Forecasting Power Consumption of Radio Base Stations in the Framework of Federated Learning

Thesis Background

In this thesis, statistical or machine learning model will be used to forecast power consumption of Radio Base Stations. The thesis will also focus on the application of federated learning to radio base stations power consumption forecasting models to understand how the models could be personalized to the usage profile. Federated learning will allow to update the developed forecasting model by using collective experience without affecting the privacy of data.

Federated learning aims at training a machine learning algorithm on multiple local datasets contained in local nodes without explicitly exchanging data samples. The general principle consists in training local models on local data samples and exchanging model parameters between these local nodes at some frequency to generate a global model shared by all nodes. One of the challenges that need to be addressed is that data is not always independent and identically distributed across local nodes.

What I Will Do

The thesis would involve the following steps:

- Review literature with focus on identification of relevant concepts and algorithms for power consumption forecast and analysis of federated learning state-of-the-art use cases.
- Implement a statistical or machine learning model to forecast Radio Base Station's power consumption and measure the computing resources needed to be trained and make inferences.
- Model and simulate a federated learning-based deployment scheme for the forecast model.
- Identify evaluation metrics for the model developed using federated learning and evaluate performance under different use case scenarios

Data Description

The forecasting will be implemented using time-series data provided by the company.

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