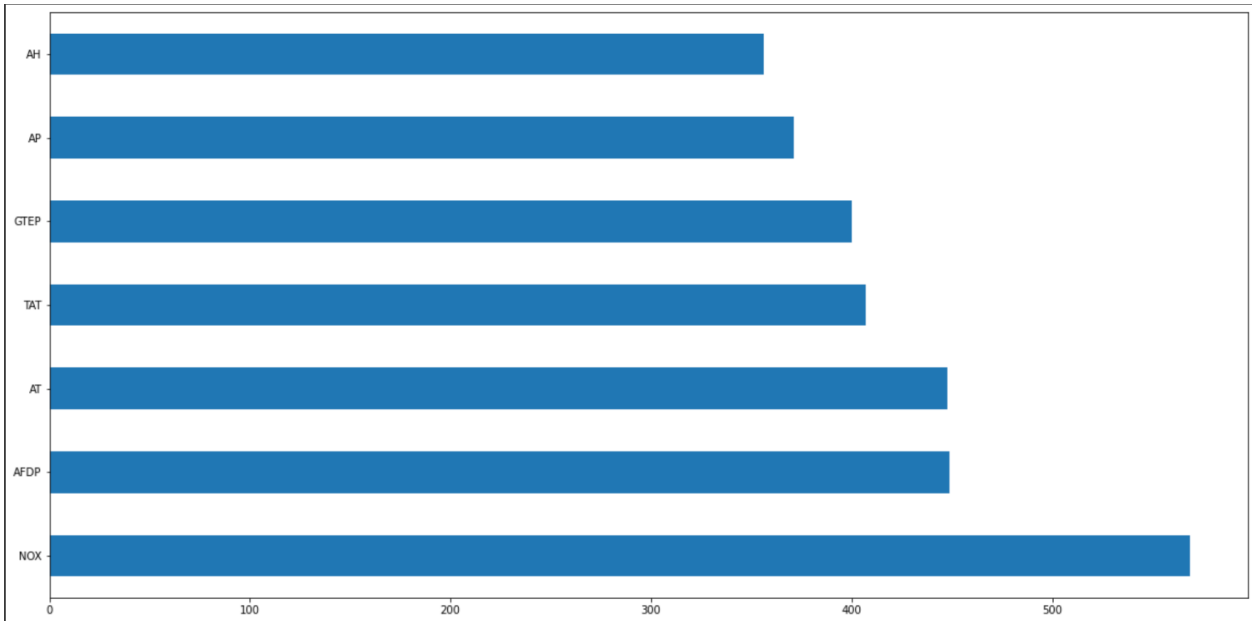
Predict Amount of CO emitted

Objective 1:-

Model Description

- Shape of data - (7152, 11)
- Training data points - 5721
- Test data points - 1431
- Columns used for training model - ‘AT’, ‘AP’, ‘AH’, ‘AFDP’, ‘GTEP’, ‘TAT’, ‘NOX’
- RMSE on train data - 0.57
- RMSE on test data - 0.72
- Notebook

