CS 429/529 Assignment 4

Assignment Release Date: Monday, November 14, 2022
Assignment Submissions Due: Tuesday, November 22, 2022 (Due 23:59 Istanbul Timezone)
Assignment Submission: Submit on Moodle
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Maximum Points: 100

Important Notes Before You Start:

- Your homework assignment file(s) name should include your full name (first and last name) and the assignment number. Your submission should be submitted as a single pdf file on Moodle using the following name template: **FirstName_LastName_A#no.pdf**
- Homework assignments are to be done individually, partnering on this homework assignment is not allowed.
- **Penalty points:** Submissions not following the requested file naming/format will receive a 10 point cut.

Exercise-1: Using different grouping algorithms on the Les Miserables dataset (60 points)

Using ORA, Gephi, or another social network analysis tool of your choice, run the betweenness based (Girvan-Newman) and modularity (Louvain) based grouping algorithms on the LesMiserables dataset. Different formats for the same data are provided in the Moodle.

a) (20 points, 10 points for each algorithm) For both algorithms, provide a list of what nodes are in what group.
b) (10 points) Include a visualization of the network where nodes are colored by Girvan-Newman grouping. Make sure that the nodes have readable labels.
c) (10 points) Include a visualization of the network where nodes are colored by Louvain grouping. Make sure that the nodes have readable labels.
d) (10 points) Generate dendrogram for your grouping and include an image of it.
e) (10 points) Explain if there are any relations between the groups found by the different algorithms. (Hint: Create a node by group matrix and then use that two mode network to create one mode networks where the tie is shared group membership.)

Exercise-2: Open-ended discussion on your project data (40 points)

a) (20 points) Explain __*in your own words*__ how structural equivalence differs from cohesive groups? In what situations might structurally equivalent groups be more meaningful than cohesive groups? Include citations for the sources you have benefited from and make sure to have your own sentences in the discussion.
b) (20 points) Using a sample of the data you will use for your term project (if your dataset is small, use all), demonstrate and explain a use case where you find a meaningful application of structural equivalence or cohesion. If you are partnering on the term project, discuss with your partner so you each cover different portions and different aspects of your data.