An Introduction to Universal Disaggregation

Background

With the rollout of AMI infrastructure, leading utilities are realizing the benefits of disaggregation: their customers are more educated, more engaged, and more efficient; and the utilities themselves can use disaggregation analytics to improve program and product targeting, increase call center efficiencies, and gain a better understanding of load profiles.

But what about the millions of non-AMI customers? Without a cost-effective way to provide them with disaggregation and realize the host of customer and utility benefits that go along with it, they've been missing out on the smart meter experience.

Universal disaggregation changes that.

What is universal disaggregation?

Universal disaggregation applies the latest in machine learning advancements to extend the benefits of disaggregation to address non-smart meter homes. What does this mean? Itemization for monthly-read meters, personalized insights, and a consistent experience for all homes in a utility's service territory.

How does it work?

Smart meters
The disaggregation process for smart meter customers is well established: at a high level, their meter data is analyzed with AMI disaggregation algorithms, which identify the top consuming appliances in the home, creating the opportunity for more personalized customer communication

Non-Smart meters
With non-smart meter homes, the approach requires some ingenuity, since AMI disaggregation algorithms are not applicable on a single monthly data point.

Leveraging Similar Homes
The approach starts with the premise that similar homes use energy in similar ways. For example, a single person living in a Manhattan studio is going to be similar in their energy usage to another single person living in a Manhattan studio, but very different from a family living in a 5 bedroom home in Phoenix. And assuming each of these homes has a smart meter, AMI disaggregation would demonstrate those similarities and differences.

But what if one of the Manhattan studios didn't have a smart meter? The meter type won't impact the studio's energy usage; it will still look similar to the other Manhattan studio. And therein lies the key. If the goal is to disaggregate the Manhattan studio **without** the smart meter, the most logical starting point is to leverage the disaggregation from the similar Manhattan studio **with** the smart meter. Better yet, instead of leveraging disaggregation from a single similar smart meter home, what if there were hundreds or thousands of similar smart meter homes that could be leveraged?

The Need for LOTS of Smart Meter Data
Successfully leveraging the similar home approach relies on the availability of smart meter homes to compare to each target non-smart meter home. And in this case, more is definitely better: not only does a larger database of smart meter homes diversify and expand the potential coverage universe of non-smart meter homes, it also increases the accuracy of the solution by enabling a more rigorous analysis of the key comparison criteria between the homes - weather/geography, seasonal/annual energy consumption patterns, home size/occupancy, and appliance ownership profiles.

Putting Machine Learning to Work
The challenge of non-smart meter disaggregation - the "rigorous analysis" mentioned above - can only be handled by machine learning. At its core, machine learning is an automated mechanism to learn the optimal predictive relationship given an input and the desired output, and it is the key component enabling significant technology advances across industries: self-driving cars, natural language processing, and facial recognition, to name a few.

In the context of non-smart meter disaggregation, by continually learning through the similar home comparison process between non-smart meter and smart meter homes, machine learning maximizes processing speed and analytics accuracy, resulting in the most accurate non-smart meter disaggregation results, and making the non-smart meter solution scalable across millions of homes.

Impact of universal disaggregation

With universal disaggregation, no longer is there a gap between the smart meter and non-smart meter experience. By providing appliance itemization to all homes in their territory, utilities are able to educate their entire customer base on the costs of specific appliance usage, and engage each of them with a more personalized experience.