CSCI 552(Spring 2021)

Homework #3

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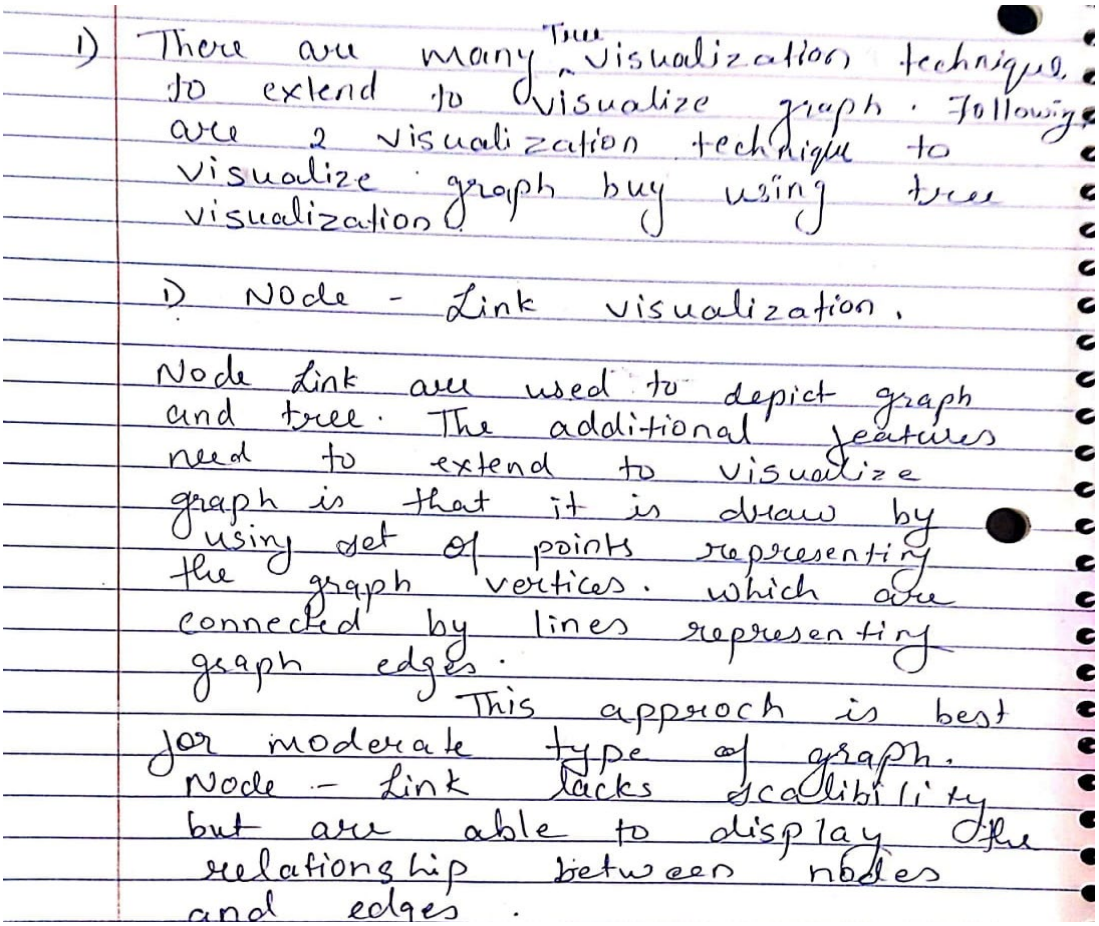
Handout: Thursday, April 1, 2021

Due: 11:59 pm, Thursday, April 15, 2021

Total points: 35

All assignments will be submitted through Canvas. Documents will need to be in either Word or PDF format. Images need to be in jpeg format.

Q1. Since tree is a special case of graph, many tree visualization methods are extended to visualize graphs. Describe two such examples among the known tree and graph visualization methods. Explain what additional features are needed when extending to graphs.



1) There are many Tree visualization techniques to extend to visualize graph. Following are 2 visualization technique to visualize graph buy using tree visualization.

1) Node - Link visualization.

