BLG 454E Learning From Data (Spring 2018)

150130032-Baran Kaya Homework IV

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1 Question 1.a

Code for backpropagation algorithm implemented as Figure 2. Result of the cross entropy error for 1 iteration and η=0.1 was 189602.20832731648. After that, i tried with 2 iteration training but program stoped and showed the 'Math domain error'. Then i tried with 1 iteration with η=1 and it failed again. Therefore i could not write the error values of the cross entropy.

Note: I used $\sum_i = r_i logy_i$ for cross entropy calculation.

2 Question 1.b

Accuracy of the test data:

3 Question 2.a

Three different SSE values for:
K = 1 → 52879.47362635362, 52879.47361995184, 52879.473630234774
K = 5 → 15316.385088231567, 15316.351237683606, 15314.634023466218
K = 10 → 6693.355100775761, 6701.245929534126, 6692.949753986865
K = 20 → 3668.1189659756405, 3609.4251063466454, 3669.4858107073774

Average SSE values for:
K = 1 → 52879
K = 5 → 15315
K = 10 → 6695
K = 20 → 3649

4 Question 2.b

When K increased SSE drops because our data do not have clusteres itself. When the number of clusters increased, all points are going to be closer to the center of the new cluster. Because there will be more cluster centers than before.

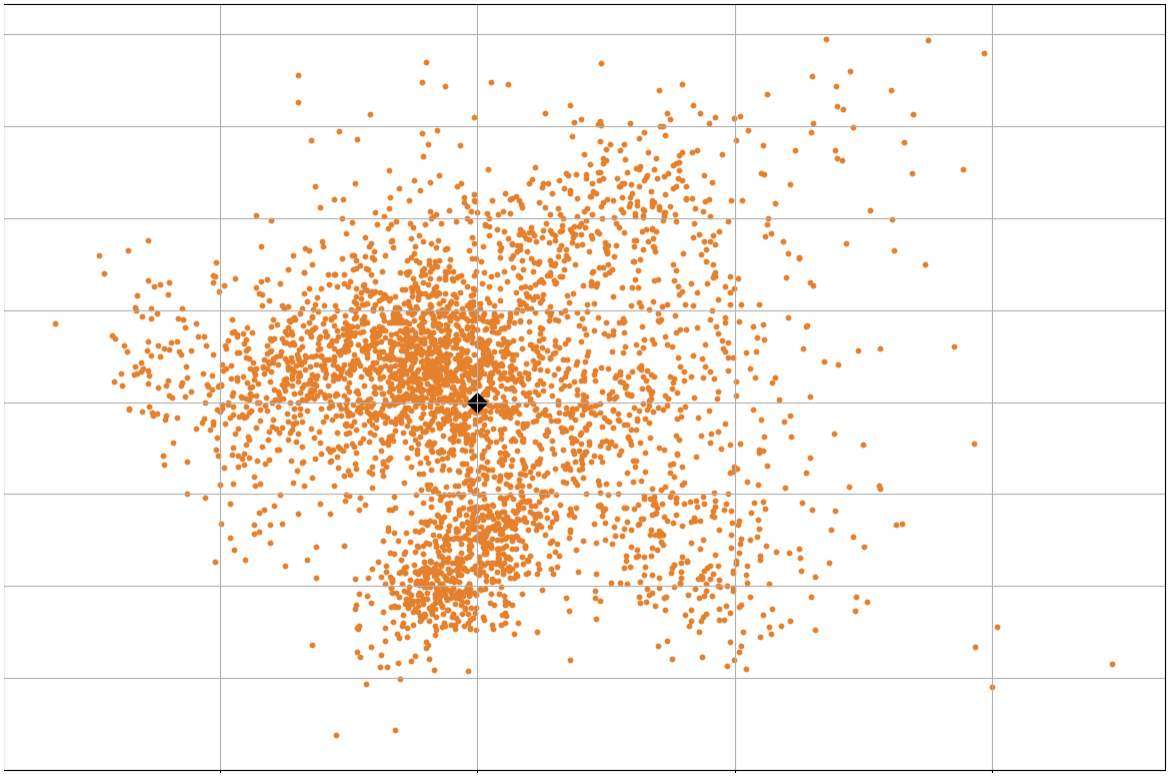

Figure 1: 1-means Graph

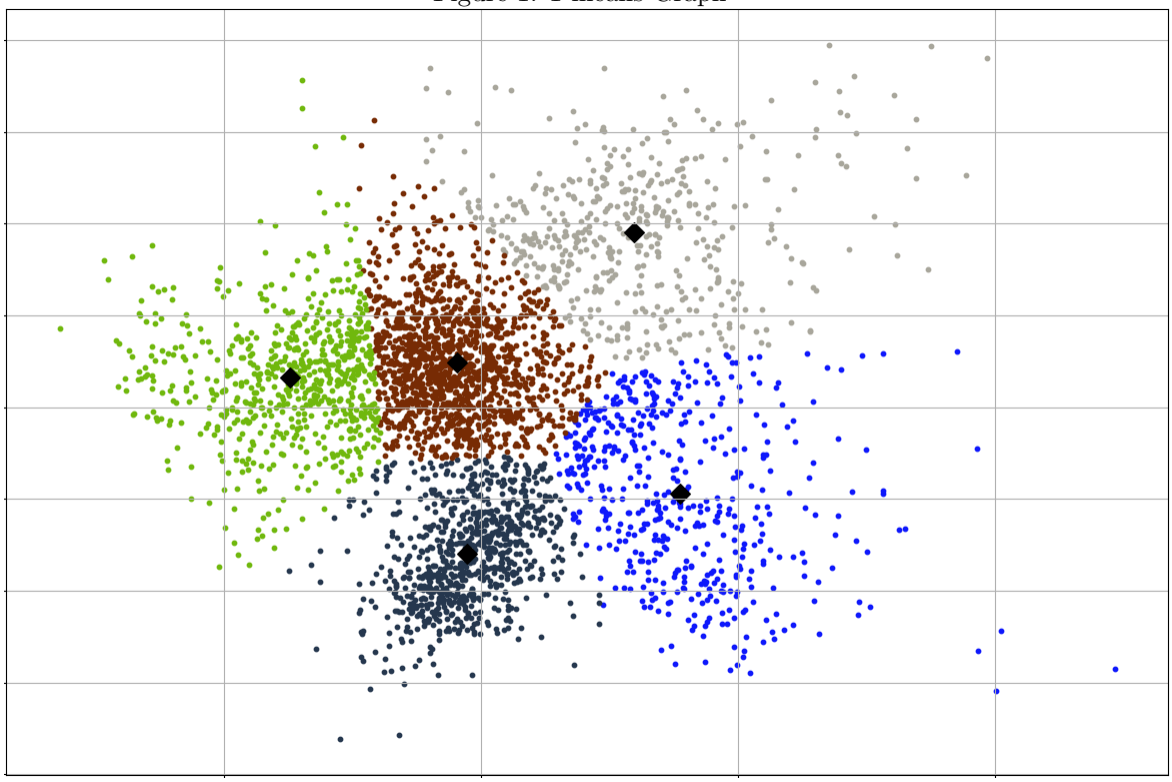

Figure 2: 5-means Graph

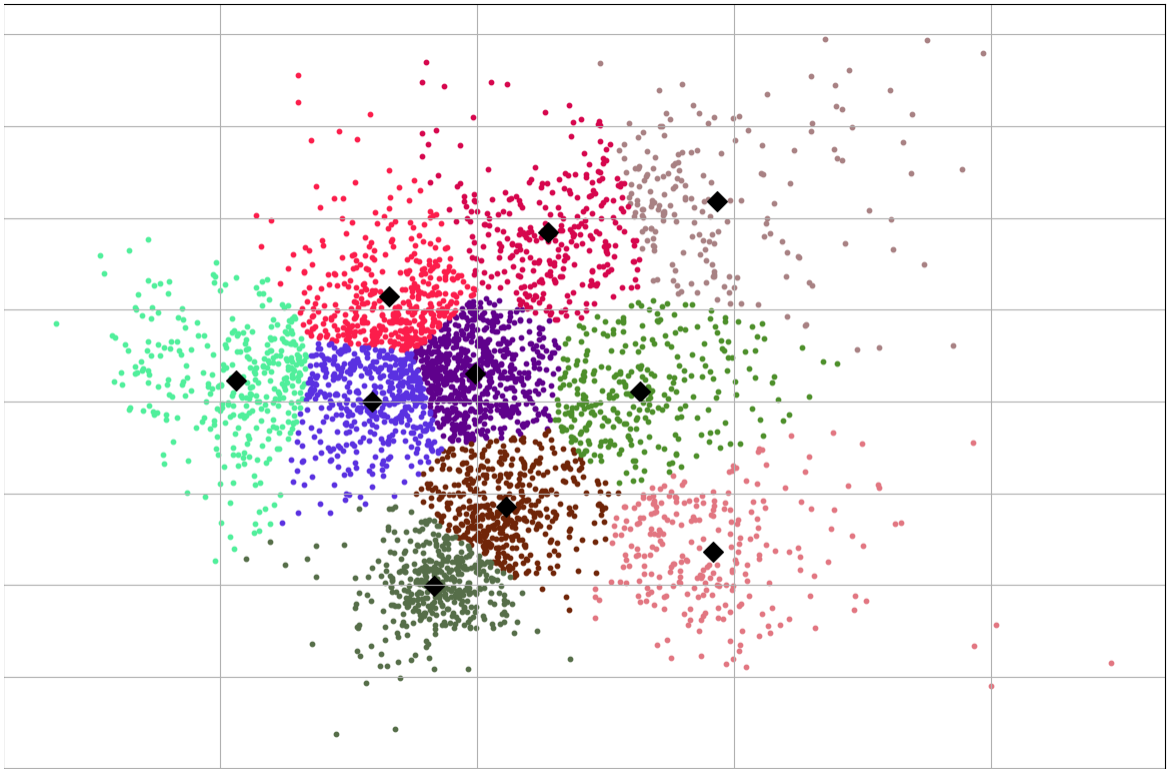

Figure 3: 10-means Graph

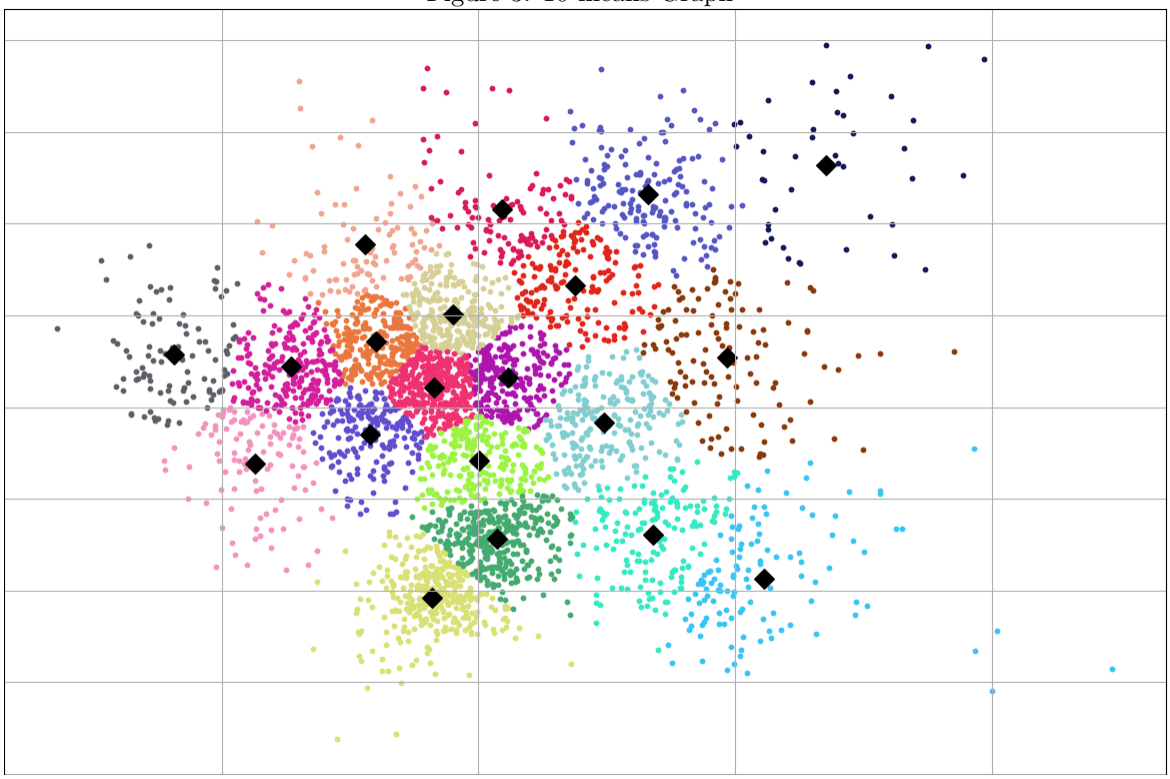

Figure 4: 20-means Graph