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Course:	Data Mining and Warehouse Laboratory
Course Code:	DJ19CEL501
Experiment No.:	08

AIM: Implementation of Page Rank Algorithm

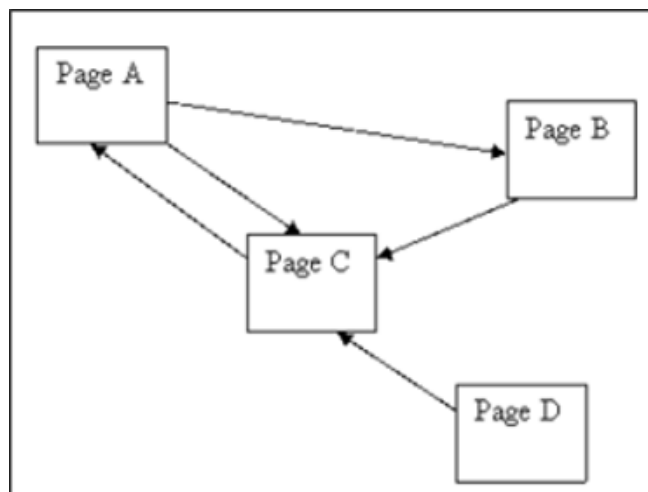
CODE:

```
import numpy as np
def page_rank_algorithm(graph,damping_factor):
    outgoing = dict()
    incoming_nodes = dict()
    coefficients = dict()
    # Outgoing Nodes
    for i in range(len(graph)):
        outgoing[i]=0
    for i,node in enumerate(graph):for
        edge in node:
            if edge:
                outgoing[i] += 1
    # Incoming Nodes
    for i in range(len(graph)):
        temp=[]
        for node in graph:if
            node[i]:
                temp.append(no
de)incoming_nodes[i] =
        temp
    # Coefficient Matrix
    for i,node in enumerate(graph):temp
        = []
        for j,other_node in enumerate(graph):
            if other_node in incoming_nodes[i]:
                temp.append(damping_factor*(1.0/outgoing[j]))
            elif i == j:
                temp.appe
nd(-1)else:
                temp.app
end(0)coefficients[i]
        = temp
    coefficients_list = []
    for key,value in coefficients.items():
```



```
coefficients_list.append(value)
constant_matrix = []
for i in range(len(graph)):
    constant_matrix.append(damping_factor-1)
pageranks =
np.linalg.solve(np.array(coefficients_list),np.array(constant_matrix))
print()
for i,rank in enumerate(pageranks):
    print('Page Rank of {} is {:.4f}'.format(chr(65+i), rank))
def main():
    n = int(input('Enter the number of nodes : '))
    d=float(input('Enter the damping factor : '))
    graph = []
    print('Enter Adjacency Matrix with terms separated by a space: ')
    for i in range(n):
        temp_list = input().split(' ')
        graph.append(list(map(int,temp_list)))
    page_rank_algorithm(graph,d)
main()
```

GRAPH:



OUTPUT:

```
Enter the number of nodes : 4
Enter the damping factor : 0.85
Enter Adjacency Matrix with terms separated by a space :0 1 1 0
0 0 1 0
1 0 0 0
0 0 1 0
Page Rank of A is 1.4901 Page
Rank of B is 0.7833 Page Rank of
C is 1.5766 Page Rank of D is
0.1500
```