

# Quality Functions in Recognizing Communities in Complex Networks

Nenad Mladenović

Mathematical Institute SASA, Belgrade, Serbia  
nenad@mi.sanu.ac.rs

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Many systems in the real world exist in the form of complex networks, such as biological, social, www, transportation etc. Community detection refers to finding a subset of vertices, called communities, that are more densely connected among themselves than with vertices in other communities. There is no precise definition of the community but there are many ways to formalize this idea. One way is to specify an objective function to optimize. Various objective functions, also known as quality functions, have been proposed such as normalized cut, sum-of-squares, ratio cut, edge-ratio, modularity and exponential quality. In this paper we compare several such functions on small test instances where communities are known. Communities obtained by each objective function are evaluated by other quality functions and ranked. Interesting observations are derived. For example, the objective function that recognized known structures of all instances, was ranked among worst with respect to other objectives.