9/11 Hijackers Affiliations

Exploring network connections related to data from the 9/11 attack

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Introduction

- Dataset from 9/11 hijackers, extracted from news reports with ties such as ''to school with'' and ''on the same plane as''

- Technologies used: Python, Pandas, Jupyter Notebook, Matplotlib, Seaborn

Objective

- Our objective for our project is to analyze a dataset that we have found that relates to 9/11 terrorist groups

- Analyze a network of specific groups of people

- Learn how the group communicates and how each person is tied with one another

- Networks of terrorist groups, can be graphed and then analyzed to examine how closely related these groups and people are

Data Gathered

Dataset in XML before clean-up

Dataset in csv format after clean-up

```
233    <link source="Ahmed Alnami" target="Saeed Alghamdi*"/>
234    <link source="Ahmed Alnami" target="Hamza Alghamdi"/>
235    <link source="Ahmed Alghamdi" target="Hamza Alghamdi"/>
236    <link source="Hamza Alghamdi" target="Ahmed Alnami"/>
237    <link source="Hamza Alghamdi" target="Ahmed Alghamdi"/>
238    <link source="Hamza Alghamdi" target="Saeed Alghamdi*"/>
239    <link source="Hamza Alghamdi" target="Ahmed Al Haznawi"/>
240    <link source="Hamza Alghamdi" target="Mohand Alshehri*"/>
241    <link source="Ahmed Al Haznawi" target="Saeed Alghamdi*"/>
242    <link source="Ahmed Al Haznawi" target="Hamza Alghamdi"/>
243    <link source="Ahmed Al Haznawi" target="Ziad Jarrah"/>
244    <link source="Mohand Alshehri*" target="Hamza Alghamdi"/>
245    <link source="Mohand Alshehri*" target="Fayez Ahmed"/>
246    <link source="Fayez Ahmed" target="Mohand Alshehri*"/>
247    <link source="Fayez Ahmed" target="Marwan Al-Shehhi"/>
248    <link source="Ziad Jarrah" target="Ahmed Al Haznawi"/>
249    <link source="Ziad Jarrah" target="Marwan Al-Shehhi"/>
250    <link source="Ziad Jarrah" target="Mohamed Atta"/>
251    <link source="Marwan Al-Shehhi" target="Fayez Ahmed"/>
252    <link source="Marwan Al-Shehhi" target="Ziad Jarrah"/>
253    <link source="Marwan Al-Shehhi" target="Mohamed Atta"/>
254    <link source="Marwan Al-Shehhi" target="Abdul Aziz Al-Omari*"/>
```

```
From,To
Majed Moqed ,Hani Hanjour
Khalid Al-Mihdhar ,Hani Hanjour
Khalid Al-Mihdhar ,Nawaf Alhazmi
Hani Hanjour ,Majed Moqed
Hani Hanjour ,Khalid Al-Mihdhar
Hani Hanjour ,Nawaf Alhazmi
Nawaf Alhazmi ,Khalid Al-Mihdhar
Nawaf Alhazmi ,Hani Hanjour
Nawaf Alhazmi ,Salem Alhazmi
Nawaf Alhazmi ,Ahmed Alnami
Nawaf Alhazmi ,Saeed Alghamdi
Nawaf Alhazmi ,Hamza Alghamdi
Salem Alhazmi ,Nawaf Alhazmi
Ahmed Alnami ,Saeed Alghamdi
Ahmed Alnami ,Hamza Alghamdi
Ahmed Alghamdi ,Hamza Alghamdi
```

Data Gathered

Import the dataset and display general attributes

```python
1  import networkx as nx
2  import matplotlib.pyplot as plt
3  %matplotlib inline
4  import pandas as pd
5  import seaborn as sns
6  import matplotlib.colors as mcolors
7
8
9  df = pd.read_csv("9_11_hijackers.csv") #load
```

```python
1  df.head() #display the head of our dataset
```

```python
1  #read the edgelist
2  mygraph = nx.from_pandas_edgelist(df, source="From",target="To")
3
4  #display info about type, node/edge count avg degree etc
5  print(type(mygraph))
6  print(nx.info(mygraph))
```

