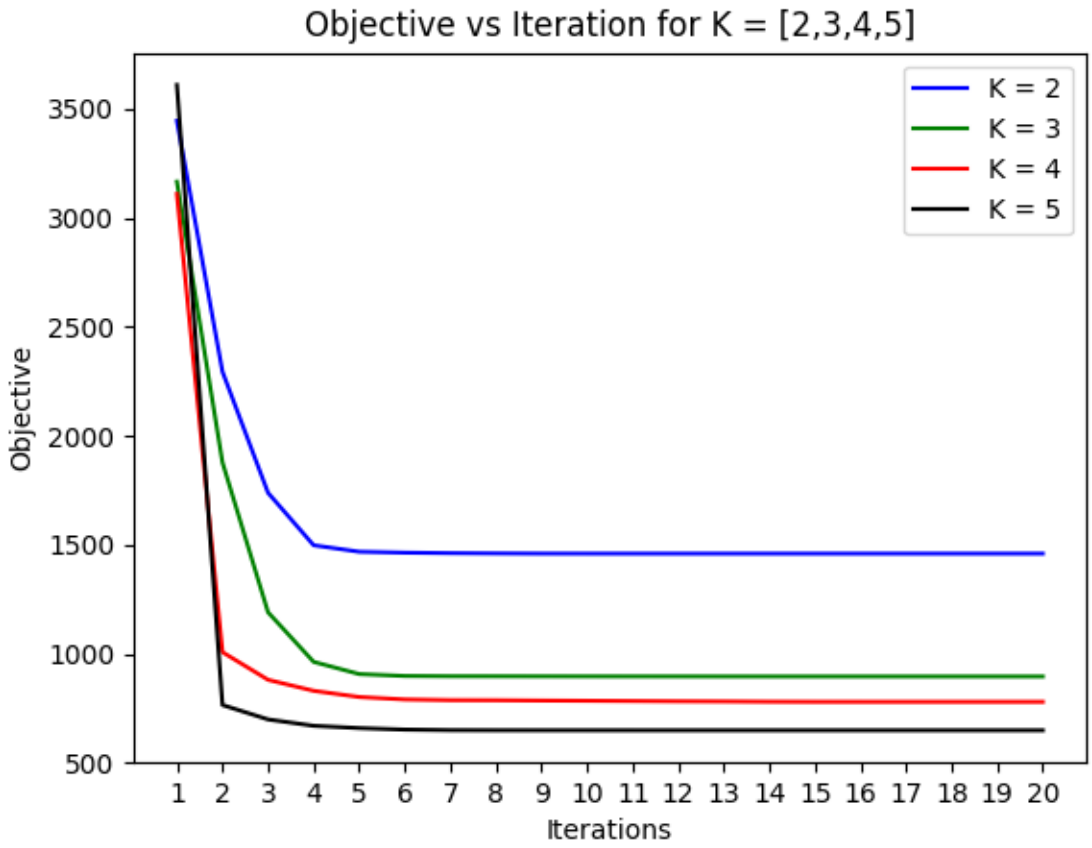
Hw4 Report

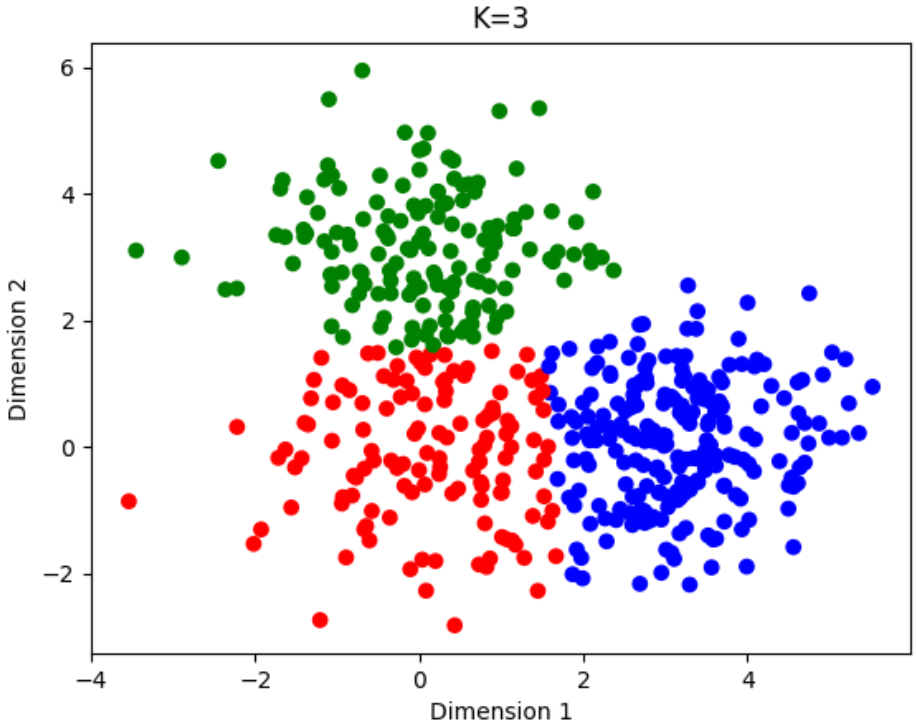
Wenbo Song
Ws2505

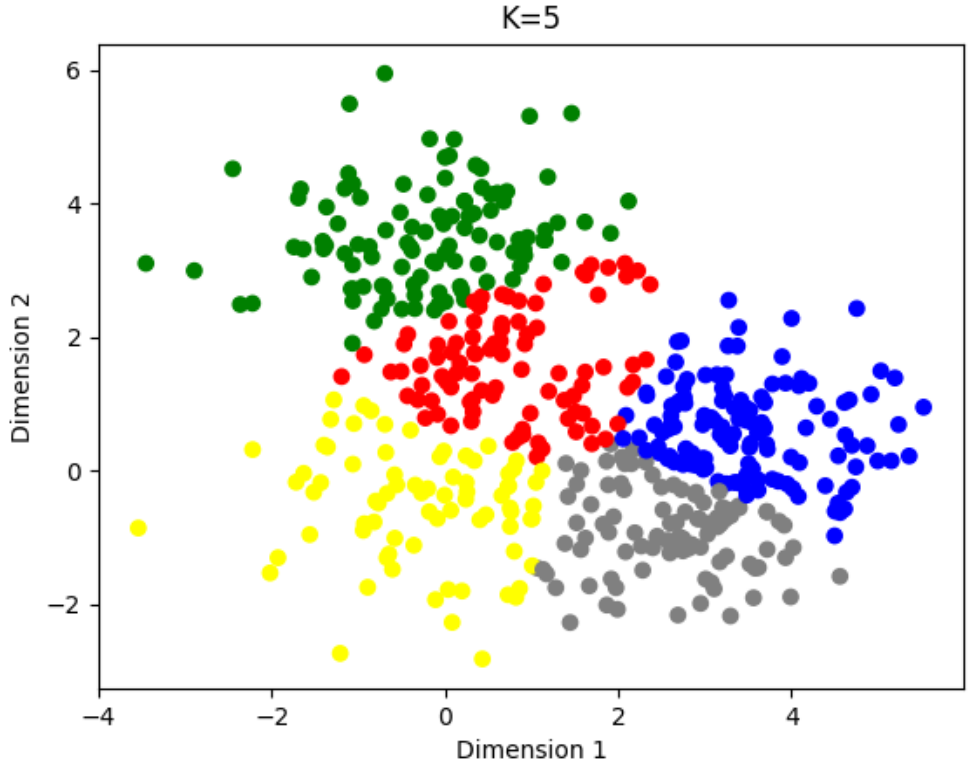
Problem 1

a. For K = 2,3,4,5, the value of K-means objective function per iteration for 20 iterations can be seen as follow:



