2 | 7 |
| I | 0 | 5 | 1 | 4 | 2 | 7 |
| J | -1 | 34 | 2 | 7 | 2 | 11 |
|  |  |  |  |  | Total bit | 86 |

To represent whole data, 47+86 = 133