

# How does AdOPT's AI Engine Work for Energy & Facility Management?

## AI Engine Overview

The AI Engine enables the AdOPT platform to deliver smart services to users. As data analytics and AI become increasingly useful in IoT applications, AdOPT has implemented an AI Engine that's been designed and developed with R&B's proprietary expertise in order to handle the challenges posed by energy and facility management, including extreme data scarcity and quality issues. AdOPT's AI Engine performs back end data cleansing, object network, feature extraction, optimization & decision-making, and interpretation, and it then automatically runs multiple service modules, such as prediction and abnormality detection. Overall, the AI Engine is purposefully designed to automatically provide support to end users by engaging a perfect combination of AI algorithms and domain knowledge.



01

One

### Data Cleansing & Object Network

Because data points collected from properties or facilities are usually generated by various equipment, devices, and systems, they often are highly diversified and difficult to label, and the robustness of real-time data connection relies heavily on conditions and maintenance of existing communication infrastructures. Therefore, when given hundreds of thousands of data points in a massive single property or facility, the AI Engine uses unsupervised machine learning to automatically treat data with (a) structuralizing, (b) labeling, (c) interpolation, and (d) deduplication. With this clean and well-structuralized data, the Engine generates an object network to map any given system by using unsupervised network analysis in order to identify entities and recognize correlations among objects.

02

Two

### Pattern Recognition

The AI Engine carries out an unsupervised or combined supervised/unsupervised learning method that allows it to recognize data patterns that represent operating features of equipment or systems. Industrial IoT applications with sequential data with step changes require a carefully designed and fine-tuned online machine learning method. Once the Engine successfully selects features, it can enable capabilities such as equipment failure prediction. The IoT data scale of properties and facilities is too small to perform deep learning techniques, such as convolutional neuro network, so the AI Engine's machine learning is a subtle process that requires a proprietary algorithm architecture and method that achieve satisfactory application performance.

03

Three

### Optimization & Decision-Making

The AI Engine's data treatment process uses a series of optimization and decision-making techniques. Optimization entails identifying optimal settings and configurations for combined machine learning with high dimensional, multivariate, and sophisticated models. The Engine's decision-making technique integrates with minimal domain knowledge and helps users validate a detected outlier or pick optimal choices under given conditions.

04

Four

### Interpretation

The AI Engine uniquely interacts with a domain library that contains expertise in energy and facility management, which interprets the Engine's output in a professionally-presentable and meaningful fashion to users without much analytical background. This state-of-the-art Engine will train the set of expertise and let it be learned by the object network.