ETH
Eidgenössische Technische Hochschule Zürich
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Distributed Computing

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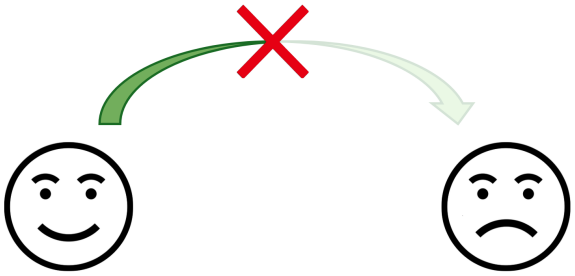
Communication Complexity in Unreliable Networks

In the last few decades, we have experienced an unprecedented growth in the area of distributed systems and networks. Even for tasks as simple as broadcasting or agreeing on a value, carefully designed protocols must be used to ensure correctness while minimizing the messages/bits sent (message/communication complexity) and running time. Moreover, due to hardware faults or adversarial interference, it might not be possible to assume the network is always reliable. Designing and analyzing such fault-tolerant protocols is now a key aspect of distributed networks theory.



There are many ways a network can be unreliable. The parties might crash, they might sometimes fail to send/receive messages (send/receive omissions), and they might even be controlled by an adversary (byzantine faults). The channels between parties can also fail, for example by crashing or becoming unreliable. Each of these cases has already been studied, and there exist protocols resilient to these kinds of faults. However, even for simple primitives like agreement, there are gaps between the known lower bounds for communication complexity and the actual complexities of existing algorithms, particularly when the channels are unreliable. You will work on tightening these gaps, either by proving stronger lower bounds, finding more efficient protocols or both!

Requirements: We are looking for people interested in distributed protocols theory. It is a huge plus if you have existing knowledge, for example by having taken one of the courses Distributed Systems and Cryptographic Protocols. We will have weekly meetings to discuss the progress of your research.

Interested? Please contact us for more details!

Contact

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