

1116-05-2288 **Kelly Yancey** and **Matthew Yancey*** (mpyancey1@gmail.com). *Bipartite Communities*.

A recent trend in data-mining is to find communities in a graph. Generally speaking, a community of a graph is a vertex set such that the number of edges contained entirely inside the set is “significantly more than expected.” These communities are then used to describe families of proteins in protein-protein interaction networks, among other applications. Community detection is known to be NP-hard; there are several methods to find an approximate solution with rigorous bounds.

We present a new goal in community detection: to find good bipartite communities. A bipartite community is a pair of disjoint vertex sets S , S' such that the number of edges with one endpoint in S and the other endpoint in S' is “significantly more than expected.” We claim that this additional structure is natural to some applications of community detection. In fact, using other terminology, they have already been used to study correlation networks, social networks, and two distinct biological networks. We will show how the spectral methods for classical community detection can be generalized to finding bipartite communities, and we will prove sharp rigorous bounds for their performance. Additionally, we will present how the algorithm performs on public-source data sets. (Received September 22, 2015)