MASTER THESIS - IMPROVING HANDOVER PROCEDURE USING MACHINE LEARNING

Background
When a mobile phone needs to change base-station because of bad coverage, a handover is performed. In this procedure, data is exchanged between base-stations to keep the phone connected to the network. It is rather common for the phone to start searching for candidate base-stations at the wrong frequency causing some handovers to fail.

To mitigate this problem there is a study ongoing on using machine learning to improve the probability that the correct frequency is chosen. Because of limitations in hardware currently used, it is not possible to use computationally heavy machine learning algorithms like neural networks. This will change in the future. Due to this limitation, these algorithms are out of scope for the current study that focuses on more lightweight implementations. It would still be interesting to investigate the possibility to use neural networks. Both to see what results are achievable and if it is possible to make a more lightweight algorithm that can be deployed within the limitations we currently have.

Thesis Description
The goal in this thesis is to use the same data that is currently used, analyze it and investigate the possibilities to use neural networks or other more complex machine learning algorithms to improve the results that are currently received.

Goal statement
1) Analyze the data
   a. Get a very basic understanding of telecom and the use case
   b. Check for abnormalities in the data
   c. Get a baseline to compare with (can probably reuse the baseline we have from the current study)
2) Investigate how neural networks can be implemented with this data.
   a. The suggested software to use is tensorflow as it has a C/C++ interface which is a requirement to use in production

Optional if time permits:
3) Make a C/C++ implementation of the algorithm in tensorflow using the framework that will be implemented by the ongoing study.

Qualifications
Previous experience in implementing machine learning, AI or statistical techniques and algorithms. We expect you to have strong analytical skills, very good knowledge in probability theory, statistics and computer science and good programming skills. Performance evaluation and documentation skills are also required. We expect the master thesis report to be written in English.
We prefer candidates that have a Mathematics and Computer Science background.

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Keywords
Neural networks, Machine Learning, Statistics, Probability, C/C++