

Domain Specific: Social Science

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For this example, we will use PSYCHCONSULT, an extract from the Staff Study of the Indianapolis Network Mental Health Study. This is a file in the Network Workbench (*.nwb) format, a basic edge-list format that can include node and edge attribute information in a text file. It is a directed (asymmetric) unvalued (unweighed) network that represents the consultation choices among the staff that work in a psychiatric hospital.

1 Load Data

Load the PSYCHCONSULT data after launching the NWB Tool with FILE--> LOAD.

Choose the PSYCHCONSULT.nwb data located in the SAMPLEDATA/NETWORK folder. This folder will be located in your NWB Installation Directory.

Once you have loaded this network, you will see it appear in the right-hand "Data Manager" window. You may right-click on this network and choose "View" to look at the contents. You may also open this file separately in a text editor to explore it or make changes. Please note that as you work, new files will be created in the Data Manager window. You may choose to save these files in various formats, and you will need to make sure that you have highlighted the network file that you wish to work in.

2 Basic Network Properties

As a matter of practice, you may want to learn a little about your network and confirm that it was read correctly into NWB. The Network Analysis Toolkit provides a quick overview of your network: Analysis--> Network Analysis Toolkit (NAT).

If you run this on the PSYCHCONSULT network, you will find that you have a directed network with 113 nodes and no isolated nodes. There are two node attributes present: the node label (which is, in this case, the job title of all of the employees) and the area (in this network, the unit in which the employee generally worked). You can also see that you have 861 edges, no self-loops or parallel edges, and no edge attributes. A common edge attribute is weight (value), but this network is unweighted.

The network is weakly connected - each node is connected to another node in the main component with no isolates. It is not strongly connected, however, as some nodes are unreachable (they send, but do not receive ties). You will also see the network's density reported.

If you should find isolates or self-loops in your data, they could pose problems for several algorithms that are currently implemented. NWB offers options for dealing with these issues: Preprocessing --> Remove Self Loops and Preprocessing--> Delete Isolates.

These options will create a new network file in the Data Manager window. You can then select this network and save it with a new name.

3 Network Analysis

NWB implements a few basic algorithms that you can use with an unweighted and directed network like PSYCHCONSULT. Make sure your network is highlighted in the Data Manager window.

- In-degree and out-degree centrality can be calculated with Analysis --> Unweighted & Directed --> Node Indegree.

Note that this will actually create two files: a text file with a sequence of the in-degree centrality of the nodes and a new network file that has appended the in-degree as an integer attribute. Choose this network file, apply the Node Outdegree centrality algorithm and you can create a new network with both measures as attributes.

- Reciprocity can be calculated with Analysis --> Unweighted & Directed --> Dyad Reciprocity.

This will give you a network-level reciprocity measure. In this network, 17.5 percent of dyads are reciprocal.


```
g.nodes.labelvisible=true
for node in g.nodes:
node.x=node.x*10
node.y=node.y*10
(label=="psychiatrist").color=red
(label=="med dir, inpt. unit").color=red
(label=="nurse").color=blue
clusts = groupBy(area)
for c in clusts: createConvexHull(c,randomColor(50))
```

After you have entered these commands or run this script file, your network might disappear off-screen. Choose View --> Center to return to the network.

These commands make the labels visible, change the sizes of the nodes and edges, colors the labels (the same color being assigned to nodes that have the same label of job type, and colors psychiatrists and the medical director red, while nurses are colored blue). The script also creates "hulls," or demarcations of areas of the network based on the attribute of area. You can experiment with the random colors assigned to the hulls by rerunning this script or line.

To save your visualization, choose FILE--> EXPORT IMAGE.