Modelling Slice Performance in Radio Access Networks through Supervised Learning

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In 5G systems, the Network Slicing (NS) feature allows to deploy several logical networks customized for specific verticals over a common physical infrastructure. To make the most of this feature, cellular operators need models reflecting performance at slice level for re-dimensioning the Radio Access Network (RAN). Throughput is often regarded as a key performance metric due its strong impact on users demanding enhanced mobility broadband services. In this work, we present the first comprehensive analysis tackling slice throughput estimation in the down link of RAN-sliced networks through Supervised Learning (SL), based on information collected in the operations support system. The considered SL algorithms include support vector regression, k-nearest neighbors, ensemble methods based on decision trees and neural networks. All these algorithms are tested in two NS scenarios with single-service and multi-service slices. To this end, synthetic datasets with performance indicators and connection traces are generated with a system-level simulator emulating the activity of a live cellular network. Results show that the best model (i.e., combination of SL algorithm and input features) to estimate slice throughput may vary depending on the NS scenario. In all cases, the best models have shown adequate accuracy(i.e., error below 10%).