ICE Network CoLab Summary: Artificial Intelligence - Tangible Applications and Communities Benefits

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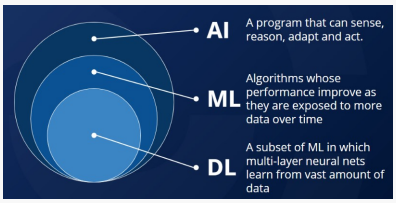
What is Artificial Intelligence, Machine Learning, and Demand Response?



Artificial Intelligence applications can work within a software program, but in the case of the applications in energy efficiency, it can also be used to control hardware, or physical devices like heating and cooling equipment, lighting, and other kinds of appliances to help them consume less electricity but still perform in the way that we, as users, need them to.

Machine Learning is a kind of AI that allows the program to make better and better predictions about the behavior of the thing it is monitoring, by processing information that is given to it. An even more specialized subset of Machine Learning called Deep Learning uses Neural Networks to learn from vast amounts of data to identify patterns and create rules without any human programming.

Essentially, what each of these kinds of technologies unlocks in the energy industry is the ability to hone the operations of energy facilities and consumption to operational perfection. Which is to say that these applications can help make energy systems operate as efficiently as possible. It can also help do root cause analysis on the data from a system over a period to inform how future operations could become better and more efficient and be used to run

simulations to predict outcomes of model scenarios. From this, Demand Response is available, which gives consumers the opportunity to consume electricity at lower-demand times for financial incentives, like lower rates, for example.

How Do Artificial Intelligence, Machine Learning, and Demand Response benefit individuals and communities?

When Demand Response is used, some consumers will get financial incentives to shift their electricity use to lower-demand times of the day, which reduces the peak load on the system. Doing this will mean that there is a lower cost to everyone using electricity. This is a way in which system operators at a community level can reduce the cost of operations on both infrastructure (poles and wires) and generation costs, especially when the generation is from fossil fuels.

Artificial Intelligence can also be used as a tool to help communities determine the best opportunities for clean energy projects. There are several aspects of projects that can be informed by AI, when applied in different ways:

1. Using historical data to simulate modern technology integrated into the existing system – this can indicate which technology options will perform better than others.
    a. Helping to identify the best place to start improving or expanding an energy system
    b. Helping to choose specific types of technology to implement
2. Using real-time data to improve operations to make the energy system more efficient.

The overall goal of these applications is to create a set of actionable decisions for the community to make. The decision types can be focused on a range of different tests, such as financial affordability, Greenhouse Gas Emissions, Capital Efficiency, etc.

On the operational side of efficiency improvements, AI can be applied to maximize efficiency in a system by reading data from the system and identifying inefficiencies. Improvements in efficiency can lead to a range of outcomes, including:

- Reducing the community fuel consumption for electricity generation.
- Identifying opportunities to use surplus energy for electric vehicles.
- Challenge consumers to look at their energy use habits and become more directly involved in the management of their energy use.

The Energy Futures Lab's Energy.AI program is supported by the RBC Foundation and is exploring the intersection between AI, energy, and climate. The program's URL is https://energyfutureslab.com/initiatives/energy-ai/

CoLab Attendees (71)

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