**OUTPUT**

(base) E:\google drive\STUDY\CSE475\final\lab-4>python kmeans.py -d dummy1 -normalize True -k 3 -en 4

Program name: kmeans.

Program name(with type): kmeans.py

Element number of program: 9

Argument list: ['kmeans.py', '-d', 'dummy1', '-normalize', 'True', '-k', '3', '-en', '4']

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Parameters Description

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Dataset: dummy1

K: 3

Number of Observations: 10

Number of Features: 2

Epoch Number: 4

Normalization: true

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After encoding and Normalization - X

X Y

0 0.470588 0.927273

1 0.235294 0.963636

2 0.411765 0.936364

3 0.000000 0.872727

4 0.411765 0.972727

5 0.764706 0.990909

6 0.529412 0.936364

7 0.352941 0.900000

8 0.411765 0.000000

9 1.000000 1.000000

X Y

7 0.352941 0.900000

0 0.470588 0.927273

3 0.000000 0.872727

Initial Centroids: [[0.35294117647058826, 0.9], [0.47058823529411764, 0.9272727272727272], [0.0, 0.8727272727272727]]

Epoch no.: 1

Distance Matrix ...

[[0.1207668501813289, 0.13375506430295075, 0.06915577822599873, 0.35399332719888305, 0.09353856857363092, 0.42168072735222073, 0.18017819668788312, 0.0, 0.9019202889460114, 0.654740499058418], [0.0, 0.23808745420306116, 0.0595218635507653, 0.47373884557718304, 0.07433924478319708, 0.30092320795890465, 0.0595218635507653, 0.1207668501813289, 0.9291366521434069, 0.5343838253608951], [0.47373884557718304, 0.2522454848143477, 0.416653044855357, 0.0, 0.42373361090475303, 0.7737842261599487, 0.5332226583575158, 0.35399332719888305, 0.9649886349446629, 1.0080666382275718]]

Cluster Assignment ...

[1, 0, 1, 2, 1, 1, 1, 0, 0, 1]

Sum of Squared Distance 1.220083502530813

[[0.23529411764705882, 0.9636363636363636], [0.35294117647058826, 0.9], [0.4117647058823529, 0.0]]

[[0.47058823529411764, 0.9272727272727272], [0.4117647058823529, 0.9363636363636364], [0.4117647058823529, 0.9727272727272728], [0.7647058823529411, 0.990909090909091], [0.5294117647058824, 0.9363636363636364], [1.0, 1.0]]

[[0.0, 0.8727272727272727]]

Updated Centroids ...

[[0.3333333333333333, 0.6212121212121212], [0.5980392156862745, 0.9606060606060606], [0.0, 0.8727272727272727]]

Epoch no.: 2

Distance Matrix ...

[[0.3354280887082207, 0.3561826071163445, 0.32476446496225353, 0.41757751681909394, 0.36015882877508787, 0.5681180559098576, 0.37117008062587037, 0.2794765622937641, 0.626143737284648, 0.7667624805381815], [0.13173785907639862, 0.3627577551037823, 0.18784538358937902, 0.6044614006350607, 0.18666846757280323, 0.1693990892045295, 0.07278339207000317, 0.2524799861564468, 0.9784999727520619, 0.4038865615331596], [0.47373884557718304, 0.2522454848143477, 0.416653044855357, 0.0, 0.42373361090475303, 0.7737842261599487, 0.5332226583575158, 0.35399332719888305, 0.9649886349446629, 1.0080666382275718]]

Cluster Assignment ...

[1, 2, 1, 2, 1, 1, 1, 1, 0, 1]

Sum of Squared Distance 0.8040336043670426

[[0.4117647058823529, 0.0]]

[[0.47058823529411764, 0.9272727272727272], [0.4117647058823529, 0.9363636363636364], [0.4117647058823529, 0.9727272727272728], [0.7647058823529411, 0.990909090909091], [0.5294117647058824, 0.9363636363636364], [0.35294117647058826, 0.9], [1.0, 1.0]]

[[0.23529411764705882, 0.9636363636363636], [0.0, 0.8727272727272727]]

Updated Centroids ...

[[0.4117647058823529, 0.0], [0.5630252100840336, 0.951948051948052], [0.11764705882352941, 0.9181818181818182]]

Epoch no.: 3

Distance Matrix ...

[[0.9291366521434069, 0.9796616302756911, 0.9363636363636364, 0.9649886349446629, 0.9727272727272728, 1.0518879695550871, 0.9437254314438915, 0.9019202889460114, 0.0, 1.160181348430354], [0.09567374747622386, 0.32793945413758324, 0.15206121839724432, 0.5685712963652999, 0.15268109296025578, 0.20540948401610398, 0.03705047529111783, 0.21641141670552583, 0.9638904677083583, 0.43960886789700915], [0.3530582369475921, 0.12612274240717383, 0.29467909465012165, 0.1261227424071739, 0.2991327413089194, 0.6511331486766846, 0.4121659271734835, 0.23599555146592205, 0.9641384970796925, 0.886138210257746]]

Cluster Assignment ...

[1, 2, 1, 2, 1, 1, 1, 1, 0, 1]

Sum of Squared Distance 0.37105714040599225

[[0.4117647058823529, 0.0]]

[[0.47058823529411764, 0.9272727272727272], [0.4117647058823529, 0.9363636363636364], [0.4117647058823529, 0.9727272727272728], [0.7647058823529411, 0.990909090909091], [0.5294117647058824, 0.9363636363636364], [0.35294117647058826, 0.9], [1.0, 1.0]]

[[0.23529411764705882, 0.9636363636363636], [0.0, 0.8727272727272727]]

Updated Centroids ...

[[0.4117647058823529, 0.0], [0.5630252100840336, 0.951948051948052], [0.11764705882352941, 0.9181818181818182]]

Final Cluster Formation ...

Cluster # 1

Point # 8 : [0.4117647058823529, 0.0]

Cluster # 2

Point # 0 : [0.47058823529411764, 0.9272727272727272]

Point # 2 : [0.4117647058823529, 0.9363636363636364]

Point # 4 : [0.4117647058823529, 0.9727272727272728]

Point # 5 : [0.7647058823529411, 0.990909090909091]

Point # 6 : [0.5294117647058824, 0.9363636363636364]

Point # 7 : [0.35294117647058826, 0.9]

Point # 9 : [1.0, 1.0]

Cluster # 3

Point # 1 : [0.23529411764705882, 0.9636363636363636]

Point # 3 : [0.0, 0.8727272727272727]