

Performance Comparison of Situation-Aware Models for Activating Robot Vacuum Cleaner in a Smart Home

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Abstract : We assume an IoT-based smart-home environment where the on-off status of each of the electrical appliances including the room lights can be recognized in a real time by monitoring and analyzing the smart meter data. At any moment in such an environment, we can recognize what the household or the user is doing by referring to the status data of the appliances. In this paper, we focus on a smart-home service that is to activate a robot vacuum cleaner at right time by recognizing the user situation, which requires a situation-aware model that can distinguish the situations that allow vacuum cleaning (Yes) from those that do not (No). We learn as our candidate models a few classifiers such as naïve Bayes, decision tree, and logistic regression that can map the appliance-status data into Yes and No situations. Our training and test data are obtained from simulations of user behaviors, in which a sequence of user situations such as cooking, eating, dish washing, and so on is generated with the status of the relevant appliances changed in accordance with the situation changes. During the simulation, both the situation transition and the resulting appliance status are determined stochastically. To compare the performances of the aforementioned classifiers we obtain their learning curves for different types of users through simulations. The result of our empirical study reveals that naïve Bayes achieves a slightly better classification accuracy than the other compared classifiers.

Keywords : situation-awareness, smart home, IoT, machine learning, classifier

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