

Forschungspraxis

Towards Digital Network Twins: Can we Machine Learn Network Function Behaviors?

Digital Network Twins can help to improve future network operation and management significantly. A Digital Twin (DT) of a network is a digital representation that is coupled to the real network. It can be used to perform experiments e.g. to improve the operation of the real network.

Running a detailed model of a network as a DT can be quite challenging.

Either the computational effort is too high to run the model somehow in real-time or the abstraction level is too high so the DT does not represent the real network closely enough.

Here Machine Learning (ML) could be a solution. Instead of accurately modeling the behavior analytically, an ML approach observes and learns the behavior of a network and its elements and may lead to a model that is less complex to use for a DT.

Research in this direction is still at its infancy, however.

This research internship should investigate the ability of current ML approaches to learn the behavior of network functions.

For this task, Kubernetes' ingress controller, a load balancer (LB), shall be set up as an exemplary network function in a virtual testbed.

The setup should further contain traffic generators to benchmark network functions and monitoring installations to observe the be-

havior of the LB. The collected data should then be used to train an ML model.

The core question is whether how far the behavior of network functions can be learned and abstracted with ML models.

Prerequisites

- Linux
- Kubernetes
- Basic knowledge ML

Advisors

Patrick Krämer, Johannes Zerwas