ETH
Eidgenössische Technische Hochschule Zürich
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Distributed Computing

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SA/BA:

Distributed Prize Selection

Imagine you are one of two participants in a game show and you have to select a prize from a choice of two sealed boxes. They look identical to you, but while one contains one million dollars, the other contains just a pair of socks. If each of you picks a different box, then you each get your choice, but you have to reach a consensus first, else nobody gets anything. While you might come to a conclusive result, things get harder if you had to play against an identical (symmetrical) copy of yourself. Since each of your actions gets mirrored by your copy, the situation cannot be resolved in a deterministic fashion. You might have to flip a coin ...

Locally breaking symmetries is one of the fundamental problems in distributed computing. The participants are modelled as nodes in a network (a graph), connected via a set of edges over which the nodes can communicate. The posed problem is that each node would like to select a different color (prize) than its peers, therefore breaking the local symmetry.

Coloring is a prerequisite for many advanced algorithms, making it desireable to be solved as fast as possible for large graphs – and of course with a very small number of colors. While there are already many algorithms and methods for various models out there, we are interested in a model of communication with more realistic message collision properties. The goal of this thesis is to develop/extend fast and good coloring algorithms for our model and possibly implement them in a small testing framework. We already have a good starting set of ideas that we would like to extend with your own.

Requirements

- Interest in theoretical aspects of distributed computing
- Creative thinking and problem solving
- Good programming skills

Interested?

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

- Klaus Tycho Förster: ETZ G61.3, klaus.foerster@tik.ee.ethz.ch, 044 63 24776
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