Bachelor thesis

Linear-time Graph Drawing

Overview

Drawing large graphs appropriately is an important step for the visual analysis of data from real-world networks and other applications. Recently, we presented a novel multilevel algorithm to compute a graph layout with respect to the maxent-stress metric proposed by Gansner et al. (2013) that combines layout stress and entropy.

As opposed to previous work, we do not solve the resulting linear systems of the maxent-stress metric with a typical numerical solver. Instead we use a simple local iterative scheme within a multilevel approach. To accelerate local optimization, we approximate long-range forces and use shared-memory parallelism.

Through a clever trick, it is possible to accelerate the approach even further and hence to scale to much larger inputs. The main idea is to use the multilevel structure of the algorithm excessively for approximating long-range forces.

The main task of this thesis is to define and implement the algorithm within the KaDraw graph drawing framework. This includes the implementation of a number of algorithms and potentially more techniques that come up during the thesis. If successful the technique will be integrated into the open source framework.

Requirements

- Interest in algorithms and data structures
- Excellent programming skills in C++
- Ability to think for yourself

INFO: More topics available such as graph partitioning.

Application deadline 30th April 2017