Online adaptive clustering algorithm for load profiling

With the large-scale deployment of smart metering, energy sector is facing ‘Big Data’ related challenges. While metered customers generate streams of data, load profiling methods are not taking advantage of this structure. Indeed, insights on the demand are traditionally provided by static typical load profiles. Renewable energy sources generate intermittency in the production and subsequently uncertainty in aligning the generation to the demand at any time. This work proposes a new view on load profiling that takes benefit of the stream structure of the data, an adaptive and recursive clustering method that generates typical load profiles updated to newly collected data. The online adaptive clustering algorithm is based on an online K-means approach using a dynamic time warping based distance associated with a facility location to adjust the number of typical load profiles. The performance of the algorithm is evaluated on a synthetic dataset and applications are presented on real-world dataset from both electricity and central district heating.