Feature Importance Plot



Feature Importance Table

|Column Name|Score|

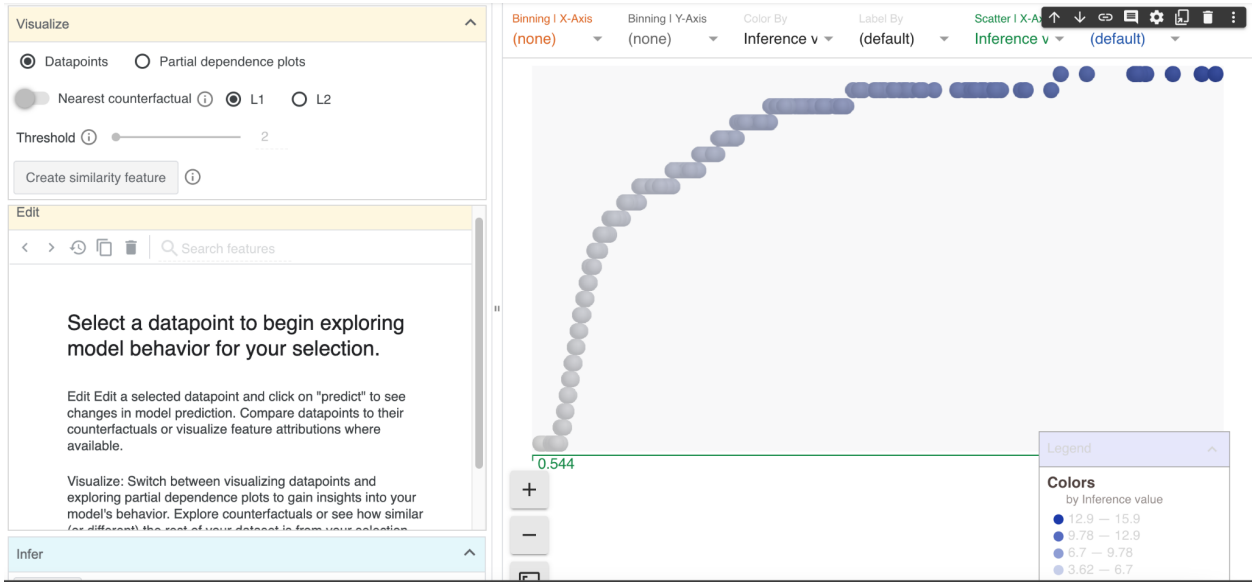
AT	448
AP	371
AH	356
AFDP	449
GTEP	400
TAT	407

