Computer Science 572 Exam
Prof. Horowitz
Monday, February 26, 2018, 8:00am – 8:50am

Name: **Student Id Number:**

1. This is a closed book exam.
2. Please answer all questions.
3. There are a total of 25 questions. Each question is worth 4 points.
4. **Place your answer immediately below the question. Limit answers to ONE SENTENCE.**

1. Define Precision and Recall.

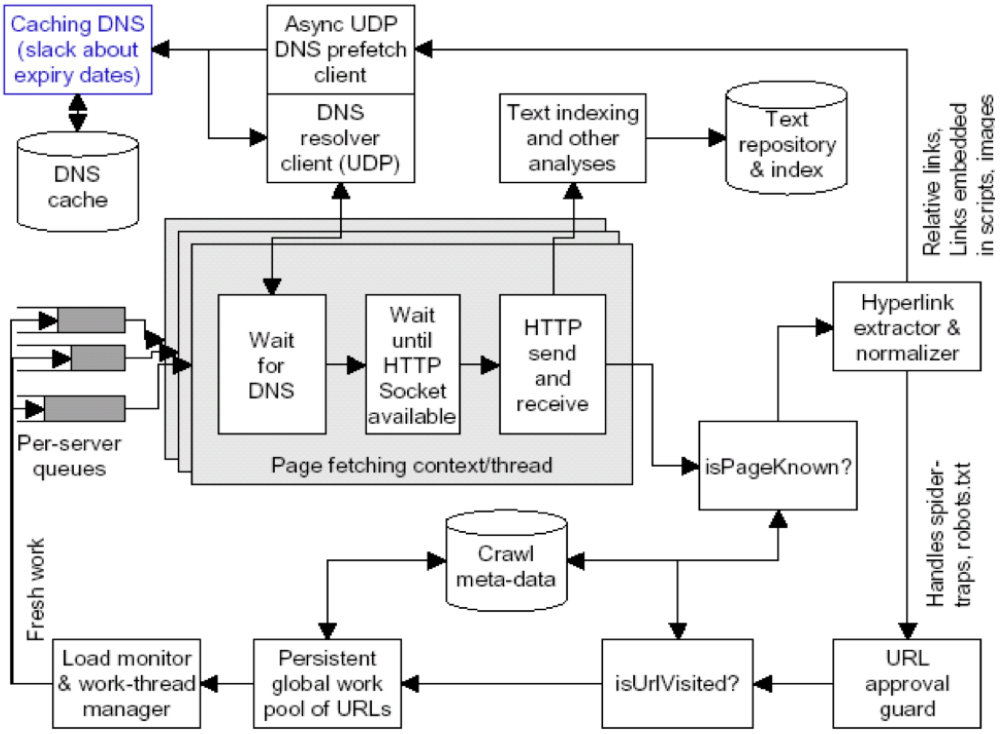
2. The harmonic mean of precision and recall is sometimes called the *F* measure. If *R* represents Recall and *P* represents Precision, define *F*.

3. An Information Retrieval system returns 8 relevant documents and ten non-relevant documents. There are a total of 20 relevant documents in the collection. What is the precision and recall of the system on this search?

4. For a set of *Q* queries where the average precision of the i^{th} query is *AvgP(i)*, define the Mean Average Precision function.

5. Suppose a search engine keeps track of how many people click on the top five search results for a specific query. If the number of clicks are 49, 36, 16, 42, and 4 respectively for results 1, 2, 3, 4 and 5, is it fair to conclude that the first result was the best one and why?

6. The class notes mention three strategies for coordination of distributed crawlers. What are the three strategies?



7. Above is an architectural diagram of the Mercator crawler. What element of the diagram controls freshness and politeness?

8. Above is an architectural diagram of the Mercator crawler. How many parallel threads are shown?

9. Crawlers need to check a new URL against the list of URLs already seen. Before making the check the URLs must be normalized. There are four steps required to normalize a URL. Name two of them.

10. The class notes define 4 properties that a distance measure must satisfy. What are they?

11. The class notes mention five specific distance measures. Name two of them.

12. Search engines must convert URLs to normal form so they can check if a new URL has already been seen. What other textual items/entities need to be converted to normal forms?

13. What is the Tika library used for?

14. Which is the more careful approach to transforming multiple forms of a word into a common base, Stemming or Lemmatization?

15. Using Porter's stemmer program, the words Universal, university and universe all stem to universe; is this an example of over-stemming or under-stemming?

16. Is the technique of using skip pointers helpful for handling OR queries, AND queries, or both OR and AND queries?

17 What is the meaning of hypernym?

18. Give an example of a hypernym and its related term.

19. The Resnik measure of similarity of two words c_1 and c_2 is defined by the following formula

$$sim_{resnik}(c_1,c_2) = -\log P(LCS(c_1,c_2))$$

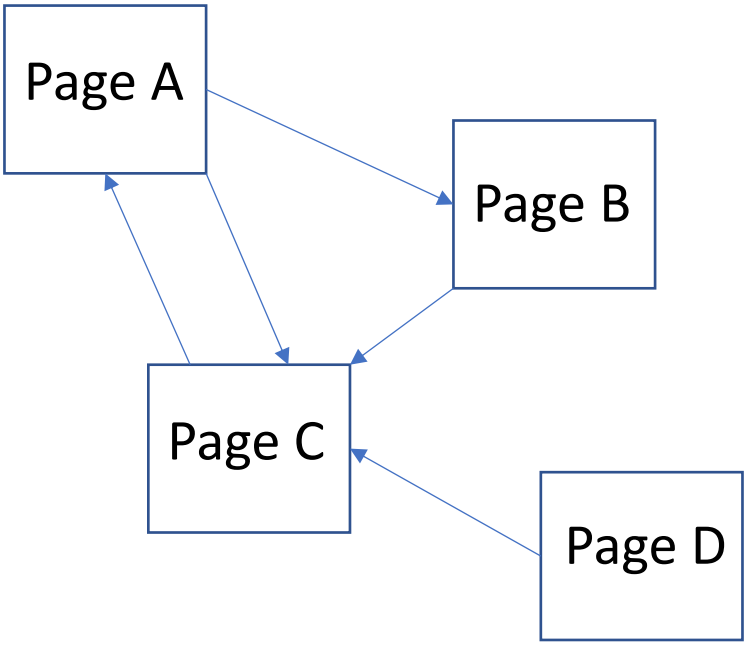
What is the meaning of $P(LCS(c_1, c_2))$?

20. Two words A and B are similar if their glosses contain similar words. What is the meaning of "glosses"?

21. If A and B are sets and |A| is the number of elements of A, and |B| is the number of elements of B, define the number of elements in A union B.

22. YouTube's recommendation system uses a co-visitation graph. For videos v1 and v2 define the co-visitation.

23. Below are four web pages A, B, C and D with connecting links. What page will have the highest PageRank? What page will have the smallest PageRank?



24. Can URLs that begin with https be used as initial seeds? Yes or No. If yes, what feature of crawler4j is needed to handle the https scheme?

25. In crawler4j, which function has to be modified to determine whether a URL must be visited or not?