Network Analysis Reading Group

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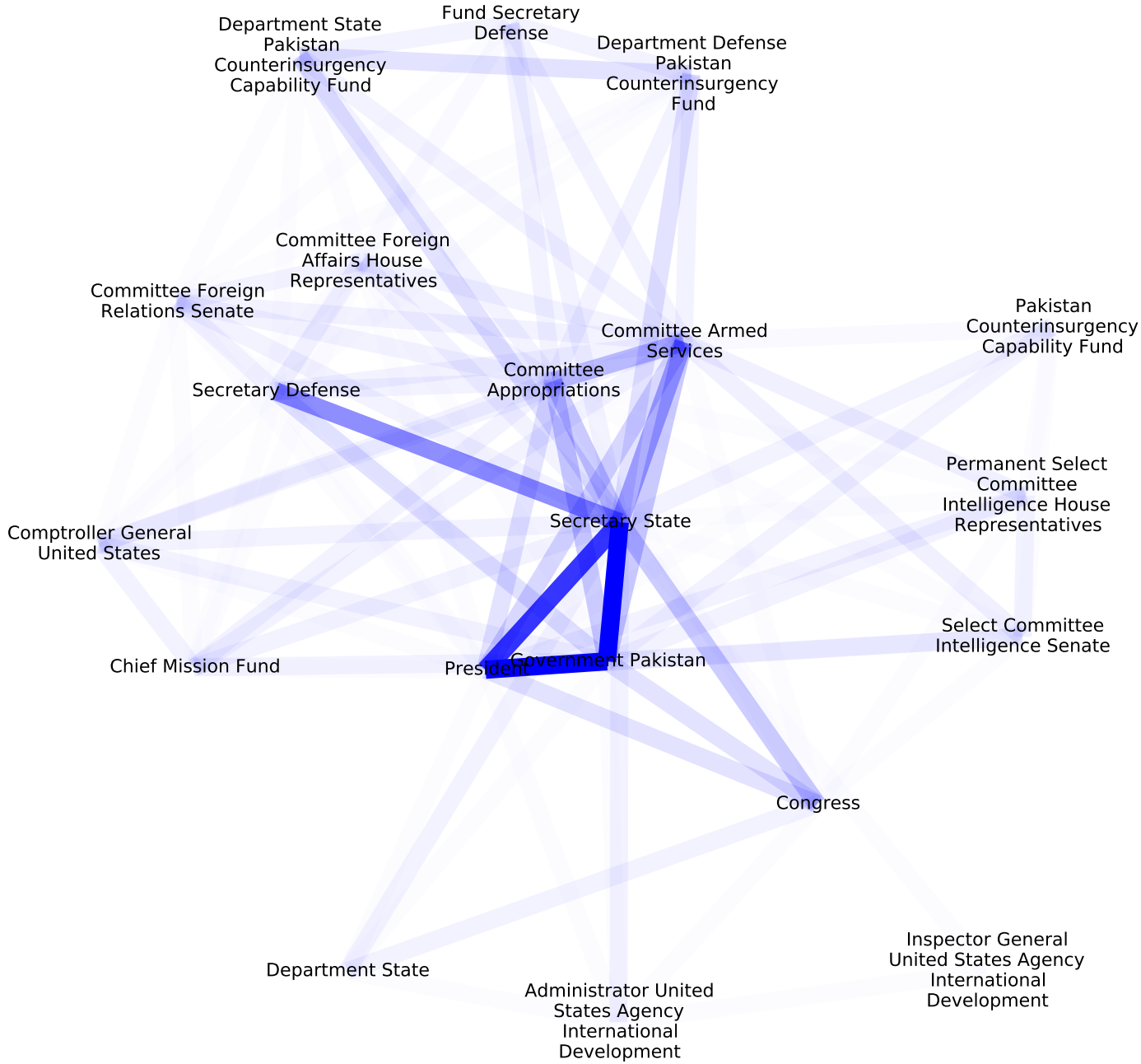
Welcome!


Department State Pakistan Counterinsurgency Capability Fund
Fund Secretary Defense
Department Defense Pakistan Counterinsurgency Fund
Committee Foreign Affairs House Representatives
Committee Foreign Relations Senate
Committee Armed Services
Pakistan Counterinsurgency Capability Fund
Committee Appropriations
Secretary Defense
Permanent Select Committee Intelligence House Representatives
Secretary State
Comptroller General United States
Select Committee Intelligence Senate
Chief Mission Fund
President
Government Pakistan
Congress
Department State
Inspector General United States Agency International Development
Administrator United States Agency International Development

Welcome!

- Network analysis is a hot topic in many areas, e.g.:
  - Social networks
  - Citation networks
  - Donor networks

- Widely but erratically used in political science

Goals

- Theoretical:
  - Familiarize ourselves with network analysis terminology, data formats (centrality, density, one/two-mode networks, local structures...)
  - Introduce major modeling approaches (quadratic assignment, ERGMs...)
- Applied:
  - Explore major network analysis software packages (Python, R)
  - Discuss measurement concerns in applied work

Logistics

- Each week, one person leads the group
- Three parts of the meeting
  - **Lightning talk:** 5 minutes (3-5 slides), introduction to the topic
  - **Discussion:** 30 minutes, give reactions to the week's ideas and applied paper
  - **Application:** 15 minutes, walk through code and software output

Example

```
class Visualize:
    def __init__(self, edge_data):
        import textwrap
        import networkx as nx

        self.edge_data = [('\n'.join(textwrap.wrap(edge[0].title().strip(), 20)),
                           '\n'.join(textwrap.wrap(edge[1].title().strip(), 20)),
                           edge[2]) for edge in edge_data]

        self.G = nx.Graph()
        weights = []
        for u, v, w in self.edge_data:
            self.G.add_edge(u, v, weight=w)
            weights.append(w)

        self.pos = nx.nx_pydot.graphviz_layout(self.G)
        self.draw()

    def draw(self):
        import matplotlib.pyplot as plt
        import networkx as nx

        plt.figure(figsize=(15, 15))
        nx.draw_networkx_nodes(self.G, self.pos, node_size=0, alpha=0, node_color='black')

        m = float(max([e[2] for e in self.edge_data]))
        for edge in self.edge_data:
            edge_list = [[edge[0], edge[1]]]
            nx.draw_networkx_edges(self.G, self.pos, edgelist=edge_list, width=10, alpha=(edge[2]/
m)**2, edge_color='b')

        nx.draw_networkx_labels(self.G, self.pos, font_size=10, font_family='sans-serif')
        plt.axis('off')
        # plt.draw()
        # raw_input('')
        # plt.close()
        plt.savefig("/home/rbshaffer/Desktop/fig1.pdf", dpi=100)
```

Logistics

- **1/26:** Terminology, data
- **2/2:** Types of networks
- **2/9:** Visualization
- **2/16:** Node centrality
- **2/23:** Network balance
- **3/2:** Local structures
- **3/9:** Diffusion
- **3/23:** Mutual support
- **3/30:** ERGMs
- **4/13:** Latent space models
- **4/20:** QAP
- **4/27:** Logistic reg. (p*)

Questions? Thoughts?