1. Overview

DWSIM COOLSIM (IA) is an innovative application designed to simulate refrigeration and air conditioning systems and serves as an example for developing more complex systems for both refrigeration and chemical process simulation.

This application bridges the capabilities of DWSIM with advanced multivariate Design of Experiments (DOE) analysis based on Latin Hypercube Sampling (LHS). This integration enables the handling of both continuous and discrete variables, allowing for comprehensive exploration and optimization of process conditions. By leveraging the powerful simulation engine of DWSIM, users can generate extensive datasets that form the foundation for sophisticated DOE analyses.

The application goes a step further by using simulated data from DWSIM to develop soft sensors based on Multilayer Perceptron (MLP) neural networks. These soft sensors provide real-time predictions and insights, enhancing process monitoring and control. With DWSIM COOLSIM (IA), engineers and researchers can efficiently explore design spaces, identify optimal conditions, and implement predictive models, ultimately leading to more efficient and robust process operations.

2. Key Features

- **Seamless Integration with DWSIM**: Effortlessly connect with DWSIM to perform simulations and gather comprehensive datasets for further analysis.
- **Multivariate DOE Analysis:** Utilize advanced Design of Experiments (DOE) techniques, including Latin Hypercube Sampling (LHS), to explore a wide range of process variables, both continuous and discrete.

- **Soft Sensor Development:** Create robust soft sensors based on Multilayer Perceptron (MLP) neural networks, enabling real-time predictions and enhanced process control.
- **Optimization and Prediction:** Leverage simulated data to identify optimal process conditions, improving efficiency and performance in various industrial applications.
- **User-Friendly Interface:** Access a streamlined, intuitive interface that simplifies the process of setting up simulations, analyzing results, and developing predictive models.
- **Scalability and Flexibility:** Adapt the application to various process scenarios and scales, from small lab setups to large industrial systems, ensuring versatility across different use cases.

3. Development Team

- Prof. Dr. Nicolas Spogis <nicolas.spogis@gmail.com> || <https://linktr.ee/CascaGrossaSuprema>

4. Installation

To install the necessary dependencies, you need to have Python installed on your system. If you don't have Python, you can download it (https://www.python.org/downloads/). After installing Python, follow the steps below:

- **Clone the Repository:** First, clone the DWSIM COOLSIM (IA) App repository to your local machine (https://github.com/Spogis/DWSIM_CoolSim)
- **Install Dependencies:** Within the project directory, locate the `requirements.txt` file containing all necessary libraries. Install them by running: `pip install -r requirements.txt`. This will install all the dependencies required to run Easy DOE.

5. Execution

To run the application, follow these steps:

- Navigate to the project directory where `main.py` is located.
- Execute the `main.py` file using Python: `python main.py`
- After running the command, Dash will start the local server and you can access the application through your browser. Normally, the URL will be something like `http://127.0.0.5:8080/`.

6. Support

If you encounter any problems or have any questions, do not hesitate to open an issue in the GitHub repository or contact us directly.

7. License

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8. Contact: https://linktr.ee/CascaGrossaSuprema