ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Distributed Computing

Semester / Bachelor Thesis

Distributed Approximation Algorithms

Given a connected graph G with a weight function ω on edges (where, for each edge e, $\omega(e)$ is known to nodes incident to e), the task is to find distributed approximation algorithms for some of the following problems:

- Given two nodes s and t, the **shortest s-t path** problem is to find the shortest path between s and t. In the end of the process a node outputs the length of the shortest path.
- A set of edges E' is a **cut** if G is not connected when we delete E'. The **minimum cut** problem is to find a cut of minimum weight. A set of edges E' is a s-t cut if s and t are not connected when we delete E'. The **minimum s-t cut** problem is to find an s-t cut of minimum weight. In the end of the process, a node outputs the weight of the minimum cut and minimum s-t cut.
- The , problem is defined as follows. We think of the weight on an edge as the cost of routing messages through this edge. The routing cost for a pair of vertices in a given spanning tree is the sum of the weights of the edges in the unique tree path between them. The routing cost of the tree itself is the sum over all pairs of vertices of the routing cost for the pair in the tree. Our goal is to find a spanning tree with minimum routing cost.
- The **generalized Steiner forest** problem is defined as follows. We are given k disjoint subsets of vertices $V_1, ..., V_k$. The goal is to find a minimum weight subgraph in which each pair of vertices belonging to the same subsets are connected.

This list is incomplete, there are many more problems that can be considered - just ask us. Sometimes new algorithms need to be invented, other times known algorithms might be modified to work for these problems. Maybe it is possible to find reductions to problems for which we have good approximation algorithms.

Interested? Come to our office for coffee and a small chat or contact us by email / phone.

Contact

Stephan Holzer, ETZ G64.1, stholzer@tik.ee.ethz.ch, 044 632 7065
Prof. Dr. Roger Wattenhofer, ETZ G63, wattenhofer@tik.ee.ethz.ch, 044 632 6312