18-755: Networks in the Real World
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Overview of the project topic (~5 sentences):
- Our project will focus on the "Network Destroy-Repair Game." Robustness is a fundamental attribute of networks, and as A. L. Barabasi has shown in [1], a lack of robustness can cause failure in biological, economic and engineering systems. Given the environment, some networks have the remarkable strength to tolerate attacks and may even have the ability to repair itself. On the other hand, other networks are more susceptible to attacks and failures occur in a cascading and detrimental manner. Therefore, it is important to evaluate the robustness property of a network and this analysis will in return allow a better understanding of natural and man-made network systems.

Goal of the project (~5 sentences):
- In this project, we will investigate the robustness of networks under varying circumstances and how resilient each network behaves in response to deliberate attacks or failures.The goal of our project can be summarized into the following components. First, we will select our target networks and analyze the properties of the network such as the number of nodes, the degree, etc. Second, we will design an attack and repair mechanism for the network and monitor the network behavior under different attack and repair conditions. Finally, we want to explore the consequences of our result and consolidate our results to demonstrate the robustness of each network and propose reasons to explain why certain networks are more robust than others.

Dataset and networks (~6 sentences):
- In this project, we will be using the dataset provided by Stanford's SNAP [2]. SNAP provides a range of datasets and we will select from one of these, such as citation network, social network, internet network and road network. These datasets are examples of a network; paper and references are respectively the nodes and edges in a citation network, while individual accounts and following are respectively the nodes and edges in a social network. We anticipate these networks to have a mix of directed and undirected edges. We further anticipate that the networks have a power-law distribution, as some particular nodes in the citation and social networks have more influence than others.

Reference:

1. A.-L. Barabasi. Network Science. Cambridge University Press
2. https://snap.stanford.edu/data/