Extending Combinatorial Optimization for Non-Intrusive Appliance Load Monitoring

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***Abstract*—Non-Intrusive appliance load monitoring (NIALM) is the process of disaggregating the overall electricity usage into constituent appliances. In this paper we extend the Combinatorial Optimization (CO) approach for disaggregation, which was originally proposed in the seminal work on NIALM, in following two ways: 1) Breaking the problem into subproblems and reducing the state space; 2) Applying additional constraints backed by sound domain expertise. We evaluate our approach using REDD dataset and show practical problems which need to be solved while dealing with the dataset. We also propose a metric for evaluating NILM, which we believe overcomes many shortcomings of commonly used metrics.**

I. Introduction

NILM definition [1]

Motivation

- Feedback 15 energy savings % [2]
- Potential use cases from Hart paper, benefit to
  - Utility
  - End Users
  - Appliance Makers

Typical setup

- How is NILM done- H/W requirements, Put a picture

Previous work

Several classification [3], [4], [5]:

- High vs Low frequency
- Time vs Frequency domain analysis
- Supervised vs Unsupervised

Datasets

Recent datasets have spurred this field

- REDD [6]
- Blued [7]
- Smart* [8]

A. Subsection Heading Here

Subsection text here.

1) Subsubsection Heading Here: Subsubsection text here.

II. Related Work

III. Introduction

IV. About Dataset

V. Terminologies/ Notations

VI. Algorithm

VII. Results

VIII. Conclusion

The conclusion goes here.

Acknowledgment

The authors would like to thank [9].

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