	From	To
0	Majed Moqed	Hani Hanjour
1	Khalid Al-Mihdhar	Hani Hanjour
2	Khalid Al-Mihdhar	Nawaf Alhazmi
3	Hani Hanjour	Majed Moqed
4	Hani Hanjour	Khalid Al-Mihdhar

```
<class 'networkx.classes.graph.Graph'>
Name:
Type: Graph
Number of nodes: 114
Number of edges: 187
Average degree:   3.2807
```
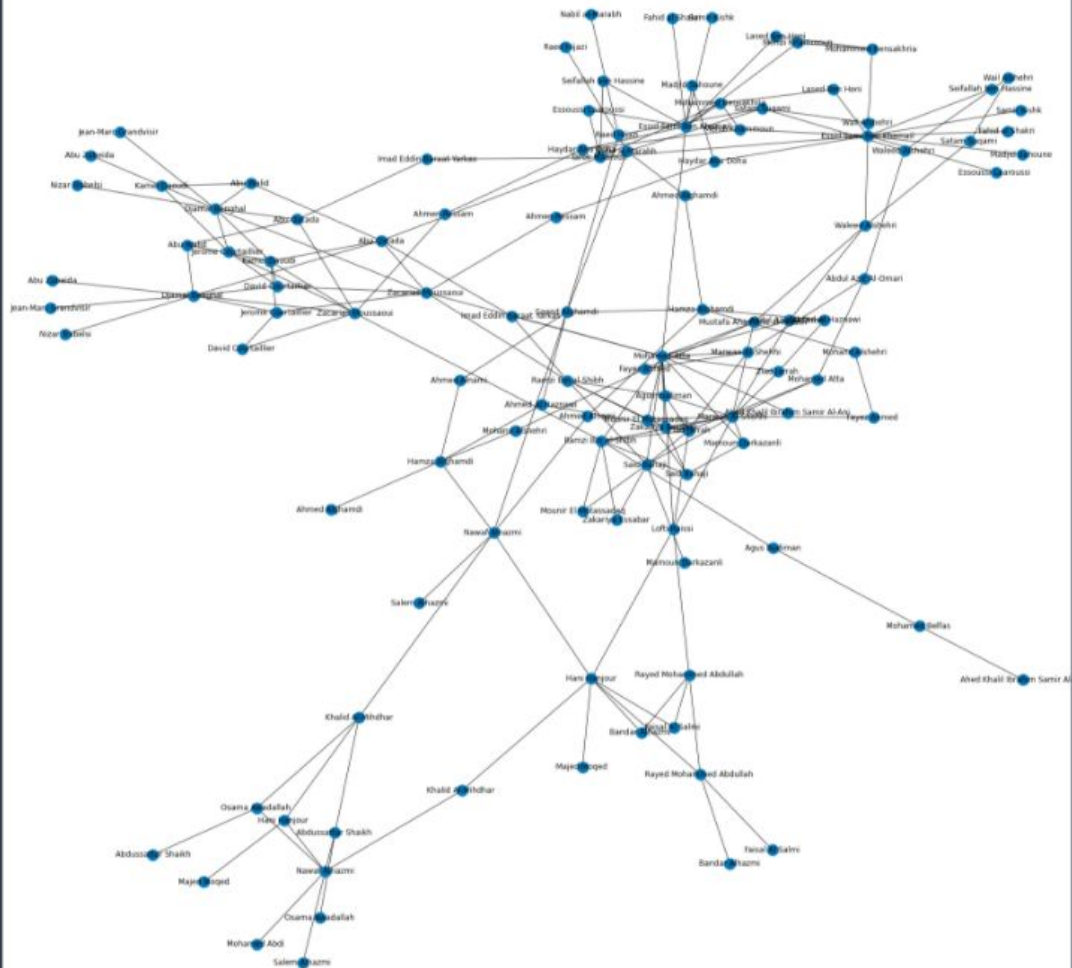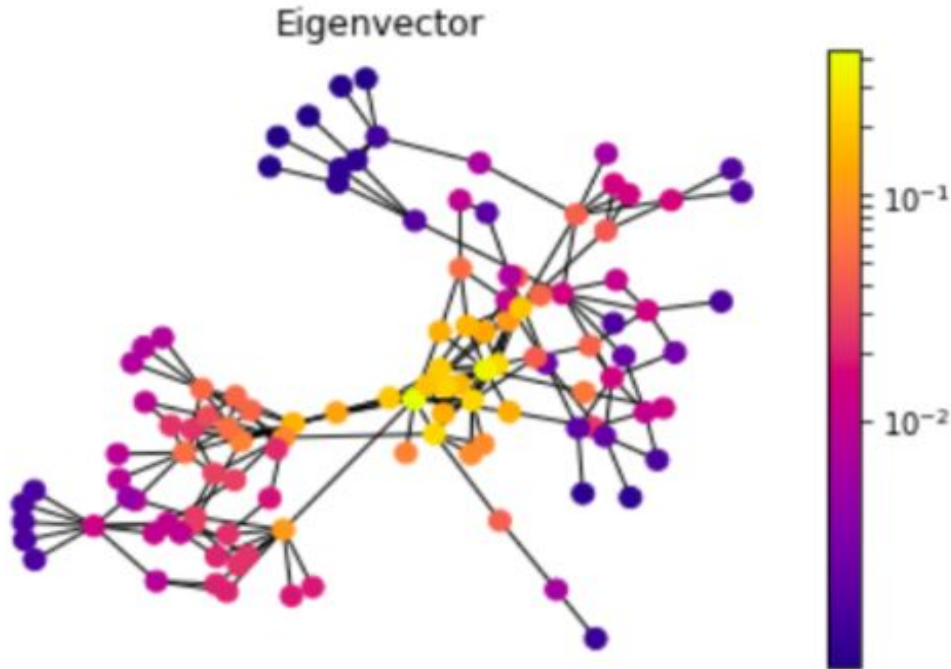
Observations - Degree Centrality

```
[32]: pos = nx.spring_layout(mygraph, seed=675)
      draw(mygraph, pos, nx.degree_centrality(mygraph), 'Degree Centrality')
```
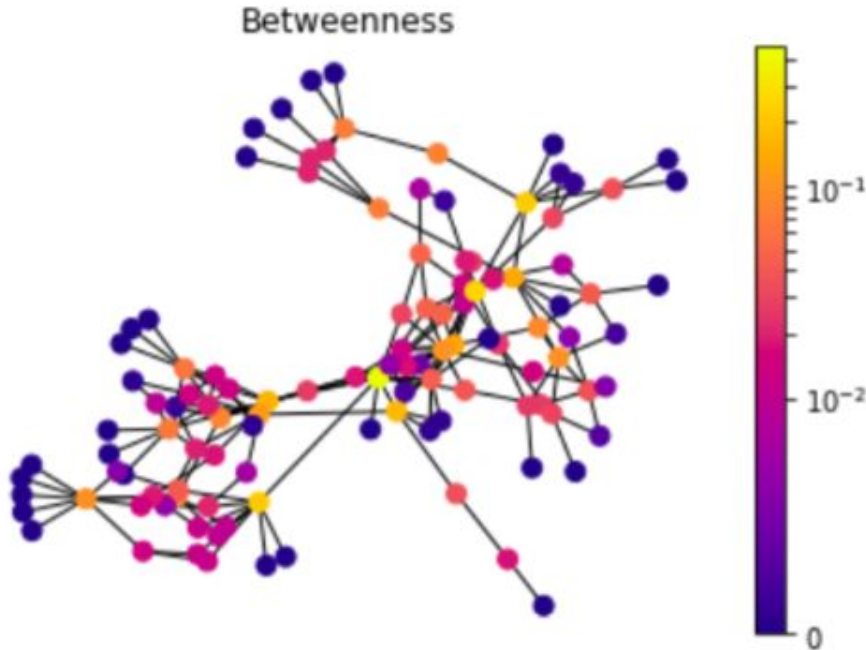

