Graphlets are brought closer to reality in a new master’s thesis at Aalto University School of Science

Sallamari Sallmen generalizes the theory of a certain type of subnetworks, called graphlets, from simple networks to multilayer networks in a new master’s thesis titled Graphlets in multilayer networks. The work was conducted in the field of complex systems in the Department of Computer Science.

Multilayer networks are more realistic representations of real-world systems compared to single-layer networks. However, generalizing concepts from simple networks to multilayer networks is still an ongoing process. The obtained results indicate that one can gain more insight about the networks, when they are analyzed using these new multilayer graphlets if the studied networks have clear multilayer structures.

The graphlets were applied to clustering networks from different domains and different random models. The ability of the multilayer graphlets to group together networks belonging to the same domain or model was compared with the ability of simple network graphlets. With dense random networks, the multilayer measures performed better than the single-layer graphlets, but for sparse random networks, opposite results were obtained.

Introducing layers to graphlets resulted in various definitions for these subnetworks. This makes matters more complicated, but on the other hand it creates freedom for the user to be able to apply a definition suitable for one’s needs.

The single-layer graphlets have already been successful for example in finding genes and proteins participating in certain functions. This gene identification is also a possible direction for applying the multilayer graphlets.

More information

Sallamari Sallmen

sallamari.sallmen@aalto.fi