GRK dIEM oSiRiS: Visual Graph Mining

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The analysis of networks or graphs is a current field of research in many application domains ranging from Homeland Security to Biochemistry. Its aim is to further the understanding of given networks by extracting important properties and prominent patterns. One aspect that lately receives much attention is the combination of graph analysis with information visualization techniques – the Visual Graph Mining. Ideally the visualization can be utilized to communicate results and to steer the analysis process. But in practice, it is hard to integrate the interactivity of the visualization on one side and the often long-running analysis methods on the other side in a useable way. While there already exist a few approaches that bridge this gap, in most cases they are tailored to specific application domains and thus to specific data characteristics and analysis tasks. In the dIEM oSiRiS graduate school, the need for an intuitive way to analyze graphs arises in many different fields:

- in medicine, when evaluating interaction partners in protein complexes

- in biology, when identifying biochemical pathways

- in databases, when examining database schemata

- in modeling and simulation, when exploring model structures

This variety of different applications requires a broader approach to Visual Graph Mining, whose conception is the aim of my dissertation. A first step towards such a more generic approach is the systematization and classification of the most prevalent methods from network analysis and graph theory, as well as from graph visualization and graph drawing. A possible classification of graph visualization and drawing techniques has already been published, a publication of a systematization for graph analysis techniques is in preparation. In addition to this formal approach, a prototype of a software framework for Visual Graph Mining has been implemented and published as well, that is used as a testbed for new ideas. It also serves as a basis for developing special purpose tools to support the specific graph analysis problems within the scope of dIEM oSiRiS. As some of these problems make extensive use of non-standard graph-models like multi graphs, hypergraphs or compound graphs, these real world use cases will provide challenging touchstones to prove the flexibility and validity of the general Visual Graph Mining concept in different domains.