Math 168: Short Essay 3
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Network Visualizations

Penguins

I chose to visualize the Penguins of Kyoto data set Abby mentioned in discussion. Brooks and Feng[2] produce several data sets to model social behavior amongst 59 penguins in an aquarium in Kyoto. There are data sets measuring whether the penguins are friends, couples, exes, enemies, family and one even considering complicated relationships. In particular, I chose to visualize the penguin exes data set with a Spring layout (Ford-Fulkerson algorithm). A graph of the network's degree distribution and the visualization are shown below.

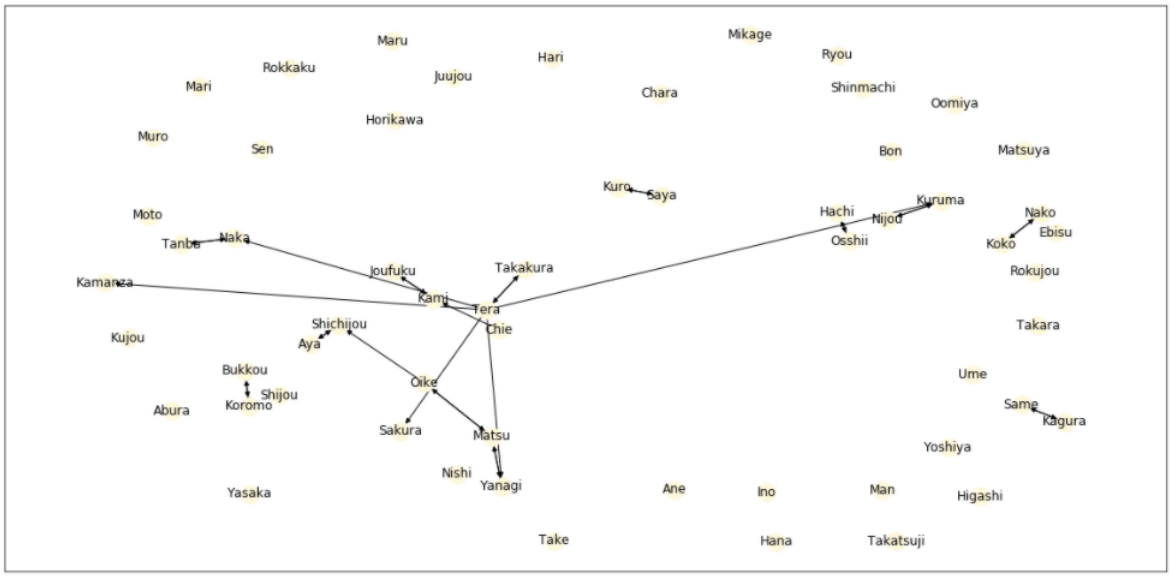

Figure 1: Ex-relationship structure amongst the Penguins of Kyoto

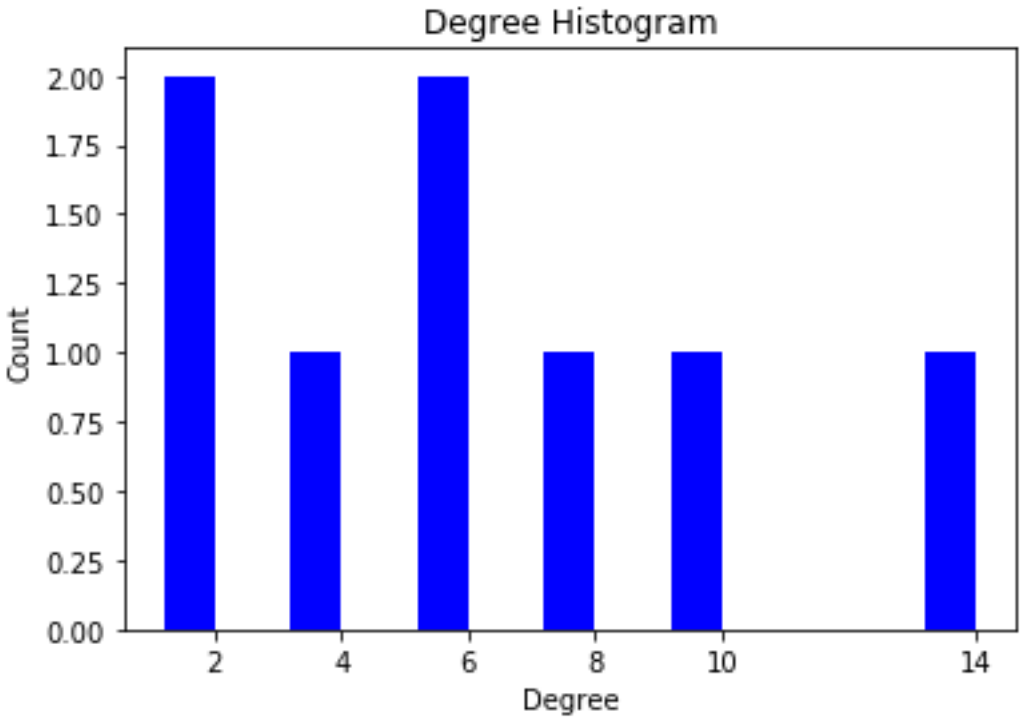

Figure 2: Degree distribution of the Penguins of Kyoto Exes Network

Baboons

For the second visualization, we look at the relationships between 8 Gelada Baboons, studied by Dunbar and Dunbar in 1975[1]. The picture shows the social dynamics of baboons before there were 2 more baboons added to see differences in behavior. The authors record characteristics like gender, dominant nature, leader/follower and whether the baboon was a newcomer.

