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National University of Computer and Emerging Sciences, Lahore Campus

Course:	Information Retrieval	Course Code:	CS317
Program:	BS(Computer Science)	Semester:	Fall 2016
Duration:	60 Minutes	Total Marks:	22
Paper Date:	11-Nov-16	Weight	13%
Section:	ALL	Page(s):	5
Exam:	Midterm-2	Roll No:	

Instruction/Notes: ***Attempt the examination on this question paper.***. *You can use extra sheets for rough work but do not attach extra sheets with this paper. Do not fill the table titled Question/marks*

Question	1	2	3	4	5	6	7	8	Total
Marks	/ 2	/ 4	/ 2	/ 2	/ 1	/ 1	/ 6	/ 4	**/22**

Q1) Following is page rank formula taken from Wikipedia page. What is missing in this formula? What will happen to the page rank values if we use this formula for web. $M(p_i)$ is set of pages that have link towards p_i, $L(p_j)$ is total number of outgoing links from p_j. [2 points]

$$PR(p_i) = \frac{1-d}{N} + d \sum_{p_j \in M(p_i)} \frac{PR(p_j)}{L(p_j)}$$

Q2) An IR system returns 20 results for a query. The results returned at ranks 1, 2, 4, 8, 16 are relevant; the results returned at all other ranks are irrelevant. We further know that there exist 10 relevant results for this specific query. [4 points]
(a) Compute Precision and Recall. [2 point]
(b) Compute Precision@5. [1 point]
(c) Compute Mean Average Precision. [1 point]

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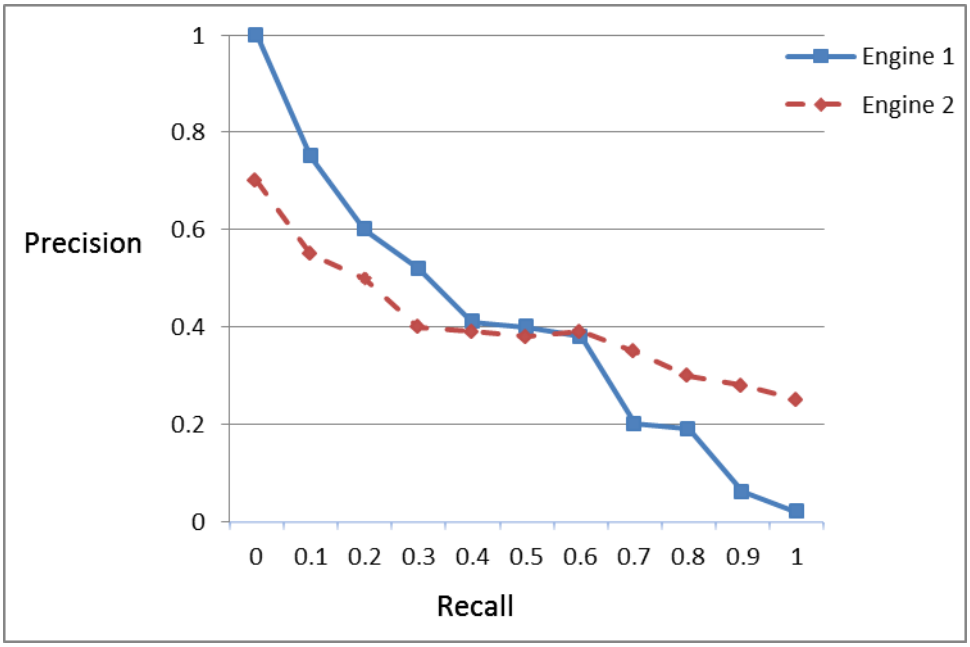

Q3) The figure above depicts interpolated precision-recall curves for two search engines that index research articles. There is no difference between the engines except in how they score documents. Imagine you're a scientist looking for all published work on some topic. You don't want to miss any citation. Which engine would you prefer and why? [2 Points]

Q4) Why do we use F measure instead of simply taking average of precision and recall? What problem will arise if we use average of precision and recall for evaluation? Illustrate with an example. [2 points]

Q5) Rocchio Classification Algorithm does not work well on what kind of data? [1 Point]

Q6) Which of the following are non-linear classifiers? [1 Point]

- Naive Bayes
- Rocchio
- KNN

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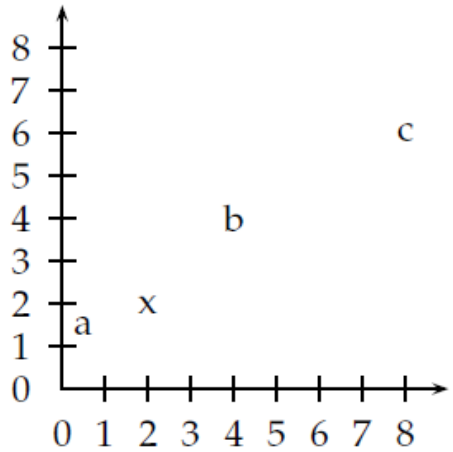
Q7) Encircle correct option (True / False). [6 Points]

1. Bernoulli NB classifier works better for long text documents as compared to Multinomial NB classifier. True / False
2. We should select K that minimizes RSS (Residual Sum of Squares) for KMeans clustering algorithm (Select K which gives minimum value of RSS). True / False
3. We should select K that maximizes RSS (Residual Sum of Squares) for KMeans clustering algorithm. True / False
4. Good initial seeds should be close to each other for KMeans clustering algorithm. True / False
5. Time Complexity of KMeans is $O(n^2)$ where n is total number of documents. True / False
6. Macroaverage of an evaluation measure for multiclass classification problem gives equal weight to each class. True / False

Q8) Following figure shows training examples form three classes a, b, and c in two dimensions. Classify test document x with 1NN classification algorithm using

I. Euclidean Distance
II. Cosine Similarity

Show all calculations. The vectors are a = (0.5 1.5), x = (2 2), b = (4 4), and c = (8 6) [4 Points]



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