NOX 569

Objective 2:-

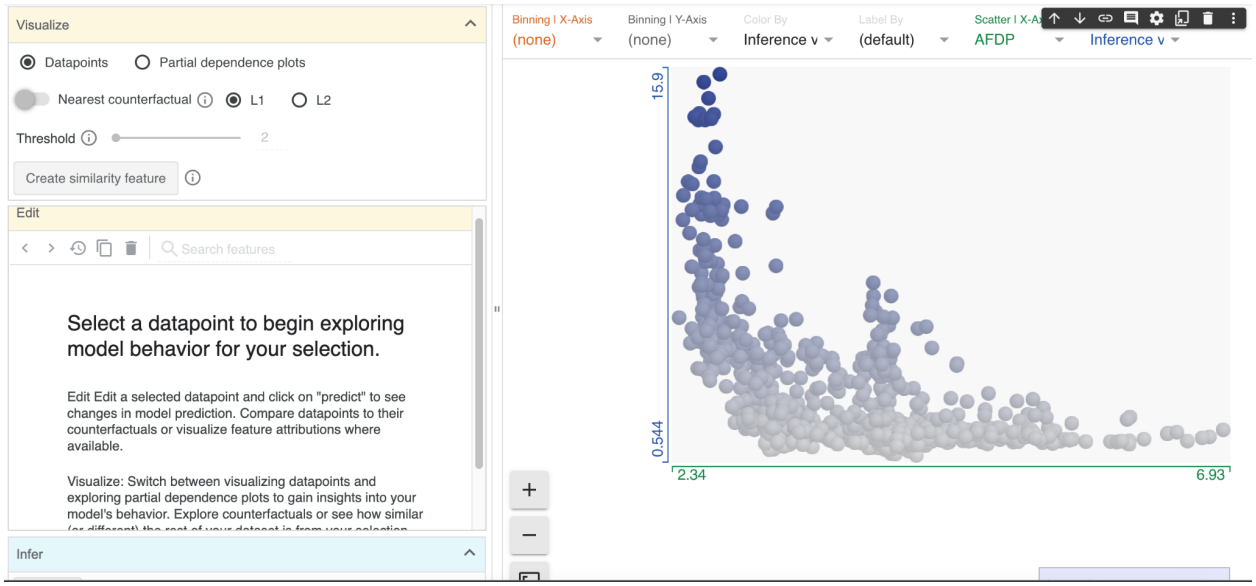
What If Tool Box

- Initial View



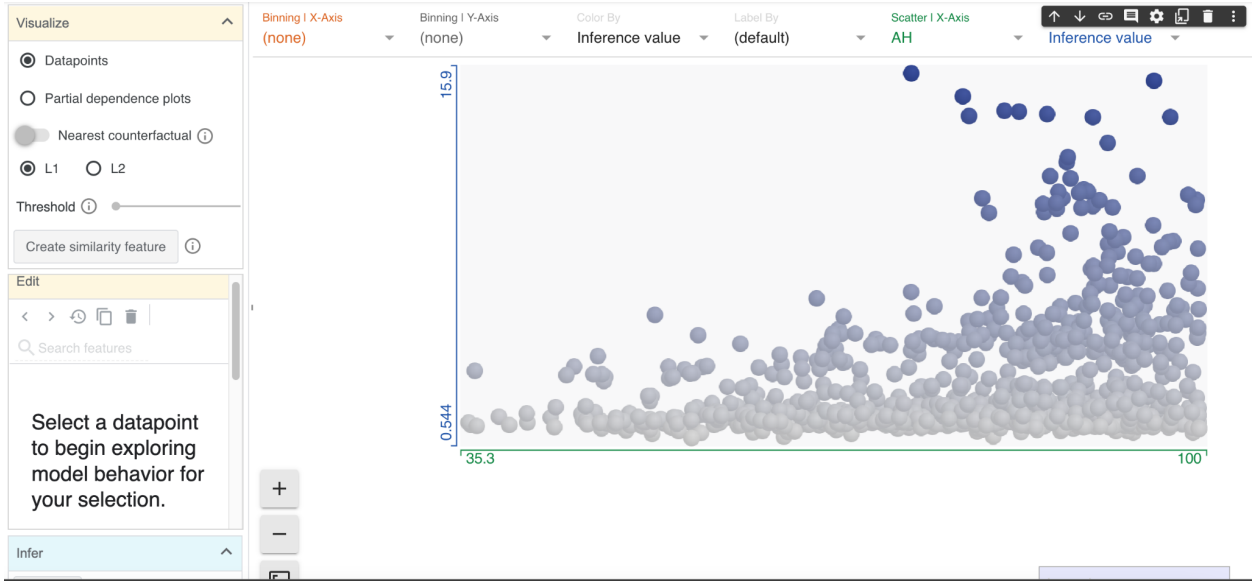
The above plot shows us that the number of points on top half is higher than that of present in bottom half. This implies majority of datapoints have high amount of emitted CO.

