TECHNISCHE UNIVERSITÄT MÜNCHEN
LEHRSTUHL FÜR INFORMATIONSTECHNISCHE REGELUNG
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B A C H E L O R T H E S I S / M A S T E R ' S T H E S I S

Machine Learning for Energy Networks

Problem description:

Due to the growing efforts made by companies and governments to fight global warming, energy systems are required to work more efficiently than ever before. A promising approach for contributing to this goal is to employ data-driven approaches to model and control energy systems. A promising approach for contributing to this goal is to employ data-driven approaches to model and control energy systems. In particular, deep neural networks and reinforcement learning have been recently combined to produce remarkable results in various areas of research where modeling and control become intractable using classical approaches [4, 2]. So far, research on learning methods for energy systems is scarce, although some successful efforts have been undertaken in this field [1, 3].
During the proposed thesis, the student will aim to implement novel machine learning algorithms to model and control an aggregated energy system in a city quarter. This will involve implementing existing methods in a simulative setting, as well employing tools developed using the state of the art in machine learning techniques.

Tasks:

Bibliography:

[1] Claessens, B. J., P. Vrancx, and F. Ruelens (2016). Convolutional neural networks for automatic state-time feature extraction in reinforcement learning applied to residential load control. *IEEE Transactions on Smart Grid*.
[2] Duan, Y., X. Chen, R. Houthooft, J. Schulman, and P. Abbeel (2016). Benchmarking deep reinforcement learning for continuous control. In *International Conference on Machine Learning*, pp. 1329–1338.
[3] Mocanu, E., P. H. Nguyen, M. Gibescu, and W. L. Kling (2016). Deep learning for estimating building energy consumption. *Sustainable Energy, Grids and Networks 6*, 91–99.
[4] Silver, D., A. Huang, C. J. Maddison, A. Guez, L. Sifre, G. Van Den Driessche, J. Schrittwieser, I. Antonoglou, V. Panneershelvam, M. Lanctot, et al. (2016). Mastering the game of go with deep neural networks and tree search. *Nature 529*(7587), 484–489.

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