FlexGraph: Flexibility Study of Network Topologies (Reliability Use Case)

Flexibility is an indispensable feature of future communication networks and technologies. Only flexible networks allow coping with the fast-changing demands of future network applications and use cases like 5G/6G. In order to quantify the flexibility of networks, we have recently presented a new flexibility measurement framework. As many problems in network communication are studied on graphs, this thesis should investigate the impact of topologies on network flexibility by applying the concepts proposed in our framework. In detail, different networking use cases (like network programmability, network failures, and network verification) should be analyzed for a variety of network topologies. As graph measures are one way to characterize network graphs, the thesis should analyze the relation between graph features and network flexibility. It will be expected that the studies will be data-intensive; hence, the student should bring preliminaries in carrying out automated and data-intensive analysis. Finally, this thesis should study the predictability of flexibility given topologies. For this, it should apply supervised machine learning models to answer the question of whether we can predict the flexibility of given problems for specific networking problems.

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