

Difference Detection for Large Attributed Graphs

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Description of problem

In biomedical applications as well as in social networks, large graphs with a high number of nodes and edges (i.e. 10.000 to 1.000.000 nodes) as well as attributes connected to nodes and edges are studied. The graphs change in time: In biomedical applications researchers add or remove nodes or modify attributes, in social networks, user activity leads to an automatic change of the graph. The different possibilities for a screen layout of the graph as well as the large sizes makes it difficult for a user to spot these small differences.

The task consists of a concept and an implementation of a graph difference algorithm, connected with a visualization of the graph.

Description of tasks

1. Analyzing the state of science in the area of graph layout..
2. Designing graph difference algorithms.
3. Implementation with suitable visualization.
4. Evaluation using sample graphs.

References to get started

- Fruchterman, Thomas M. J.; Reingold, Edward M. (1991). "Graph Drawing by Force-Directed Placement". *Software – Practice & Experience* (Wiley) 21 (11): 1129–1164..
- Harel, David; Koren, Yehuda (2002). "Graph Drawing by High-Dimensional Embedding". *Proceedings of the 9th International Symposium on Graph Drawing*. pp. 207–219.
- Kamada, Tomihisa; Kawai, Satoru (1989). "An algorithm for drawing general undirected graphs". *Information Processing Letters* (Elsevier) 31 (1): 7–15.

Requirements

- Basic knowledge about graphs, Java and/or C++ programming skills.

Learning goals

While working on the thesis the candidate will learn about:

1. Graph layout.
2. Graph algorithms.

Publication

An academic publication is possible for good students. Data, setup configuration, empirical study, and results should be made available for general audience, preferably under open source license.