Information Retrieval Fall 2016

Quiz 4 (Total Marks = 10)

Roll No: ____________________ **Name** ______________________

Q1) Consider following posting list of a term. (document Id, count, [positions]) (4 Marks)

(3,3,[4,7,12]) (5,1,[84]) (12,4,[13,15,20,24])

a) Delta encode document Ids and delta encode term positions
b) Encode resulting list from part a using Elias Gamma Encoding
c) How many bits are required for encoding entire list in part b? How many bits will be required for encoding list from part a using fixed length encoding of 8 bits per number

Solution:

a) (3,3,[4,3,5]) (2,1,[84]) (7,4,[13,2,5,4])

b) 101 101 11000 101 11001 100 0 1111110010100 11011 11000 1110101 100 11001 11000

c) 3 + 3+ 5+ 3+5+3 +1+ 13+ 5+5+7+3+5+5 = 5*6 + 3*5 + 1+13+7 = 30+15+21 = 66

encoding list from part a using fixed length encoding = 14*8 = 112

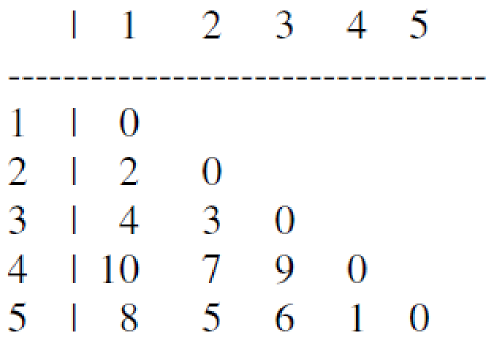
Q2) Following table gives RSS (Residual Sum of Squares) for different value of K using K Means clustering algorithm for some n documents. Which value of K will you choose and why? (2 Marks)

K	2	3	4	5	6	7	8	9	10
RSS	2000	1800	1610	1565	1300	1120	900	700	500

Ans: K = 4 since K = 5 doses not give much reduction in RSS . This is Knee in plot.

Q3) Show the different steps of HAC algorithm using the distance matrix below.
Give partial results after each step. [4 Marks]

a) Calculate Similarity of Clusters using Complete Link
b) Calculate Similarity of Clusters using Single Link



```
     |  1    2    3    4    5
---------------------------------
1    |  0
2    |  2    0
3    |  4    3    0
4    | 10    7    9    0
5    |  8    5    6    1    0
```

Solution

a) Complete Link

Document 4 and 5 have minimum distance so they will be merged first

	1	2	3	4-5
1	0			
2	2	0		
3	4	3	0	
4-5	10	7	9	0

Documents 1 and 2 have minimum distance so they will be merged

	1-2	3	4-5
1-2	0		
3	4	0	
4-5	10	9	0

Cluster 3 and Cluster 1-2 will be merged

So we will have last 2 clusters 1-2-3 and 4-5. They will be merged to get 1-2-3-4-5

a) Single Link

Document 4 and 5 have minimum distance so they will be merged first

	1	2	3	4-5
1	0			
2	2	0		
3	4	3	0	
4-5	8	5	6	0

Documents 1 and 2 have minimum distance so they will be merged

	1-2	3	4-5
1-2	0		
3	3	0	
4-5	5	6	0

Cluster 3 and Cluster 1-2 will be merged

So we will have last 2 clusters 1-2-3 and 4-5. They will be merged to get 1-2-3-4-5