Algorithms and Complexity

GROUP ASSIGNMENT

IMPORTANT: You have to submit your report, and your Java program and its output via iKamva. Remember to write all of the members details when submitting.

Social Network Graph from Articles.

What does a disperse web of politicians, companies, places and celebrities look like?

We live in an age of media and information, and the importance of understanding the details of the News cannot be overstated. Knowing which organisation, product or boss was on the news is not difficult, but knowing in whose company or place they were while on the news can give you valuable insight into the kind of crowd in which they find themselves. Your task is to build a social network graph representation from articles below:

- SACP, Cosatu say they warned ANC about corruption involving COVID-19 funds. by 'Kgomotso Modise' - https://ewn.co.za/2020/09/01/sacp-cosatu-say-they-warned-anc-about-corruption-involving-covid-19-funds
- Treasury says SABC, Sapo asked for financial support. by 'Eyewitness News' - https://ewn.co.za/2020/09/01/treasury-says-sabc-sapo-asked-for-financial-support
- WC cop arrested for allegedly raping his brother's girlfriend. by 'Kaylynn Palm' - https://ewn.co.za/2020/09/01/wc-cop-arrested-for-allegedly-raping-his-brother-s-girlfriend
- Bold new Pan African collaboration gets underway at the 2020 virtual South African Book Fair. by 'The South African Book Fair' and 'APO Group - Africa Newsroom' - https://www.africa-newsroom.com/press/bold-new-pan-african-collaboration-gets-underway-at-the-2020-virtual-south-african-book-fair

The fundamental principle behind building our social network will be four-fold and simple:

- If two people are mentioned in the same article, they are friends.
- The closeness of two people is measured by the number of articles in which they are both mentioned.
- If a person is mentioned with an organisation in the same article, he is an associate of that organisation.
- The more articles that mention an individual and a particular organisation, the longer that person has been an associate of the organisation.

Note: Please show all the entities ('ORG' – Organisation and 'Per' – Person) identified in the articles above and their relationships. A table for entities and graph illustration is advised.

A simple example is shown:

Build a social network graph with the following sentence:

'Daniel went to Johannesburg to meet Richard at Standard Bank'

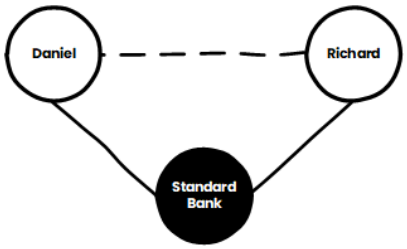

Figure 1 - Social Network Graph.

The above figure depicts a graph built from the example sentence where the dotted line represents the closeness of people, and straight lines represent the association of people to an organisation.

The table below discusses the grading rubric for the social network graph.

CRITERIA	POINTS
Entity Table	10
Graph Illustration	10

Bus Services (A Knapsack Problem).

How would a bus company load passengers with their luggage to maximise a single trip profit?

In the knapsack problem, you need to load groups of travellers and their luggage, with details given in the table below, into different busses with a maximum capacity of 100 people each. If the total number of travellers exceeds the maximum capacity of 100, you can't load them all in one bus. In that case, the problem is to choose a subset of all the given groups of travellers such that a maximum total number of people are fit into the five available busses. Every group of travellers pay the same price. A group of travellers are allowed to have luggage that weighs 100 kilograms in total, and the excess weight is charged at R5 per kilogram.

Table 1 - Travellers Details

GROUP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Members	48	30	42	36	36	48	42	42	36	24	30	30	42	36	36
Weight (kg)	100	300	250	500	350	300	150	400	300	350	450	100	200	300	250

The above table discuses the traveller in groups where “members” is the number of people in each group and “weight” is the total weight of all the luggage of the people in that group. The company want to know how can travellers in the above table loaded in the most profitable way possible. Your task is to use Dynamic Programming to solve the problem using the Java programming language.

The table below discusses the grading rubric for the problem above.

CRITERIA	POINTS
Code Comments	5
Algorithm Implementation	10
Results	10