Simple Visual Analyses



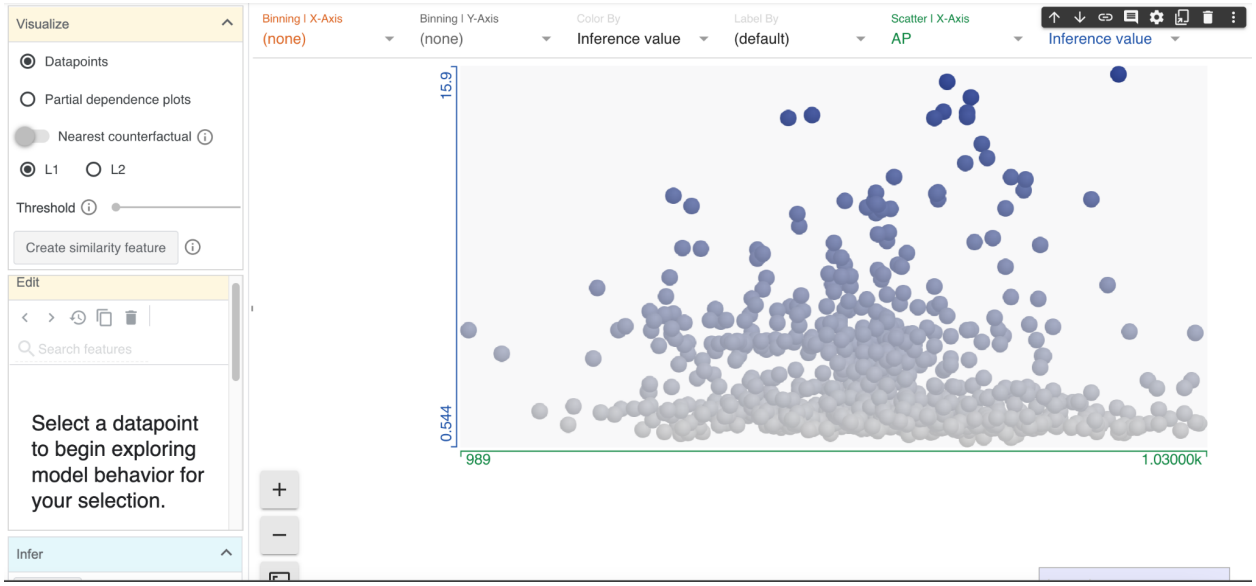
AFDP - Air Filter Difference Pressure

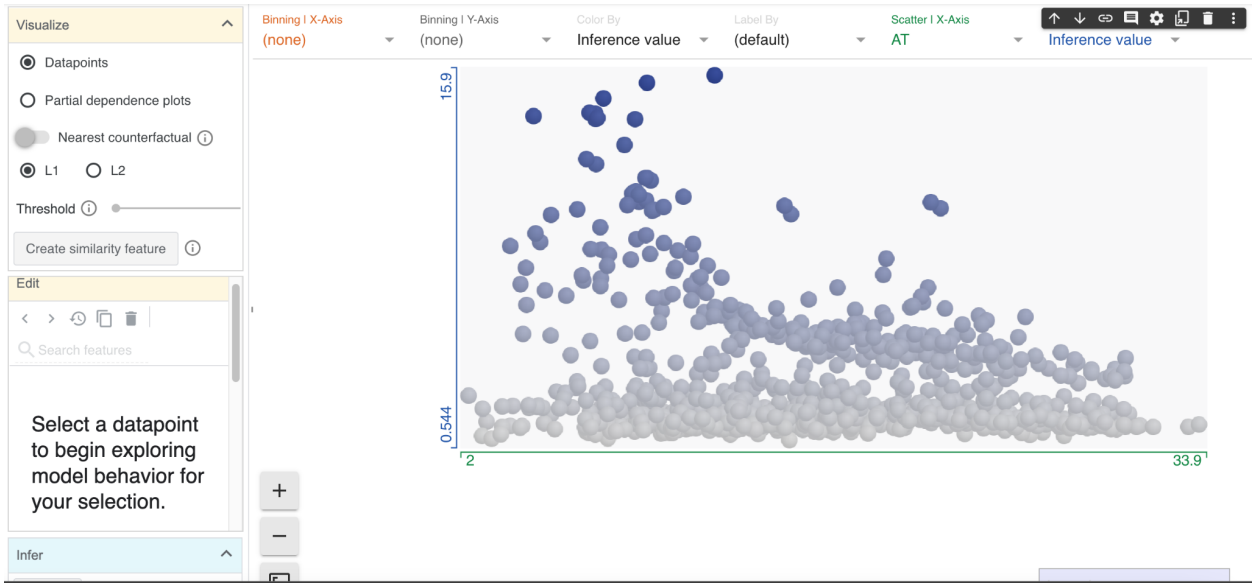
On increasing AFDP the emission of CO decreases. So there is a negative correlation between AFDP and amount of CO emitted.



AH - Ambient Humidity

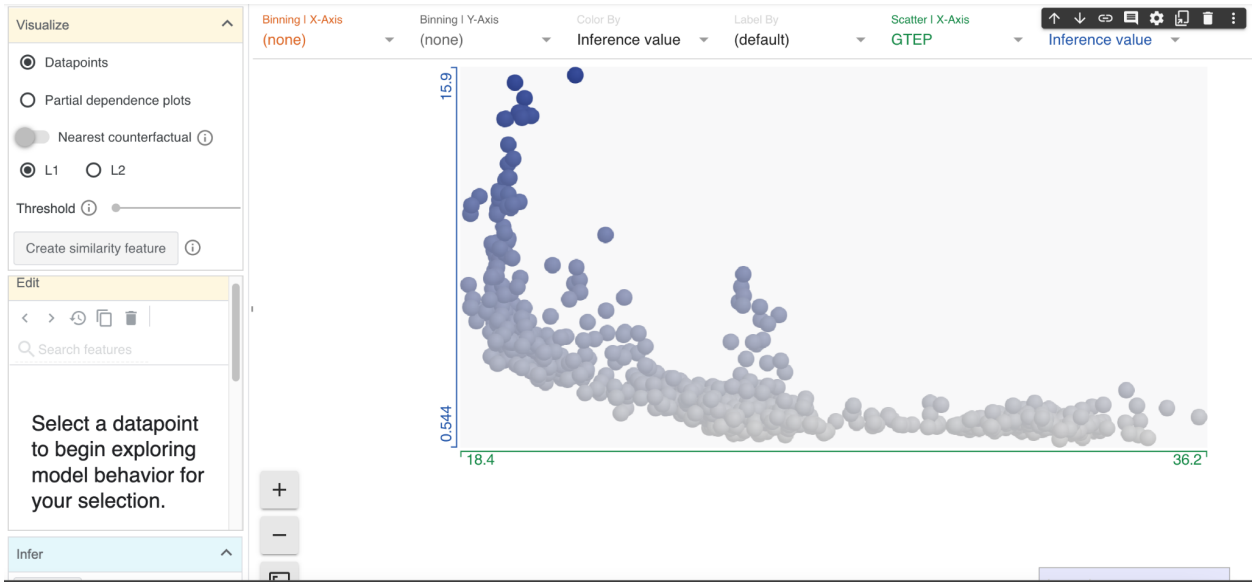
The number of data points on right side of the plot is higher. So on increasing AH, amount of CO emitted also increases.





