COT6410 Project - Data-Driven Approximations to NP-Hard Problems

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Abstract

Deep learning is a branch of machine learning which attempts to learn hierarchical representations of data to perform various tasks. One of the most common deep learning architectures is an artificial neural network which can learn complex mathematical relationships between inputs and outputs. In this work, we will present how Milan *et al.* [1] uses a type of recurrent artificial neural network, specifically a long-short term memory (LSTM) network, to approximate two complex problems: marginalisation of linear assignments and the quadratic assignment problem (QAP), which is NP-Hard. We will explain the mathematical formulations for both of these problems pursuant to the tasks of data association and feature point matching, respectively. Additionally, we will present their novel training method which improves the results on these two problems, as well as the NP-Hard travelling salesman problem (TSP).

References

[1] Anton Milan, S Hamid Rezatofighi, Ravi Garg, Anthony Dick, and Ian Reid. Data-driven approximations to np-hard problems. In *Thirty-First AAAI Conference on Artificial Intelligence*, 2017.