

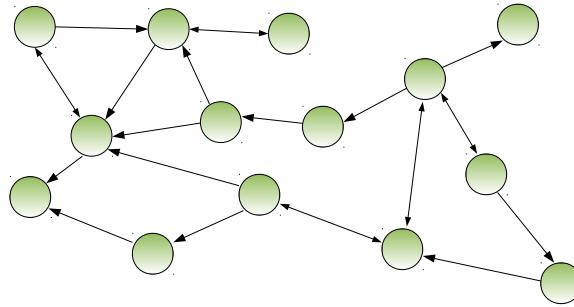
Project Title: Node Selection Methods for Control of Complex Networks

Background: Many complex systems in modern society, such as electrical power grids, transportation systems, and biological systems, can be described as complex networks. Such networks contain a large number of nodes, with edges between nodes if one node can influence another.

The problem of control of complex networks, where one controls a subset of the nodes in order to drive the entire network to a certain desired behaviour, has received significant recent interest [1, 2]. Such problems consist of 1) selection of a set of control nodes, and 2) the design of control laws to drive the network to the desired state/s.

A quantitative notion of network controllability in terms of the control energy was proposed in [2]. A control strategy consisting of a method to select the set of control nodes based on network partitioning, and a distributed control law, was also developed.

Project: The method for selecting the control nodes in [2] is heuristic, and may not necessarily give the best performance. This project will involve the investigation of different methods for selection of the control nodes, such as methods originating in the community detection literature [3, 4].



Prerequisites: Knowledge of control theory and optimization. Ability to program in Python and/or Matlab.

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References

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