

# **CS101: Discrete Mathematics PROJECT-2**

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April 24, 2024

## **Question-1**

### **Experiment**

During the experiment, the students were instructed to ask each other random questions. If a student was impressed by the answer given by another student, they would add the students's name to a google document.

### **Problem Statement:-**

In this problem, we are given a network of impressions from the experiment conducted on campus. Our task is to determine the top leader by performing a random walk on the graph using a teleportation method.

### **Solution :-**

To begin, we will gather the data from the impression network, which is stored in a CSV file. Next, we will construct a graph using `networkx`. This graph will have directed edges connecting nodes where one student was impressed by another in the experiment. Once the graph is created, we will proceed with the random walk experiment.

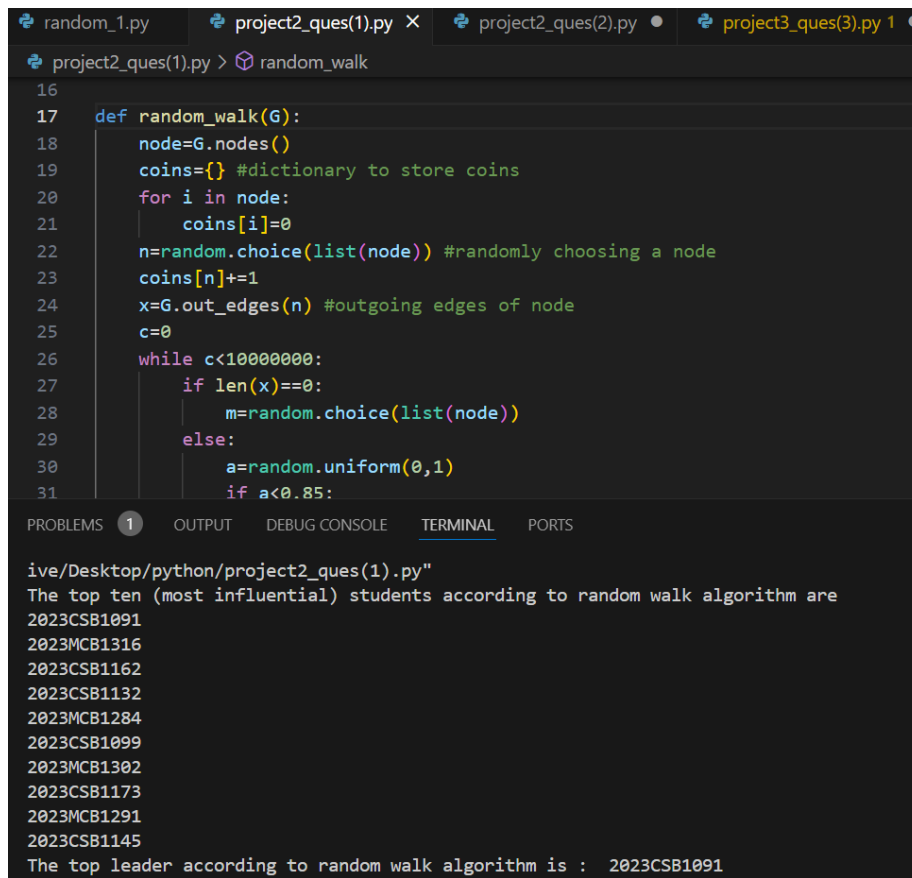
### **Random Walk Algorithm**

The random walk algorithm involves assigning coins to each node we visit. Initially, a random node is selected as the starting point of the random walk, and its coin count is increased.

When you take a step, you have an 85% probability of moving to a nearby node through a directed edge, and a 15% chance of randomly teleporting to any node in the graph. The coin count of the selected node is updated, and the random walk moves to that node.

This process continues for a large number of iterations. Once the random walk simulation is complete, the code sorts the dictionary containing the coin counts of all the students based on the number of coins accumulated by each node.

Once we organize the dictionary, we can display the top ten students who have the most coins. Therefore, the student with the highest number of coins will be the top leader.



```
random_1.py project2_ques(1).py X project2_ques(2).py project3_ques(3).py 1
project2_ques(1).py random_walk
16
17 def random_walk(G):
18     node=G.nodes()
19     coins={} #dictionary to store coins
20     for i in node:
21         coins[i]=0
22     n=random.choice(list(node)) #randomly choosing a node
23     coins[n]+=1
24     x=G.out_edges(n) #outgoing edges of node
25     c=0
26     while c<10000000:
27         if len(x)==0:
28             m=random.choice(list(node))
29         else:
30             a=random.uniform(0,1)
31             if a<0.85:
```

ive/Desktop/python/project2\_ques(1).py"

The top ten (most influential) students according to random walk algorithm are

2023CSB1091

2023MCB1316

2023CSB1162

2023CSB1132

2023MCB1284

2023CSB1099

2023MCB1302

2023CSB1173

2023MCB1291

2023CSB1145

The top leader according to random walk algorithm is : 2023CSB1091

Figure 1: Figure: Snapshot of code and output

Hence, the top leader according to the teleportation method is the student with entry number 2023CSB1091.