

Homework 1

Social Media Mining

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CS-539

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Due Date: 9/12/2018 at 11:59 pm

Date of submission:

Exercise 1 (30 points)

1.- Consider the following undirected, directed, and weighted graphs and answer the following questions?

a) Compute the adjacency matrices for all the three graphs:

Graph #1 Undirected

	A	B	C	D	E	F	G
A	0	1	1	1	1	1	0
B	1	0	0	0	0	1	0
C	1	0	0	0	0	0	0
D	1	0	0	0	0	0	0
E	1	0	0	0	0	0	0
F	1	1	0	0	0	0	1
G	0	0	0	0	0	1	0

Graph #2 Directed

	A	B	C	D	E	F	G
A	0	1	0	0	0	0	0
B	0	0	1	1	0	1	1
C	0	0	0	1	0	0	0
D	0	0	0	0	1	0	0
E	0	0	0	0	0	0	0
F	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0

Graph# 3 Weighted

	A	B	C	D	E	F	G
A	0	8.0	12.0	12.0	12.0	16.0	0
B	8.0	0	0	0	0	4.0	0
C	12.0	0	0	0	0	0	0
D	12.0	0	0	0	0	0	0
E	12.0	0	0	0	0	0	0
F	16.0	4.0	0	0	0	0	12.0
G	0	0	0	0	0	12.0	0

b) Compute the adjacency list for the undirected and directed graphs:

Graph#1 Undirected

A	B, C, D, E, F
B	A, F
C	A
D	A
E	A
F	A, B, G
G	G

Graph#2 Directed

A	B
B	C, D, F, G
C	D
D	E
E	
F	
G	

c) Compute the diameter of the undirected and directed graphs.

Graph#1 Undirected

	A	B	C	D	E	F	G
A							
B	1						
C	1						
D	1						
E	1						
F	1	1					
G	2	2				1	

Diameter = 2

Graph#2 Directed

	A	B	C	D	E	F	G
A		1	2	2	3	2	2
B			1	1	2	1	1
C				1	2		
D					1		
E							
F							
G							

Diameter = 3

d) Compute the articulation points in the undirected graph.

If I remove node	Increase the number of connected components?
A	True
B	False
C	False
D	False
E	False
F	True
G	False

Articulation points are = [A, F]

2) Discuss an idea of how to compute the diameter in the weighted graph. (Hint: how do we define a shortest path?)

Answer: If we consider that a diameter under the following statement “In social media mining, we might be interested in determining how tightly connected a social network is by measuring its diameter.” [1]

We are interested on determining the diameter as a measure of minimum cost, in the undirected case, going from node to node. However, intuitively in the case of a directed graph, the cost is determined in terms of weight.

Therefore It is my opinion, that when we fill the table of what it used to be, the length of the longest shortest path between any pair of nodes in the graph, now we will use *the biggest sum of the total minimum weight possible between any pair of nodes in the graph*.

3) **What kinds of things do we recommend in social networks?**

Things that will help the user make a decision, therefore things that we commonly recommend are:

- Items
- Users
- Ratings

Bibliography

- [1] M. A. A. L. Reza Zafarani, Social Media Mining, An Introduction, Cambridge University Press, 2014, p. 53.