

Exploring Correlation Patterns for Anomalous Usage Detection in Smart Home

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ABSTRACT

Owing to the great advance of sensor technologies, electric meters are widely deployed to collect usage data in smart home environment. The electricity consumption data of all appliances can be collected easily. From these log data, some useful information and pattern can be discovered which may help residents to better understand the usage of appliances. In this paper, we develop an intelligent system, Anomaly Detection System (ADS), to detect the abnormal usage behavior for users in a smart home environment. Most previous studies on anomaly detection only conducted the usage behavior on single device and neglect the appliance correlation. With considering the correlation among appliances and the probability distribution of each appliance, we propose several methods to detect abnormal usage which can help users distinguish their unnecessary usages. We also propose a parameter tuning strategy to optimize the mining result in ADS system. The experimental results indicate the efficiency and the effectiveness of ADS. Finally, we use a real dataset to show the practicability of abnormal usage detection.

Keywords – correlation pattern, smart home, sequential pattern, Extreme Value Theory, time interval.

