TU Clausthal

Kolloquium zur Bachelroarbeit

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„Generating Sparse Representations of Electrical Waveform Data using Autoencoders: A Parameter Space Exploration“

Motivated by the rising popularity of energy metering technologies, energy consumption readings are continuously collected for different purposes like understanding consumption habits and regulating energy production accordingly. The overwhelming amount of gathered data can hinder attempts to infer useful information from it. Multiple procedures exist to deal with this problem. Most of them achieve their goals by transforming data into a more manageable and interpretable form. This thesis discusses the potential of using autoencoders for such tasks. An autoencoder is a type of neural network with a symmetrical structure built around a central hidden coding layer. The autoencoder in this study is trained on current signals from the BLOND dataset, which contains energy measurements of a typical office building. The considered data is sampled at a frequency of 6.4 kSps at plug-level. The data is divided into current cycles and supplied to the model. The learning process in an autoencoder forces it to learn a representation (encoding) of the input data. This encoding process can be tweaked by multiple parameters to satisfy some criteria. For example, to produce a more compact representation with higher information content that highlights unique features in the original data. A number of parameters, gathered from promising studies in the field, are considered to configure the investigated autoencoder. The impact of each parameter is examined and the results are presented. The final autoencoder is analyzed regarding its performance and compared to conventional methods such as the Fourier transformation. It will be shown that an autoencoder with the right set of parameters for the specific type of energy data can achieve better results than other considered techniques. Finally, some recommended configurations to build a similar model are provided.

Mittwoch, 30.10.2019, 09:00 Uhr,
Seminarraum 105 (T1), Albrecht-von-Groddeckstr. 7

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