



BA/SA/MA/Group/Lab:

## Dynamic Directories using Reinforcement Learning

Imagine that a single mobile resource is to be shared among the nodes of a network. The nodes can request the shared resource concurrently and multiple times. Our task is to design a protocol to satisfy all the requests, as quickly as possible. This protocol is often known as a *Distributed Directory* service as the nodes can use the service to locate a mobile object.

The problem has numerous applications other than using it to coordinate access to a shared resource. For example, one can use the service to globally order transactions as in a blockchain, where a transaction request can be issued by an arbitrary node at an arbitrary time.

Arrow is a practical protocol to solve the problem, however, the protocol works well only on trees but not on general networks. In this thesis, we will design heuristics for a practical directory protocol, in the spirit of Arrow, which work well on general networks. We will use deep reinforcement learning to explore the heuristic space, since, this approach is proving to be successful for various “path-finding” problems and a directory protocol essentially involves finding good paths.



Figure 1: Changing Paths.

**Requirements:** Interest in graph algorithms and prior knowledge in deep learning and reinforcement learning.

**Interested? Please contact us for more details!**

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