

Software Design for Community Detection

OBJ: Design software to discover, visualize, and characterize 5 communities of strongly interacting windows in the Hist1 region

a) Find the five nodes with the largest degree centrality

Search through a Pandas Series (degree centrality) containing the degree centrality of each window and Store the five highest degree centrality nodes.

I went ahead & computed this and these are my 'hubs':

Window	degree centrality
53	0.7375
34	0.725
29	0.7125
36	0.6875
16	0.675

b) Using the normalized linkage table as a representation of the network, identify the communities based on their respective hub. Each community has a hub and its neighbors which are the nodes directly connected to the hub.

Method 1

In order to develop the communities I will traverse the adjacency matrix (Edges) that is 81×81 windows and compare the Hubs (5 specific rows) with all other rows.

These comparisons will work as follows:

if $col[i]$ of Hub == $col[i]$ of node:
 $match += 1$ // increment counter

Store the match value for all rows (nodes).

Determine which hub has the strongest connection to each node by selecting the highest match value out of the 5 values for each node.

Hub 1

0	1	1	0	1	...
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Hub 2

1	0	0	0	1	...
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Row 1

0	0	1	0	1
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Row 1 correlates to Hub 1 more than Hub 2

Matches Hub 1 with $\frac{4}{5}$ columns

Matches Hub 2 with $\frac{3}{5}$ columns.

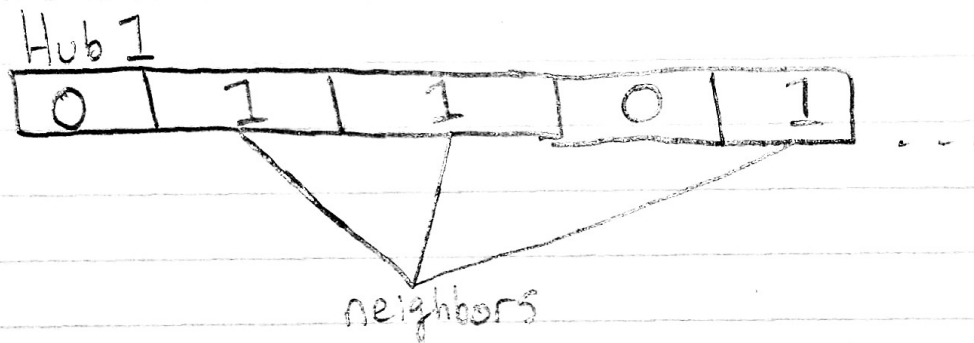
This means Row 1 is in Hub 1's community.

In the case of a tie, we can put the node in more than 1 community.

Method 2

In order to develop the communities I will traverse the adjacency matrix (Edges) that is 81×81 windows and look at the values of the five Hubs.

Each Hub is a row (or column) in the Edge matrix and to determine the Hub's immediate neighbors we check if the value is a '1' or a '0'.



To report the stats of the communities I will make a function with LAD and hist1 as parameters.

When I visualize the community, I will have 1s and 0s in a 81×81 matrix for the respective neighbors and non-neighbors.

I have 5 communities, thus will have 5 heat maps.