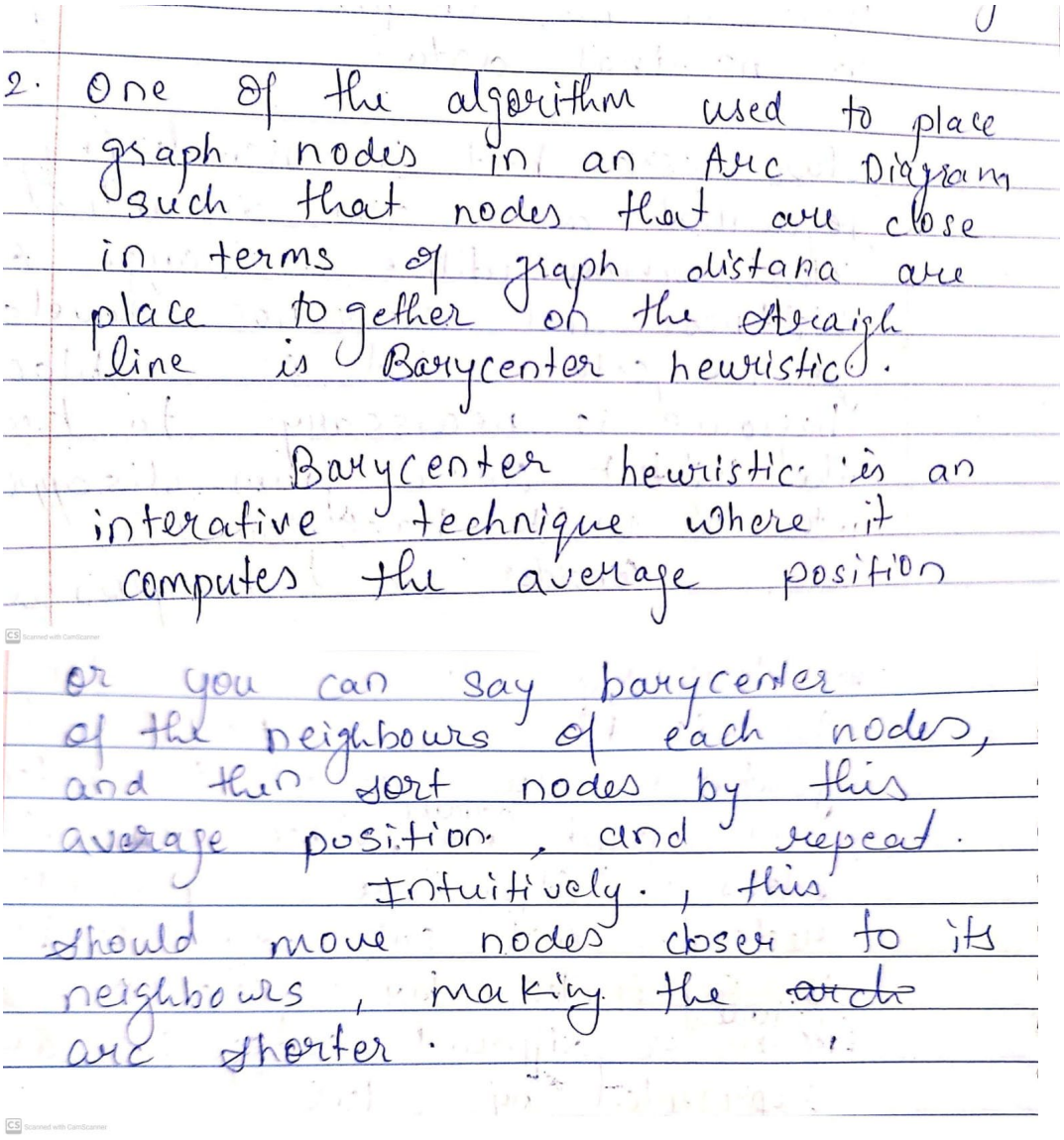
Node Link are used to depict graph and tree. The additional features need to extend to visualize graph is that it is draw by using set of points representing the graph vertices. which are connected by lines representing graph edges.

This approch is best for moderate type of graph. Node - Link lacks scalibility but are able to display the relationship between nodes and edges.

2. Tree map - Treemap is also used to visualize graph. Additional features are needed to extended into graph specially, when represting edges. Edges are represented by rectangle and sub edges or branch is represented by smaller rectangle. Nodes or different categories are represented by color

Treemap are best for large graph, specifically trees by representing the relations between the nodes implicitly. It is easier to spot small as well as large nodes.

Q2 . Arc Diagrams can be used to visualize graphs. In an Arc Diagram, graph nodes are placed on a straight line. This simplifies the graph layout problem but does not eliminate the need for placing the nodes appropriately on the straight line. Describe an algorithm to place graph nodes in an Arc Diagram such that nodes that are close in terms of graph distance are placed together on the straight line.



2. One of the algorithm used to place graph nodes in an Arc Diagram such that nodes that are close in terms of graph distance are place together on the straigh line is Barycenter heuristic.

Barycenter heuristic is an interative technique where it computes the average position or you can say barycenter of the neighbours of each nodes, and then sort nodes by this average position, and repeat. Intuitively, this should move nodes closer to its neighbours, making the ~~arch~~ arc shorter.

Q3 . Word Cloud or Wordle uses text size to represent the frequency of appearance of a word in a document. The colors of the displayed words have not been effectively utilized for any purpose. Design an approach of using text color to improve the Wordle technique in a way that helps summarizing or understanding the text file.

Q3. color works in 2 ways. When visualizing qualitative data, it does not imply order or merely difference in kind. Since there is no conceptual ranking in nominal data. The color are assigned according to statistical rationale that does not fit intention of word cloud color work best in visualizing sequential data. The sequential color scheme utilize a range of lightness and saturation levels for the colors and so a black background is necessary to keep the lightest color from disappearing into a white background. Consider a examples where

yellow - orange - Red is a color scheme. yellow is assigned to lowest frequency, orange to mid frequency and Red to higest frequency of words. A legend can be added to explain colors and hues to represent frequency range.

In a word cloud color assignment effectively improve the meaning without additional annotation.