COMSATS University Islamabad, Wah Campus

Department of Computer Science

Course : **Introduction to Data Science** Total Marks : **10**
Class : **SE-7** Dated : **20/10/2023**
Semester: **FALL 2023** **Submission Deadline: (23-Oct-2023) 11:59 PM.**

Name: Muhammad Ali Ahmad **Reg no.: FA20-BSE-006**

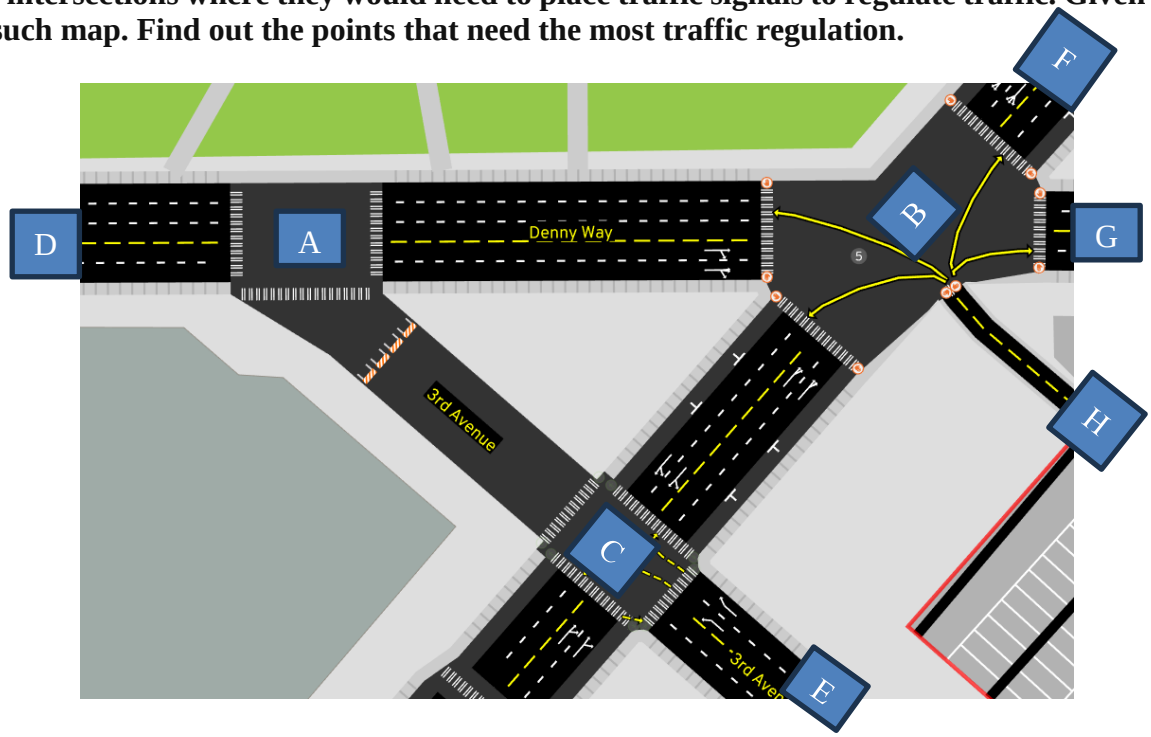
Assignment (02) (CLO 2)

Instructions:

- **Make sure to read all instructions**
- **Make sure this page is the first page of your assignment file.**
- **All answers should start from page 2.**
- **Assignment should be handwritten, scanned, and submitted in PDF format.**
- **Mention both name and roll number on this page.**
- **Give justifications where necessary!**
- **MARKS WILL BE DEDUCTED ON NOT FOLLOWING THE FORMAT.**

Assignment Tasks:

You are paired up with a highway authority for analyzing data of roadmaps to figure out their busiest intersections where they would need to place traffic signals to regulate traffic. Given below is one such map. Find out the points that need the most traffic regulation.



