Abstract: Analysis of data-driven Volume Flow Sensor Models

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Climate change, due to ever-increasing greenhouse gas emissions, is an acute problem on global scale. To reduce the impact on climate change, building optimization aims to reduce CO_2 by optimizing building energy consumption. To analyze building energy consumption, the energy flow through the building is an important variable. Its calculation is based on volume flow measurements. However, the availability of volume flow measurement data in buildings is not very high due to missing volume flow sensors. The ability to estimate the volume flow in buildings where volume flow sensors are not present can provide critical information for building energy analysis, thus enabling building energy optimization without the need for retrofitting volume flow sensors. In the last decades, sensors and the availability of building monitoring data has grown rapidly within building energy systems. This enables the use of data analytics and data-driven modeling. Therefore, this thesis aims to investigate transferable, data-driven volume flow sensor models. Long short-term memory (LSTM) and feed-forward artificial neural networks (ANN) were used for volume flow estimation. As a foundation, an application-specific, data-driven volume flow soft sensor is studied and validated on real data to gain insight into core modeling questions.