Energy XP - Water Heater Controls

Emulator Models, Testing Validation, Support Vector Machine

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Project Overview
Support Vector Machine
Electric Vehicle Emulator
Challenges and Recommendations

Support Vector Machines
Another Subsection

Machine Learning

- Machine learning provides computers the ability to learn without being explicitly programmed.
- Useful for mathematical optimization.
- Useful for predicting and separating solvent from insolvent companies.
- Support Vector Machines utilize machine learning.
- Accurate method of finding an optimal hyperplane of linearly separable data.

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- Demonstration of a Support Vector Machine algorithm.
    - Link: https://www.youtube.com/watch?v=WdbqdhJDPEw
- The Demonstration used randomly generated data (with a slight weight to help separate data).
- This algorithm 'guesses' which data points will reside between the margins optimal hyperplane.
- The simulation then graphs the hyperplane and associated margins and calculates the percent of correct predictions.
    - Code:
      https://github.com/TylerCrabtree/SupportVectorMachines

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System Overview
Design Method

Objectives and Framework

- Residential load modeling
    - Electric vehicle (EV), water heater, residential battery, HVAC, etc.
- Load emulation
    - Multiple virtual loads to simulate distributed storage
    - Aggregate loads via management system
- EV emulator

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Parameters

- EV energy capacity
    - 24kWh battery
- EV power draw
    - Level 2 charging
    - 240 V
    - 3.3 kW
- State of Charge

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Design Method

- Communication
    - Client-server
    - Pymodbus
    - AllJoyn
- States and Commands
    - IDLE
    - CHARGE
    - DISCHARGE

Recommended Upgrades

Simulation

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System

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Thank you

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