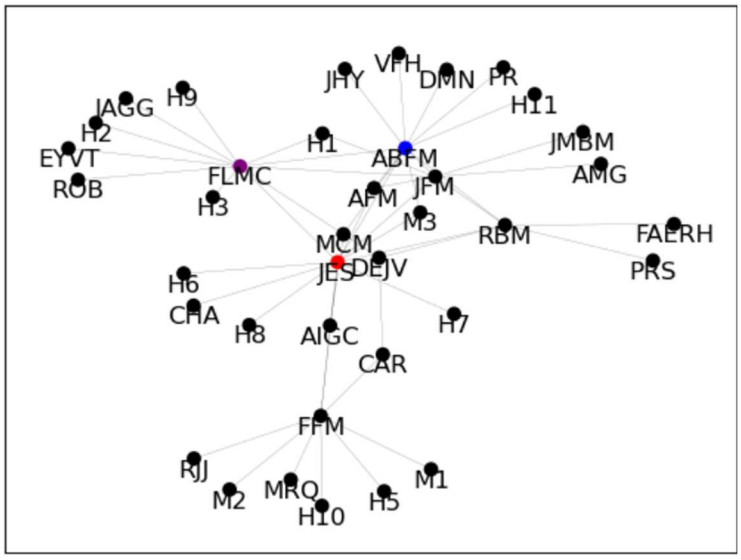
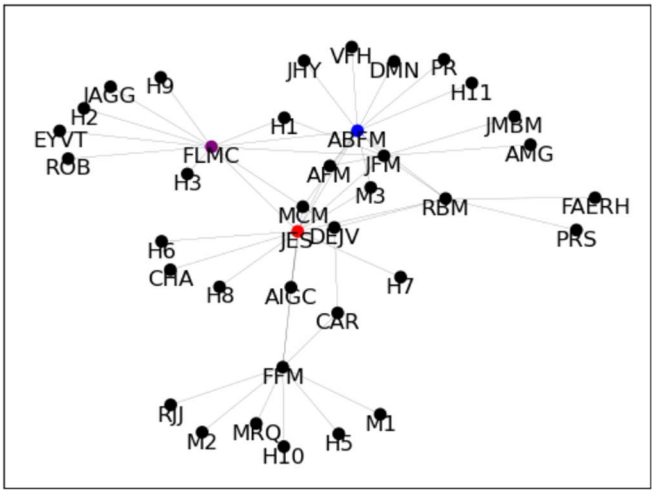
Module 6 Project

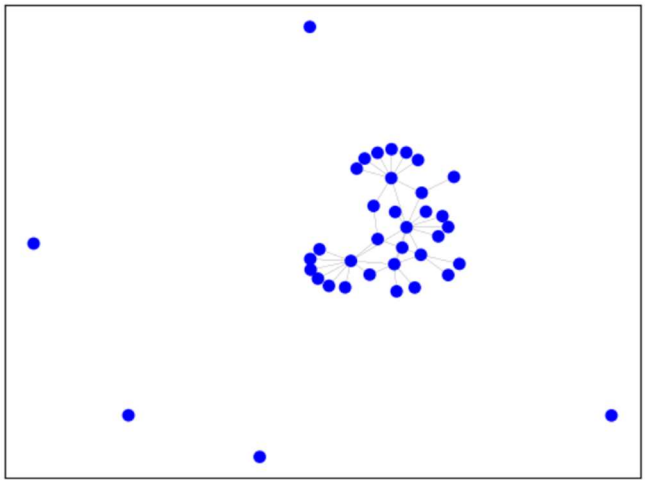
I have performed a dismantling analysis on a dataset collected via police investigations of a cocaine smuggling operation in Spain. The dataset used was from the Jake group in 2008, which was operating in the gypsy quarter of Madrid. The data was loaded into a pandas data frame, indexed by the column and then turned into a networkx object. Finally, that networkx object was graphed.



The blue node is the node with the highest degree centrality 'AFBM', and the red node is the node with the highest betweenness centrality 'JES'. The purple node is 'FLMC' which was removed because it seemed very connected. We can see from this graph that this is a very connected network, and the colored dots are the most connected nodes. Those most connected nodes were then removed to observe the effect on the network.

