Information Retrieval – Exercise 5 IST 441

This exercise is worth **5** *points.*

In this exercise, you will illustrate a small network and calculate some of its basic properties. For this case, it will be a social network though any network could do. You will calculate PageRank for the network.

Given the following people (nodes) and relations (edges):

Nodes: P1: Tom, P2: Jean, P3: Nat, P4: Steven, P5: Vijay, P6: Mary, P7: Oscar, P8: Michelle, P9: Jian, P10: Clark

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Edges:

P1 -> P4

P2 -> P1, P2 -> P4

P3 -> P2,

P4 <-> P10

P5 -> P4, P5 -> P1,

P6 -> P7, P6 -> P8, P6 -> P9, P6 -> P2

P7 -> P8, P7 <-> P1

P10 -> P6, P10 -> P1

P10 -> P9
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Analyze the network network.

- 1. (1 point) Network characteristics
 - a. Draw the network as a graph and a matrix
 - b. (1pt) Calculate the following metrics
 - i. (1/2pt) In degree of each node
 - ii. (1/2pt) Out degree of each node

2. (4 points) Given the following modified directed connection, calculate the PageRank scores for each node in the social network. We suggest you use either:

http://www.webworkshop.net/pagerank_calculator.php or the excel sheet available at the exercise 5 web page.

- 1. (1pt) Use initial score of 1 for all nodes. Calculate 10 iterations of the PageRank scores.
- 2. (1pt) Change the initial score to 0.15. Calculate 10 iterations of the PageRank scores.
- 3. (1pt) Change the initial score to 1.5. Calculate 10 iterations of the PageRank scores.
- 4. (1pt) Compare the convergence behavior for the three initial values.