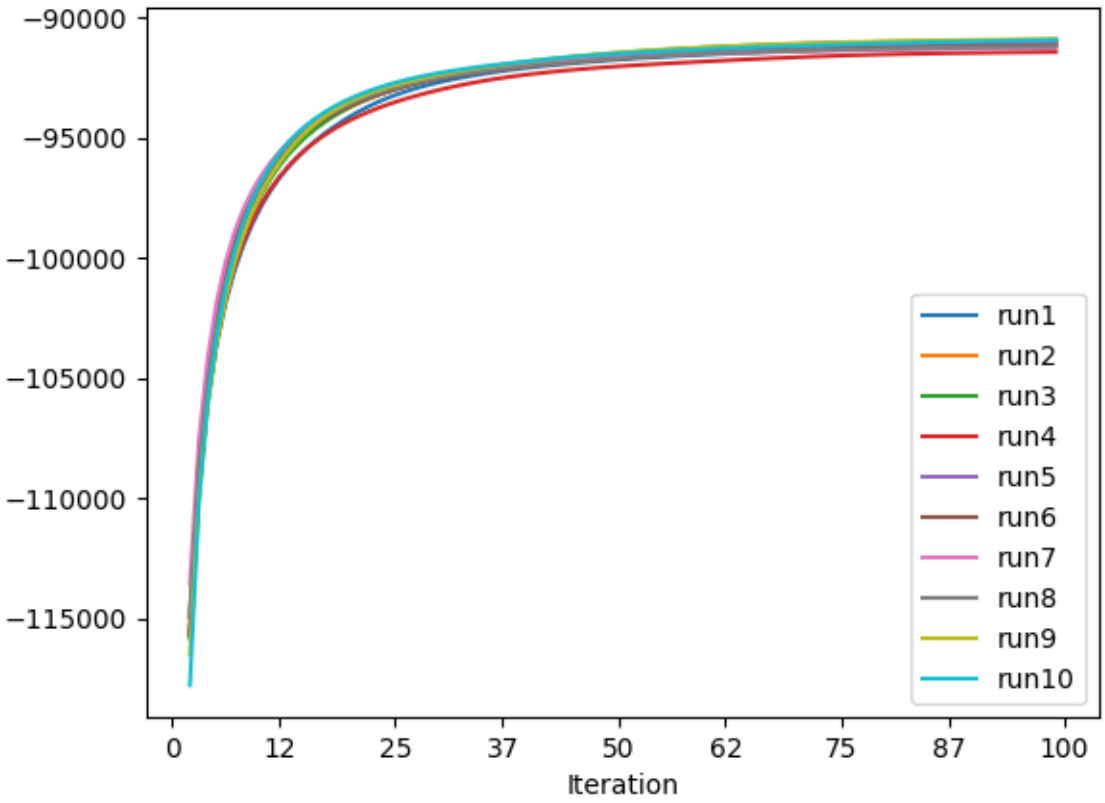
b. 500 data points for K = 3, 5 is shown as follow:


K=3
Dimension 2
Dimension 1
6
4
2
0
−2
−4
−2
0
2
4


K=5
Dimension 2
Dimension 1
6
4
2
0
−2
−4
−2
0
2
4

Problem 2

a. The log joint likelihood for iterations 2 to 100 is shown as follow:



The training objective function and RMSE on the testing set for the 10 runs

In which run	Log joint likelihood	RMSE
9	-90889.06654	1.111649936
3	-90918.16356	1.110751615
10	-90928.72693	1.107983291
1	-91044.9254	1.0948742
5	-91044.9254	1.13924095
2	-91082.05593	1.134378454
6	-91163.65205	1.150539082
8	-91204.67559	1.09554172
7	-91256.348	1.106586519
4	-91424.88786	1.126603782

b. Ten movies that are closest to movies “Star Wars”, “My Fair Lady” and “Goodfellas”

Star Wars	My Fair Lady	GoodFellas

Empire Strikes Back, The (1980)	Sound of Music, The (1965)	Once Upon a Time in the West (1969)
Return of the Jedi (1983)	Mary Poppins (1964)	Good, The Bad and The Ugly, The (1966)
Raiders of the Lost Ark (1981)	Shadowlands (1993)	Full Metal Jacket (1987)
Usual Suspects, The (1995)	Alice in Wonderland (1951)	Godfather: Part II, The (1974)
Princess Bride, The (1987)	Washington Square (1997)	Bonnie and Clyde (1967)
Sting, The (1973)	SubUrbia (1997)	Short Cuts (1993)
Terminator, The (1984)	Snow White and the Seven Dwarfs (1937)	Apocalypse Now (1979)
Blues Brothers, The (1980)	Gone with the Wind (1939)	Godfather, The (1972)
Indiana Jones and the Last Crusade (1989)	Ninotchka (1939)	2001: A Space Odyssey (1968)
L.A. Confidential (1997)	Cinderella (1950)	Cool Hand Luke (1967)

The distance of the query movie is shown as below:

Star Wars	My Fair Lady	GoodFellas
0.328800011	0.676627739	0.554563938
0.616614867	0.928825099	0.594204485
0.621324346	0.932651283	0.624790998
0.807932304	1.050563988	0.724900652
0.81559754	1.05483451	0.780583509
0.861181757	1.074415031	0.812243327
0.867592219	1.082508022	0.896308002
0.870789908	1.100103024	0.926782276
0.896641271	1.151929637	0.93840313
0.902799374	1.192906191	0.99253423