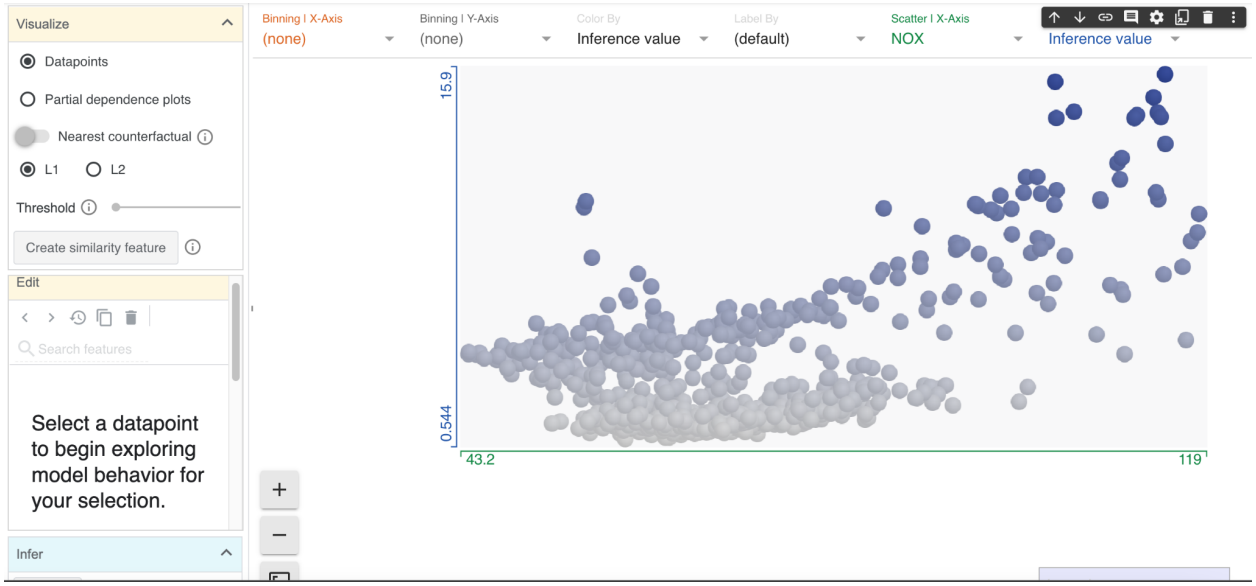
AP - Ambient Pressure
AT - Ambient Temperature

Datapoints are cluttered at bottom. There is not much impact of changing AP, AT on amount of CO emitted.



GTEP - Gas Turbine Exhaust Pressure

There is negative correlation between GTEP and amount of CO emitted.



