Analysis of Social Networks Report

Project 1

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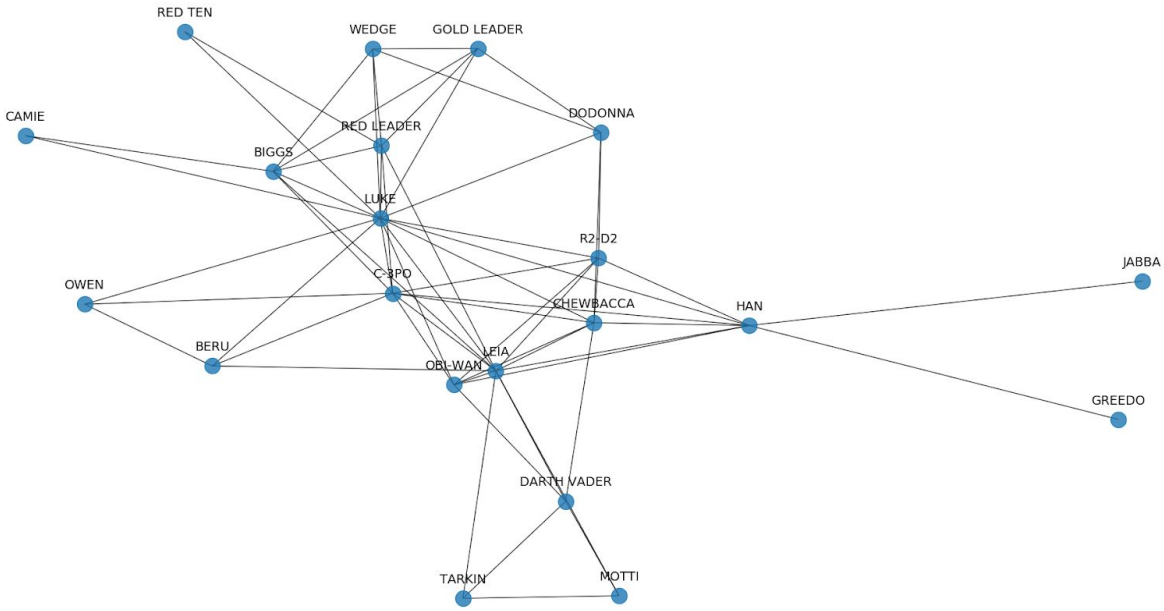
ADJACENCY LIST

A sample of a small undirected graph can be found in the folder **input_graph.** The visual representation of the graph used can be found inside the folder **draw_graph** along with the python script used.

DISPERSION CALCULATIONS

For this part of the report I used a graph which I had submitted for **Homework 1**. In the graph I found on Github someone had gathered the connections between characters of **Star Wars Episode IV** based on the manuscripts. The graph image and the .csv along with the code that generated them can be found at the folder. The graph is the following:



For my dispersion calculations I am going to focus on the **Darth Vader** node.

Darth Vader's neighbors list:

$$u_{Darth\ Vader} = \{Chewbacca,\ Leia,\ Motti,\ Tarkin,\ Obi-Wan\}$$

The neighbors list of each of Darth Vader's neighbor nodes:

- $u_{Chewbacca} = \{R2-D2,\ Obi-Wan,\ C-3PO,\ Luke,\ Han,\ Leia,\ Darth\ Vader,\ Dodonna\}$
- $u_{Leia} = \{R2-D2,\ Chewbacca,\ C-3PO,\ Luke,\ Beru,\ Obi-Wan\}$
- $u_{Motti} = \{Tarkin,\ Leia,\ Darth\ Vader\}$
- $u_{Tarkin} = \{Motti,\ Darth\ Vader,\ Leia\}$
- $u_{Obi-Wan} = \{R2-D2,\ Chewbacca,\ Luke,\ C-3PO,\ Leia,\ Han,\ Darth\ Vader\}$

Getting the common nodes for Darth Vader Node and its neighbors:

- $C_{Darth\ Vader,\ Chewbacca} = \{Leia,\ Obi-Wan\}$
- $C_{Darth\ Vader,\ Leia} = \{Chewbacca,\ Motti,\ Tarkin,\ Obi-Wan\}$
- $C_{Darth\ Vader,\ Motti} = \{Leia,\ Tarkin\}$
- $C_{Darth\ Vader,\ Tarkin} = \{Leia,\ Motti\}$
- $C_{Darth\ Vader,\ Obi-Wan} = \{Leia,\ Chewbacca\}$

Using the algorithm given, we get the pairs for each node in the *C* sets declared above:

- $dispersion_{Darth\ Vader,\ Chewbacca} = 0$
  - $(Leia,\ Obi-Wan)$ are directly connected.
- $dispersion_{Darth\ Vader,\ Leia} = 4$
  - $(Chewbacca,\ Motti)$ increases dispersion by one because their common neighbour is Leia.
  - $(Chewbacca,\ Tarkin)$ increases dispersion by one because their common neighbour is Leia.
  - $(Chewbacca,\ Obi-Wan)$ are directly connected.
  - $(Motti,\ Tarkin)$ are directly connected.
  - $(Motti,\ Obi-Wan)$ increases dispersion by one because their common neighbour is Leia.
  - $(Tarkin,\ Obi-Wan)$ increases dispersion by one because their common neighbour is Leia.
- $dispersion_{Darth\ Vader,\ Motti} = 0$
  - (Leia, Tarkin) are directly connected.
- $dispersion_{Darth\ Vader,\ Tarkin} = 0$

    - (Motti, Leia) are directly connected.
- $dispersion_{Darth\ Vader,\ Obi-Wan} = 0$
    - (Chewbacca, Leia) are directly connected.

SCRIPT

The python script is named **dispersion.py**. There are multiple prints for each major step taken in the algorithm so as to understand better the execution.

RESULTS

Results can be found in **results.txt.**

GITHUB LINK

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