1)Shingling

- Imported the documents from csv file and converted it into an RDD

- For all docs, converted each document into shingkles of length 5

- hashed each shingle using flatMap and saved the hashed values for each document

2)Minhashing

- For each document get the minhash value of the form ax+b

- create random coefficients a and b

- For each shingle in each document, hash it for ax+b and get the min value

- Do this for all hash functions = 100

- This min value is the minhash value of the document. It will be a vector of sze 100.

3)Kmeans

- Now create k=5 random centroids

- Measure the disticnce of each min hash value from the centroid and keep doing this for about 10 iterations.

- Initialize k random centroids

- Eudlidean distance method which returns the cluster number for each signature(document)

- Kmeans method to run k-Means and output the new set of k centroids

- Calculate SSE for each signature in each cluster. Add them up and plot the elbow curve for different values of k.

References -

1) For shingling and mishash, I have read this blog -

http://mccormickml.com/2015/06/12/minhash-tutorial-with-python-code/

2) For K means, I have looked at the code provided in class slides and on this link -

https://github.com/apache/spark/blob/master/examples/src/main/python/kmeans.py

3) For SSE, I have referenced a slide 18 from this link -

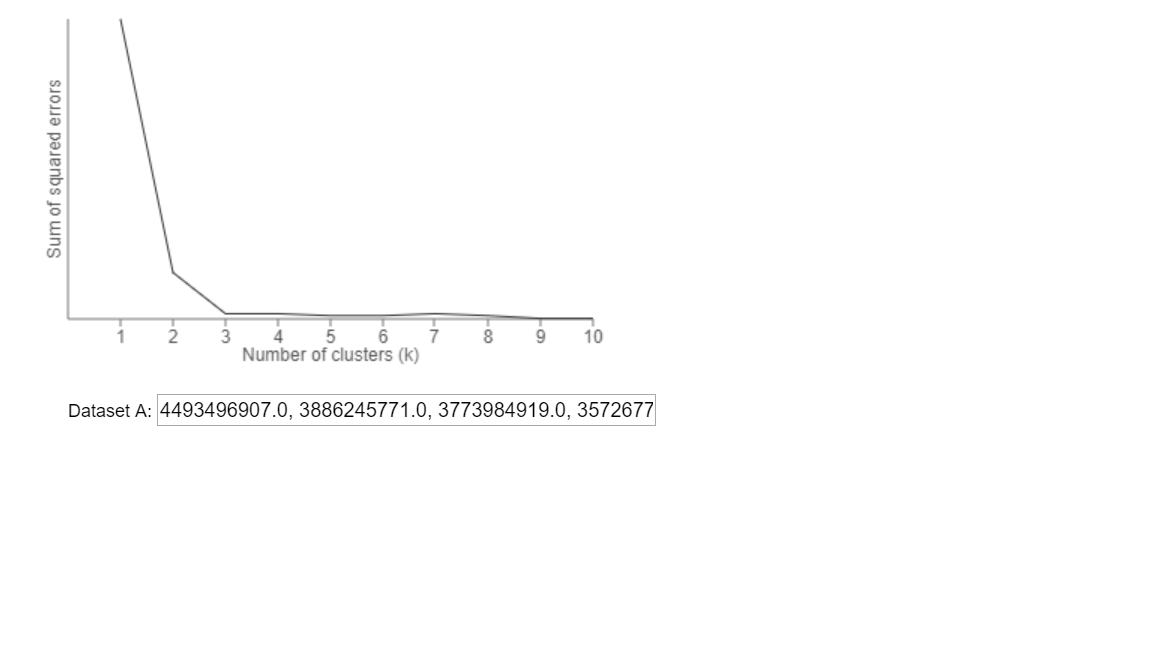
https://www3.nd.edu/~rjohns15/cse40647.sp14/www/content/lectures/12%20-%20k-means%20Clustering.pdf

4) Plotted the elbow curve in the link given in the question by entering the SSE for each k(1 to 10)

<https://bl.ocks.org/rpgove/0060ff3b656618e9136b>

Below is a snapshot of the elbow plot plotted for these values of SSE, for k ranging from 1 to 10.

[4493496907.0, 3886245771.0, 3773984919.0, 3572677529.0, 3572000270.0, 3478966810.0, 3445630774.0, 3491196707.0, 3505086807.0, 3461403333.0]



**For K=3, these are the clusters formed -**

[[0, [1024, 1026, 1028, 1030, 1031, 1032, 1034, 1035, 1038, 1044, 1045, 1047, 1048, 1049, 1050, 1052, 1053, 1054, 1055, 1057, 1058, 1059, 1060, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1070, 1071, 1073, 1074, 1075, 1076, 1078, 1079, 1080, 1082, 1083, 1084, 1085, 1086, 1089, 1091, 1092, 1093, 1094, 1095, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1120, 1121, 1122, 1124, 1125, 1126, 1127, 1128, 1129, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1143, 1144, 1145, 1146, 1148, 1150, 1152, 1153, 1154, 1155, 1157, 1158, 1159, 1160, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1178, 1180, 1181, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1191, 1192, 1195, 1196, 1197, 1199, 1200, 1201, 1202, 1203, 1204, 1206, 1207, 1209, 1210, 1211, 1214, 1215, 1216, 1217, 1219, 1221, 1225, 1226, 1229, 1230, 1231, 1235, 1236, 1237, 1238, 1239, 1240, 1244, 1246, 1247, 1248, 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2589, 2597, 2598, 2601, 2610, 2612, 2614, 2627, 2633, 2655, 2658, 2664, 2670, 2678, 2682, 2684, 2690]]]