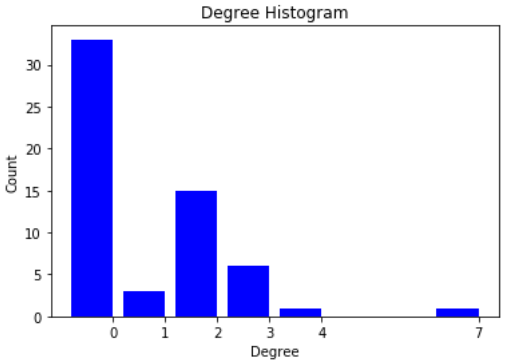

Figure 3: Degree distribution of the Baboon Network

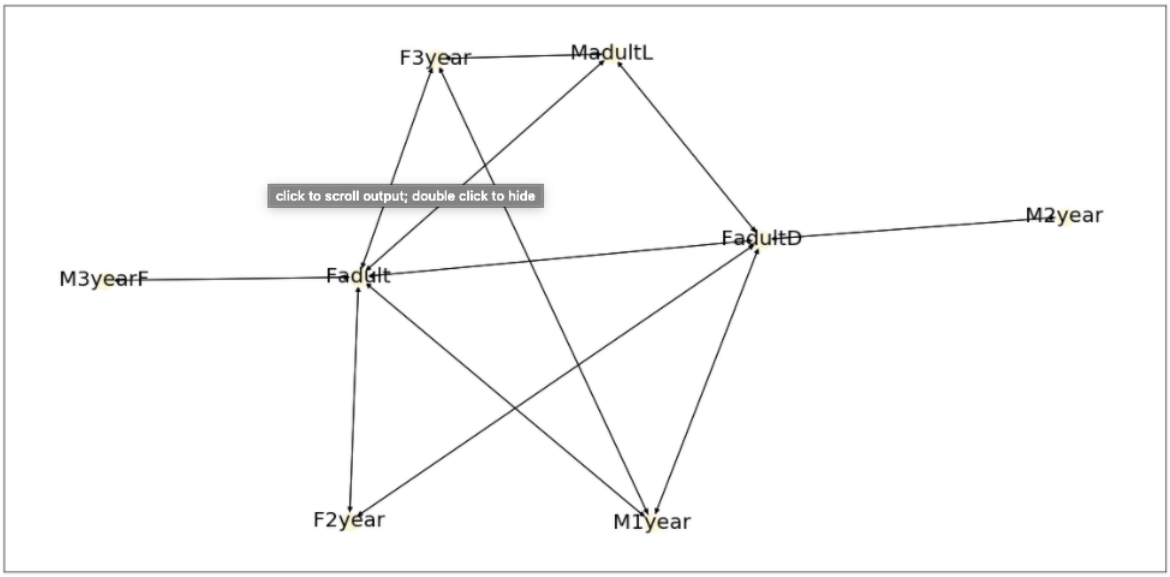

Figure 4: Social Dynamics of Galeda Baboons

Python Code

```
import networkx as nx
import matplotlib.pyplot as plt
import collections
%matplotlib inline

penguins = nx.read_gexf('penguins_of_kyoto/gexf/Penguin_Exes.gexf')
baboons = nx.read_pajek('baboons.paj')

plt.figure(figsize=(20,10))
nx.draw_networkx(baboons, node_color='#FEF8DD', font_size=20)

plt.figure(figsize=(20,10))
nx.draw_networkx(penguins, pos=nx.spring_layout(penguins, k=0.15, iterations=

def plot_deg_dist(G):
    degree_sequence = sorted([d for n, d in G.degree()], reverse=True)
# degree sequence
    degreeCount = collections.Counter(degree_sequence)
    deg, cnt = zip(*degreeCount.items())

    fig, ax = plt.subplots()
    plt.bar(deg, cnt, width=0.80, color="b")
```

```
    plt.title("Degree Histogram")
    plt.ylabel("Count")
    plt.xlabel("Degree")
    ax.set_xticks([d + 0.4 for d in deg])
    ax.set_xticklabels(deg)
    plt.show()

plot_deg_dist(penguins)
nx.number_of_edges(penguins)
```

References

[1] Dunbar R. and Dunbar P. *Social Dynamics of Galeda Baboons.* `Contributions to Primatology 6(1975), 1-157.`, 1975.

[2] Heather Z. Brooks and Michelle Feng *Penguins of Kyoto Multilayer Network.* *https://bitbucket.org/mhfeng/penguins*$_o f_k$*yoto/src*2020.