TU Clausthal

Kolloquium zur Masterarbeit

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„Recognizing Activities of Daily Living using Non-Intrusive Load Monitoring"

Activity recognition using Non-Intrusive Load Monitoring (NILM) is a relatively new field of research and is gaining more traction. The majority of existing research focuses more on disaggregating aggregate energy consumption data provided by smart meters into appliance level energy consumption data and only a few have explored the disaggregation into activity level energy consumption. The activity level power consumption data has the advantage of providing the user with a more intuitive means to optimize their energy consumption. In this work, a novel approach is proposed for activity recognition with NILM in which synthetic data with a pre-existing tool AMBAL-based NILM Trace generator (ANTgen) is utilized to train the model. This circumvents the common problem of generality of existing research models that use the same dataset for training and testing and are biased to the considered dataset. The proposed system comprises of a training, evaluation and Non Intrusive Activity Recognition Tool (NIART) modules for recognizing single and multiple appliance activities. Three classification algorithms namely the decision, random forest and extra tree are utilized for classification and their performance is evaluated with suitable metrics. The single activity recognition was done on the ECO household 1 and 2 and DRED datasets showed marginally better performance with the extra tree classifier yielding an average F1 Score of 0.82, 0.76 and 0.85 respectively. The multiple activity recognition, for DRED dataset, random forest classifier gave the best performance whereas decision tree showed better result for ECO dataset. However, some of the activities were poorly detected with an F1 score below 0.50. The results show the sufficient capability of transfer learning from the artificial training data to real world dataset with the proposed model.

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