Prof. R. Wattenhofer

Lightning Network + GNNs

The Lightning Network is a layer 2 protocol that facilitates fast and cheap Bitcoin transactions. It is made up of bidirectional payment channels between nodes that participate in the network. The network can thus be considered as a graph, with the topology known to all network participants. While this is the case for the general topology, payments that are routed through the network are disguised by design and cannot easily be observed. This makes it hard to analyze the usage of the network and extract meaningful information.

In some cases, we might not even know about all nodes or edges in the network as they are not announced publicly. One way to uncover this hidden information is through an on-chain analysis that looks at the footprints left by Lightning channels on the Bitcoin blockchain. In this thesis, we want to extend the analysis with Machine Learning methods.

For that, we will use Graph Neural Networks on multimodal graphs to solve tasks like, but not limited to, identifying "private" channels or predicting properties like channel lifetime or routed transactions. We will further adapt existing graph learning methods to solve these tasks and benchmark them on the newly created dataset.

Requirements: Ability to work independently and determined to obtain results, creative thinking, knowledge of Machine Learning and Python. Ideally has worked with graph learning frameworks such as pyG before.

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