Class Project Description

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Stochastic Block Model (SBM) is a generative model used for generating random networks with some structures, including community structure, core-periphery structure, etc. [1]. In this model, each node (vertex) is assigned to one of communities. Edges are placed between nodes with the probability p which depends on the nodes' membership to the communities. For example, nodes in the same group, say c_1 could more likely be connected than those which both are in different groups, c_i and c_j. One of the advantages of SBM is that we could control the structure of a network with a handful parameters. In this class project, I am going to construct a temporal SBM model which takes a set of three parameters , which evolve according to some chaotic equation, such as Lorenz equation. The idea is that those three parameters which control the network structure evolve over time as a state-space trajectory in a chaotic equation. I then construct networks based on the resulting parameters and investigate some properties of them.

The Following are a more detailed description of the parameters (they are still very abstract, meaning that I will have to ponder on them more): C, a quantity measuring the density of the entire network (mean degree could be useful), $C_{in} - C_{out}$, a measure of how skewed connections are between communities where C_{in} and C_{out} are edge densities within a community and between communities, respectively , and γ, the ratio of communities' size. In this model, we assume there only exists two communities for the sake of simplicity.

References

[1] `https://en.wikipedia.org/wiki/Stochastic_block_model`.