

Clustering in networks

Vladimir Batagelj^{1,2,3}

¹Institute of Mathematics, Physics and Mechanics,
Jadranska 19, 1000 Ljubljana, Slovenia

²University of Primorska, Andrej Marušič Institute, 6000 Koper, Slovenia

³ National Research University Higher School of Economics,
Myasnitskaya, 20, 101000 Moscow, Russia.

vladimir.batagelj@fmf.uni-lj.si

Real life networks are usually created by some processes adding / removing nodes or links and changing their properties. An increased activity in some part of a network often increases a local density of nodes / links and intensity of properties in that part.

In this talk we will consider two problems: identification of important units / subnetworks and determining a (complete) clustering of a given network.

To identify important subnetworks we usually define a measure (property of nodes or weight on links) expressing our goal / question combining local structural information (indexes, fragments, motifs, graphlets) with available variables. The important subnetworks are determined using procedures such as cuts and islands.

Many approaches exist to the clustering in networks. We will limit our attention to:

- clustering with relational constraint: clusters are connected subgraphs of selected type containing similar units;
- blockmodeling: the reduced network obtained by shrinking the clusters provides a good description of the overall structure of the network.

For details see:

1. Doreian P, Batagelj V, Ferligoj A: Generalized blockmodeling. Cambridge UP, 2004.
2. Batagelj V, Doreian P, Ferligoj A, Kejžar N: Understanding Large Temporal Networks and Spatial Networks: Exploration, Pattern Searching, Visualization and Network Evolution. Wiley, 2014.
3. Doreian P, Batagelj V, Ferligoj A: Advances in Network Clustering and Blockmodeling. Wiley, 2019.