Algorithm Engineering for Graph Clustering

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Graph clustering has become a central tool for the analysis of networks in general, with manifold applications e.g. in data mining, social networks, biology or complex systems. The general aim of graph clustering is to identify dense groups in networks. Countless formalizations thereof exist, among those the widespread measure modularity. However, the overwhelming majority of algorithms for graph clustering relies on heuristics, e.g., for some NP-hard optimization problem, and do not allow for any structural guarantee on their output. Moreover, networks in the real world are often large, evolve over time or come as a data stream.

The talk will discuss algorithmic aspects of graph clustering, especially quality measures and algorithms that are based on the intuition of identifying as clusters dense subgraphs that are loosely connected among one another. We will focus on the algorithm engineering methodology which consists in a cycle of design, analysis, implementation, and experimental evaluation of algorithms, bridging the gap between algorithm theory and practical applications. Special emphasis will be on clustering large networks.

Biography. Dorothea Wagner is a full professor for Informatics at the Karlsruhe Institute of Technology (KIT). Her research interests include design and analysis of algorithms and algorithm engineering, graph algorithms, computational geometry and discrete optimization, particularly applied to transportation systems, energy systems, network analysis, data mining and visualization. Among other activities she is member of the German Council of Science and Humanities (Wissenschaftsrat. From 2007 to 2014 she was vice president of the DFG (Deutsche Forschungsgemeinschaft - German Research Foundation) and 2004 to 2013 speaker of the scientific advisory board of Dagstuhl - Leibniz Center for Informatics. In 2012 she received a Google Focused Research Award, she is member of Academia Europaea and Fellow of the GI (Gesellschaft fr Informatik). Dorothea Wagner obtained her diploma and Ph.D. degrees from the RWTH Aachen in 1983 and 1986 respectively; and 1992 the Habilitation degree from the TU Berlin. 1994 - 2003 she was a full professor at the University of Konstanz.