

# COP 5537 ASSIGNMENT #3

## 1 Pseudocode for PageRank Algorithm

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**Algorithm 1** PageRank(Adjacency matrix **A**, Damping factor **d**, Convergence criterion  **$\epsilon$** , Number of web-pages **n**)

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1: for i  $\leftarrow$  1 to n do                                 $\triangleright$  Initialize PageRank score for all the web-pages
2:   R_cur[i]  $\leftarrow$   $\frac{1}{n}$ 
3: indegree[x]  $\leftarrow$  list of nodes that have directed edge towards node x
4: outdegree[x]  $\leftarrow$  list of nodes that have directed edge from node x
5: OutDeg[x]  $\leftarrow$  length of outdegree[x]
6:
7: for iter_no  $\leftarrow$  1 to max_iter do
8:   for page  $\leftarrow$  1 to n do                             $\triangleright$  Updates PageRank score for all the n web-pages
9:     R_next[page]  $\leftarrow$   $\frac{(1-d)}{n} + d(\frac{R\_cur[T_1]}{OutDeg[T_1]} + \frac{R\_cur[T_2]}{OutDeg[T_2]} + \dots + \frac{R\_cur[T_l]}{OutDeg[T_l]})$   $\triangleright T_1, T_2, \dots, T_l$  represent the list of nodes
10:                                                                that have directed edge towards node
11:                                                                'page',  $T_l = \text{indegree}[\text{page}][l]$ 
12:   if  $\sum_{j=1}^n |R\_next[j] - R\_cur[j]| < \epsilon$  then
13:     break                                                 $\triangleright$  Reached Convergence
14:   R_cur = R_next                                           $\triangleright$  Not converged yet, so updates current PageRank score and
15:                                                                continues to iterate until reaches convergence or max_iter
16: return iter_no, R_next
```

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