Degree Centrality
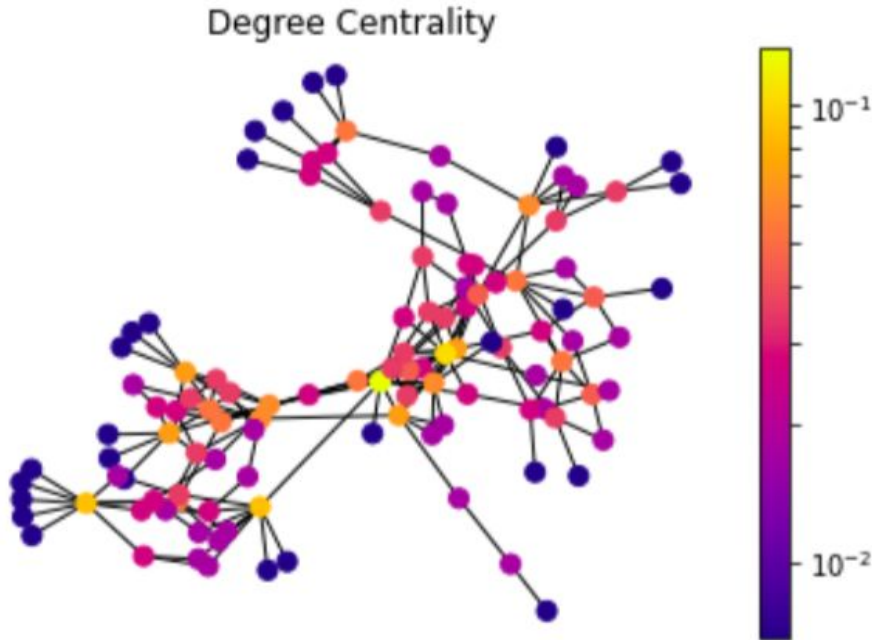
Observations - Eigenvector centrality

```
21]: pos = nx.spring_layout(mygraph, seed=675)
     draw(mygraph, pos, nx.eigenvector_centrality(mygraph), 'Eigenvector')
```


