



Current Project Overview

Our goal is to perform a time series analysis of sensor data (wind speed and direction, temperature, humidity etc.) and meteorological data on oil and gas production sites and develop a machine learning based solution for emission localization and quantification, while also improving the repeatability of time-series data such as data acquisition and data processing. We have two options – either use a correlation-based recurrent attention network (CRAN) or transform the site layout to images and apply machine learning on these images. The plan is to go ahead with the model that gives us the best accuracy provided that the time taken is similar for both methods.

Research Progress

We are currently in the first phase of the project where we are collecting the required data and preprocessing it. The initial simulation data can be obtained from the MEET simulator. Another option is to see if satellite data of leaks can be obtained. In this case, the input to the Machine Learning model would be images vs tabular data in the former scenario.

Research Plans

1. Do a literature review on “Machine Learning applied to emission localization and quantification”.
2. Using the instrument readings captured at METEC as the initial data, analyze (time series sensor data), and preprocess the data – data cleaning, transformation etc.
3. Write the initial machine learning framework which includes the different blocks and verify that the METEC data is transformed correctly at every block and output is generated.

4. Fine tune the hyper parameters, modify the machine learning architecture for best performance. Perform ablation studies and analyze the effect of various sensor readings on the model's performance.
5. Evaluate the machine learning model on the test dataset (METEC data). Fine tune the model. Perform testing on METEC data captured at various instances to verify that the model has not overfit/underfit. Repeat steps 2-5 as required.

Publications

N/A

Literature Cited

Photo from - [Detecting Methane from Miles Away | Paul M. Rady Mechanical Engineering | University of Colorado Boulder](#)