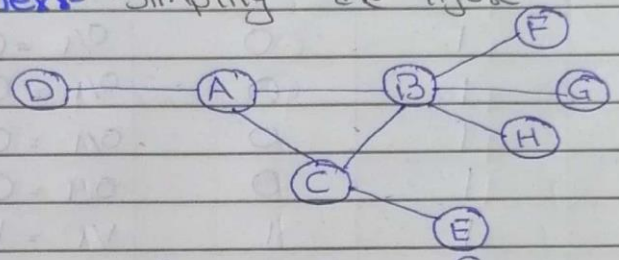
DATE: 22/10/2023

ASSIGNMENT # 2

Name:- Muhammad Ali Ahmad
Regno:- FA20-BSE-006
Subject:- Introduction to Data Science
Submitted to:- Ma'am Maha Rasheed

Question:- You are Paired ..... regulation.

Answer:- Simplify the figure



In this data of roadmaps, the corners node/intersection D, E, F, G and H will give Betweenness Centrality (BC) zero (0) because they do not play a significant role in guiding traffic between other locations so they have minimal impact on traffic routing. So

BC of D = 0
BC of F = 0
BC of F = 0
BC of G = 0
BC of H = 0

We will focus on nodes A, B and C which are linking different parts of roads networks and they are busy spots

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guiding traffic flow.

Formula of BC:-

$$BC(v) = \sum_{u \neq v \in V} \left(\frac{\sigma_{uw}(v)}{\sigma_{uw}} \right)$$

BC of A:- ABCDEFGH

	σ_{uw}	$\sigma_{uw}(v)$	$\sigma_{uw}(v)/\sigma_{uw}$
BC	1	0	0/1 = 0
BD	1	1	1/1 = 1
BF	1	0	0/1 = 0
BF	1	0	0/1 = 0
BG	1	0	0/1 = 0
BH	1	0	0/1 = 0
CD	1	1	1/1 = 1
CE	1	0	0/1 = 0
CF	1	0	0/1 = 0
CG	1	0	0/1 = 0
CH	1	0	0/1 = 0
DE	1	1	1/1 = 1
DG	1	1	1/1 = 1
DH	1	1	1/1 = 1
EF	1	0	0/1 = 0
EG	1	0	0/1 = 0
EH	1	0	0/1 = 0
FG	1	0	0/1 = 0
FH	1	0	0/1 = 0
GH	1	0	0/1 = 0
DF	1	1	1/1 = 1

BC of A = 1+1+1+1+1+1

BC of A = 6

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BC of B:- ABCDEFGH

	G_{uw}	$G_{uw}(v)$	$G_{uw}(v)/G_{uw}$
AC	1	0	0
AD	1	0	0
AE	1	0	0
AF	1	1	1
AG	1	1	1
AH	1	1	1
CD	1	0	0
CE	1	0	0
CF	1	1	1
CG	1	1	1
CH	1	1	1
DE	1	0	0
DF	1	1	1
DG	1	1	1
DH	1	1	1
EF	1	1	1
EG	1	1	1
EH	1	1	1
FG	1	1	1
FH	1	1	1
GH	1	1	1

BC of B = 1+1+1+1+1+1+1+1+1+1+
1+1+1+1+1+1

BC of B = 15

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BC of C: ABCDEFGH

	G_{uu}	$G_{uu}(v)$	$G_{uu}(v)/G_{uu}$
AB	1	0	0
AD	1	0	0
AE	1	1	1
AF	1	0	0
AG	1	0	0
AH	1	0	0
BD	1	0	0
BE	1	1	1
BF	1	0	0
BG	1	0	0
BH	1	0	0
DE	1	1	1
DF	1	0	0
DG	1	0	0
DH	1	0	0
EF	1	1	1
EG	1	1	1
EH	1	1	1
FG	1	0	0
FH	1	0	0
GH	1	0	0

BC of C = 1+1+1+1+1+1

BC of C = 6

Now,

BC of A = 6

BC of B = 15

BC of C = 6

The most traffic regulation will at B because it has the highest BC