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User Activity Simulation for Residential Buildings

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Abstract

User activities play a crucial role in the energy demand of residential buildings and will become increasingly important for smart homes with low energy consumption and low emissions. However, it is often difficult to obtain detailed user activity data and associated energy consumption. User behavior patterns are closely related to energy consumption for modeling or simulation. This paper presents a probabilistic activity model that builds from time-use survey data and creates the data generator that can generate realistic activity sequences for individuals and households. The experimental results demonstrate the effectiveness of the proposed model.

In this paper, we focus on the user activity simulation of residential buildings. First, we establish a probabilistic model calibrated by the real-world time-use data with detailed activity information of residents. Then, based on the activity model, we develop a data generator to generate individual and multi-family activity sequences that include eight possible states. In the end, we evaluate the models using statistical methods, and compare with the real-world time-use survey data.