Eigenvector

Observations - Betweenness Centrality

```
]:  pos = nx.spring_layout(mygraph, seed=675)
    draw(mygraph, pos, nx.betweenness_centrality(mygraph), 'Betweenness')
```


Betweenness

Results

- The network appears to be sparse, since there are clusters of individuals within the network that appear distant to other clusters
  - This can possibly interpret to the network wanting to minimize damage to the network if a member of the network is captured or otherwise compromised
- The most critical node, or person within the hijacker network, appears to be Mohamed Atta, as he holds the node with the highest degree and betweenness within the network
- Many of the members of the network held weak ties with each other, with only the most critical nodes allowed bridges for these nodes

Conclusion

- Being linked to a terrorist group does not prove guilt, but does invite investigation
- Networks such as a cover network as the one we analyzed do not have the members form many ties outside of their immediate cluster
- In our network, it is difficult to determine which whether ties are weak or strong, since members would rarely interact with others, but when they did, they would all know the most critical nodes, such as Mohamed Atta
- Many of the nodes in the network were not directly involved in the attacks that the data relates to
- Atta was the most influential and held the leader status in the network

9-11 Terrorist Network

- Social network graph.

  - Node: people.

  - Edge: relationship between

two people.

Reference: Valdis Krebs, http://www.firstmonday.org/issues/issue7_4/krebs