Ph.D. in Information Technology: Thesis Defense

October 13th, 2020

online by Microsoft Teams – at 10.00

Claudia PARERA SOTOLONGO – XXXII Cycle

"Transfer Learning for Anticipating Mobile Network Performance"

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Abstract:

Machine learning will play a major role in handling the complexity of future mobile wireless networks by enhancing network management and orchestration capabilities. Due to the large number of parameters that can be configured in the network, collecting and processing high volumes of data is often unfeasible during network runtime. This calls for taking resource management and service orchestration decisions when only a partial view of the network is available, and multiple decisions need to be taken within a limited period of time.

Transfer learning is a machine learning paradigm that aims at improving the prediction performance of a learning task by applying knowledge previously gained in a related learning task or domain. Motivated by this fact, in this thesis we provide a transfer learning framework that can be applied to anticipate and further adapt network decisions when only a partial network view is available. Predictions can be carried out with improved performance when information in the target network domain is limited, and multiple decisions need to be made in a small time frame. To this end, we evaluate the proposed framework in three different industry provided, real world use cases, using data collected from commercial 4G networks. Namely, they are: (i) Tilt-Dependent Radio Map Prediction, (ii) Mobile Radio Networks Key Performance Indicator Anticipation and (iii) Multi-Step Resource Utilization Prediction.

The main contribution of this thesis is the introduction of transfer learning to anticipate network performance in mobile communication networks achieving improved accuracy and complexity time.

PhD Committee

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