



Thesis Topic

Bachelor/Master/Diploma Thesis
Studienarbeit/Diplomarbeit

Title: AI-based radio resource management

Problem Statement

Radio Resource Management (RRM) in Radio Access Networks (RANs) is a large-scale control problem encompassing numerous network functionalities operating at different time-scales ranging from sub-millisecond to seconds. Complexity of an RRM task depends on the dimensionality of the problem at hand and the available execution time. The rapid advances in the Machine Learning (ML) field, specialized to handle large data sets, present an opportunity to develop an intelligent RRM which is capable to proactively monitor the resources and RRM functionality. Reinforcement learning (RL) deals with how a software agent learns to behave in an environment to achieve a given objective, e.g., maximizing a form of reward. Thus, it is particularly suitable for control problems, such as those arising in RRM. These algorithms should predict QoS parameters and, based on the predictions, allocate radio resources such that the applications do not experience interruptions.

Tasks

1. Understanding about the ML and RL.
2. Implementation of RL algorithms for RRM algorithms.
3. Investigation about how a software agent learns to behave in an environment to achieve a given objective, e.g., maximizing a form of reward. Thus, it is particularly suitable for control problems, such as those arising in RRM.
4. Studying the application of ML and RL algorithms for QoS prediction and radio resource allocation.
5. Studying about the proactive RRM and its uses in the current scenarios

Expected Skills

1. Interested students should have a background on Machine Learning or an interest to learn.
2. At the end of the thesis the candidate will have developed exceptional skills in working with ML and RL algorithms and will have a profound knowledge of QoS requirements of applications in wireless networks.

Contact Person

Atul Kumar

atul.kumar@tu-dresden.de

Arturo Gonzalez

arturo.gonzalez@tu-dresden.de