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A Closer Look at Assortative Mixing

Assortative mixing in networks is the tendency for nodes with the same attributes to link to each other. It is a property often found in social networks, manifesting as a higher tendency of links occurring between people of the same age, race, or political belief. Quantifying the level of assortativity or disassortativity (the preference of linking to nodes with different attributes) can shed light on the organisation of complex networks. It is common practice to measure the level of assortativity according to the assortativity coefficient, a network analogue of Pearson's correlation. In this talk I will describe a number of issues with measuring and interpreting assortativity, particularly for categorical attributes. First is that often the extremal values $(-1,1)$ are often unattainable due to the degree heterogeneity of the network and I will present combinatorial bounds that may be used to renormalise for a given degree sequence. Second is that assortativity is an average over the network and may not be a representative statistic when mixing patterns are heterogeneous. To capture the heterogeneity in assortativity I will present an approach to localise this global measure so that we can describe the assortativity, across multiple scales, at the node level.