

Master Thesis

Deep Learning-aided Resource Allocation for Wireless Communication Systems

Recently, deep learning has received much attention as a promising approach to optimize resource allocation for wireless communication systems. Facilitated by recent technological advances and the capabilities of specialized hardware for data processing, deep learning can be employed to solve resource allocation optimization problems in a faster manner compared to conventional approaches (e.g., monotonic optimization, successive convex approximation). A powerful and universal approach to deep learning are artificial neural networks (ANNs).

Deep learning based on ANNs employs a data-driven approach in order to identify the best ANN architecture given a training set of input-output data pairs. Once the ANN is trained, it is capable of responding to never-observed inputs by providing the optimum output given the empirical data and prior knowledge. The objective of this thesis is to train an ANN model to solve resource allocation optimization problems in wireless communication systems. In particular, the considered problem is first transformed into an approximate mathematical model and solved by employing conventional optimization methods. The ANN model is trained based on the resulting solutions and then refined for the actual system including effects that were not accounted for in the approximate model such as amplifier nonlinearities, model approximation errors, etc. The trained ANN model is then used to solve new resource allocation optimization problems for wireless communication systems.

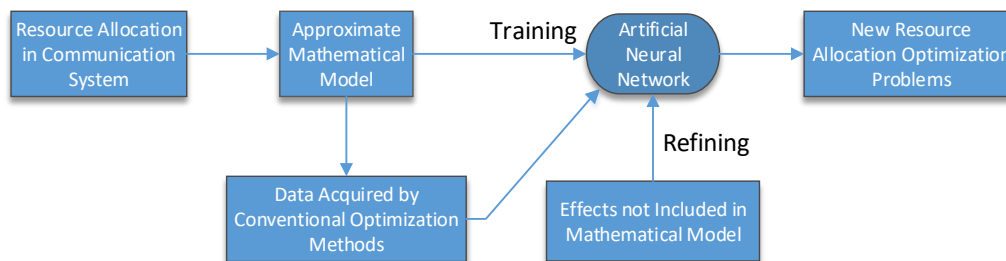


Figure 1: ANN model consisting of training phase and refining phase.

Main guidelines for the work:

- Acquisition of basic knowledge in communications and deep learning theory
- Optimization and refinement of an ANN model based on acquired data and prior knowledge
- Utilization of the trained ANN model to solve new resource allocation optimization problems and presentation of results via simulation

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