Analysis results for the first day's data

The first of the twelve days’ data was converted into a network and processed with networkX. The results were automatically generated and written to an Excel file. The Python code is in the Jupyter Notebook file.

# Overall

The overall properties of the network were shown in the firs sheet of the Excel file, which contains the table shown below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Average Length** | **Diameter** | **Radius** | **NumNodesRm** | **NodesToRm** | **NumEdgesRm** | **EdgesToRm** | |
| 1.403076923 | 2 | 2 | 8 | H | 10 | N | V |
|  |  |  |  | Q |  | W | V |
|  |  |  |  | R |  | J | V |
|  |  |  |  | K |  | S | V |
|  |  |  |  | W |  | I | V |
|  |  |  |  | N |  | M | V |
|  |  |  |  | X |  | A | V |
|  |  |  |  | M |  | P | V |
|  |  |  |  |  |  | Z | V |
|  |  |  |  |  |  | C | V |

The average length is 1.4, which means for any arbitrary pair of nodes in the network, it averagely takes 1.4 hops to connect them.

The diameter is 2, which means for any pairs of nodes, it takes at most 2 hops to connect them.

The Radius is also 2, which means each node has at least one counterpart that takes it at least 2 hops to reach.

The number of nodes to remove is 8, which means at least 8 nodes should be removed in order to break the network apart. The nodes should be removed are listed in the next column.

The number of edges to remove is 10, which means at least 10 edges should be removed in order to break the network apart. The edges should be removed are listed in the next two columns.

Eccentricities

Eccentricity indicates how far away a node is from the network’s center. From the results in the second sheet, we can see that all the nodes has an eccentricity of 2, and all the nodes are both peripheries (marginal nodes) and centers. Therefore the network does not have an obvious center.

Eccentricity is not weighted. In other words, if a node has only one connection to the rest part of the network and another has many, they have the same eccentricity, but when it comes to centrality, the latter will be greater. This can be seen in the next section.

Centralities

Centrality shows which nodes are at the center of the network. In the third sheet three types of centralities were calculated.

Degree centrality is based on how many neighbors a node has. Betweenness centrality is based on how many connections go through this node, and closeness centrality indicates how close this node is from other nodes.

The results are presented with three column charts.