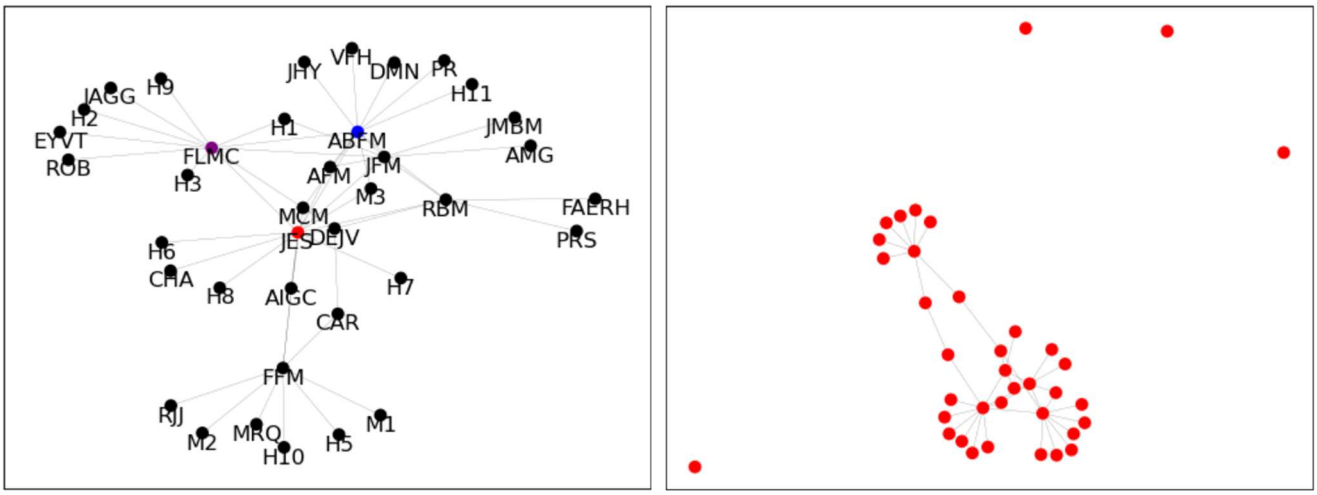
Firstly, node 'ABFM' was removed based on degree centrality, as it has the highest value of 0.3243.





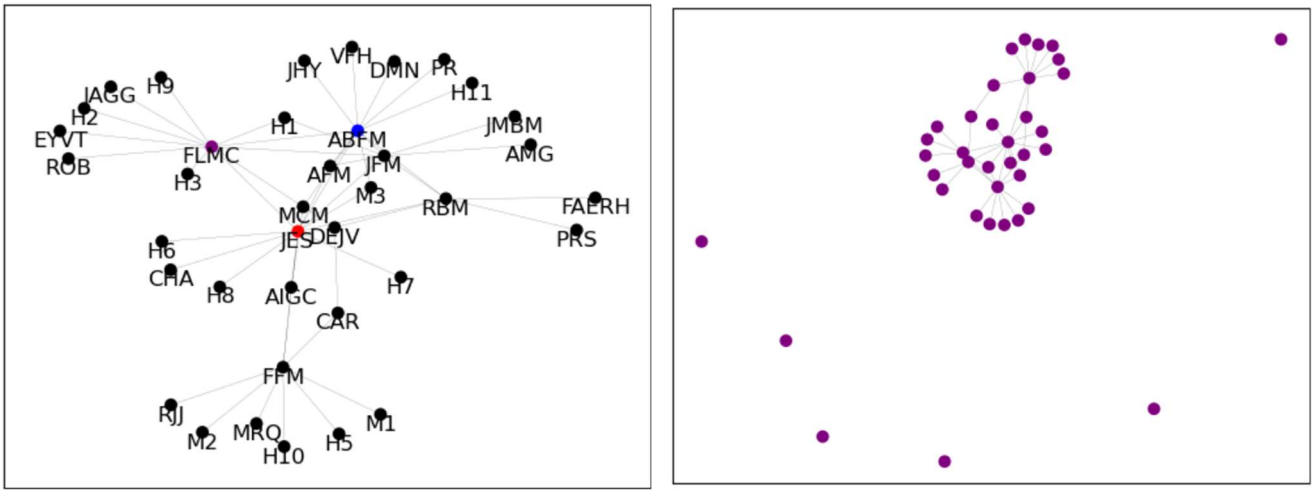
The removal of this node reduced the connections by about 16%. As seen in the visualization, were now have 5 outliers, but a still a lot of connections.

Then the node with the highest betweenness centrality ‘JES’ was removed from the original network.



This produced a network with 4 outliers and a reduction in connectivity of about 13%.

Interestingly, removing the 'FLMC' node resulted in 6 outliers and an 18% reduction in connections, despite not having the highest degree or betweenness centralities.



However, looking back at the original graph, both the 'FLMC' and 'ABFM' are the main nodes (I will refer to as "leaders") for 2 of the 3 clusters. The betweenness node 'JES' is the only node that has direct connections to 2 of the cluster leaders, so if the network were to be dismantled, targeting the 'JES' node is the best option because while it does not reduce as many connections, it makes communications between the clusters more difficult because there is no longer a direct connection. On the other hand, if those clusters are responsible for critical parts of the operation and are not cross trained on those tasks then

perhaps removing one of the cluster leaders would lead to better network dismantling. Determining the leader to remove could involve determining the most connections broken or which cluster has the most critical role in the operation.