NOx - Nitrogen Oxides

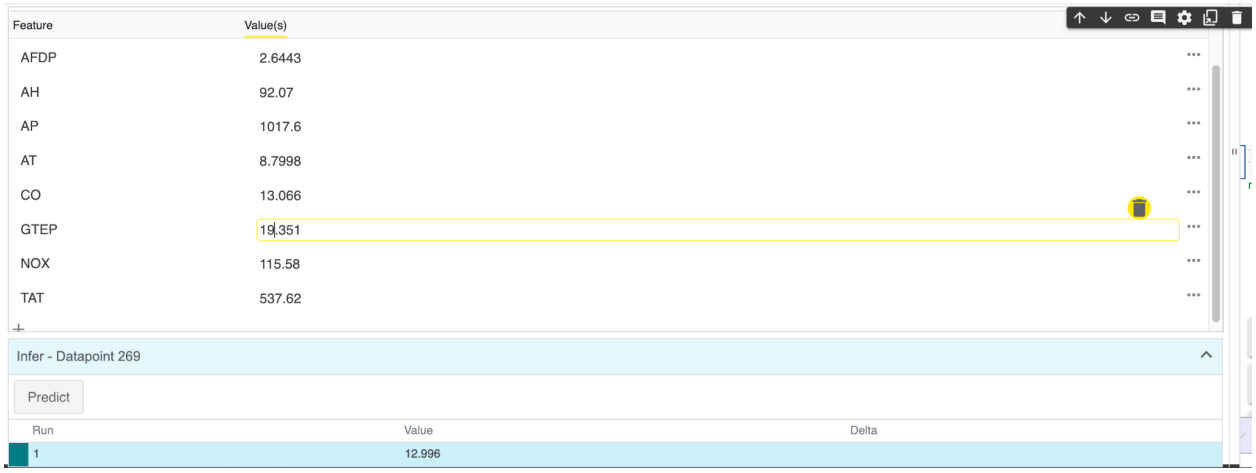
On increasing NOx the amount of CO emitted decreases.

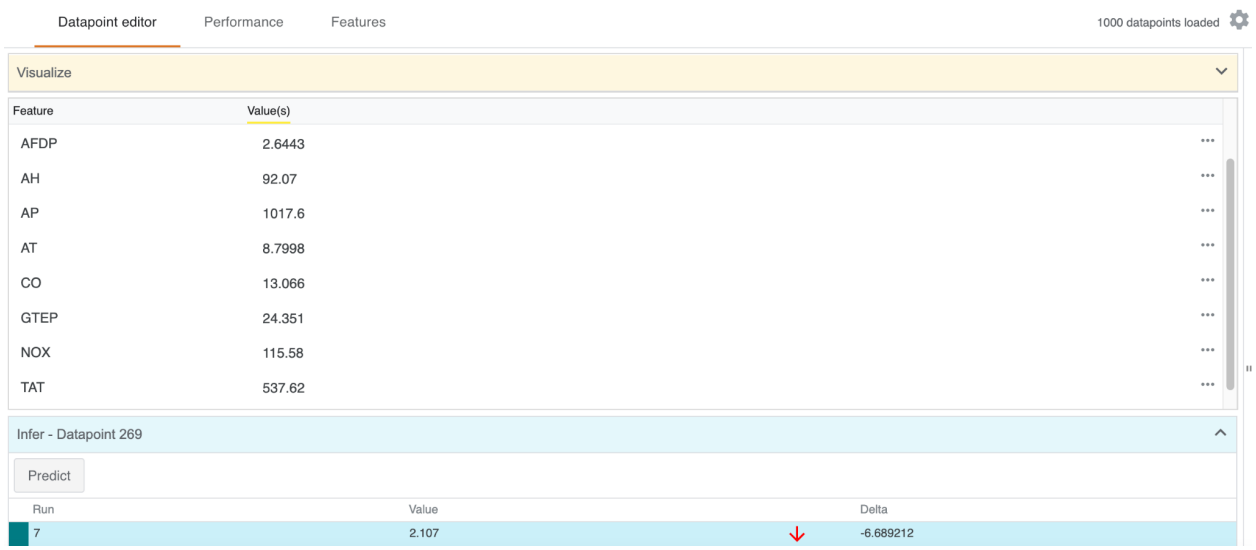
TAT - Turbine After Temperature

On increasing the value of TAT, the amount of CO emitted increases.

Scenario :-

Scenario where amount of CO emitted is huge. I want to find one factor, tweaking it will lead to significant decrease in amount of CO emitted.





Aim is to bring down the amount of CO emitted. Initially the amount of CO emitted is around ~13, to bring it down to average level of CO emitted, I increased “Gas Turbine Exhaust Pressure (GTEP)” by 5 units.

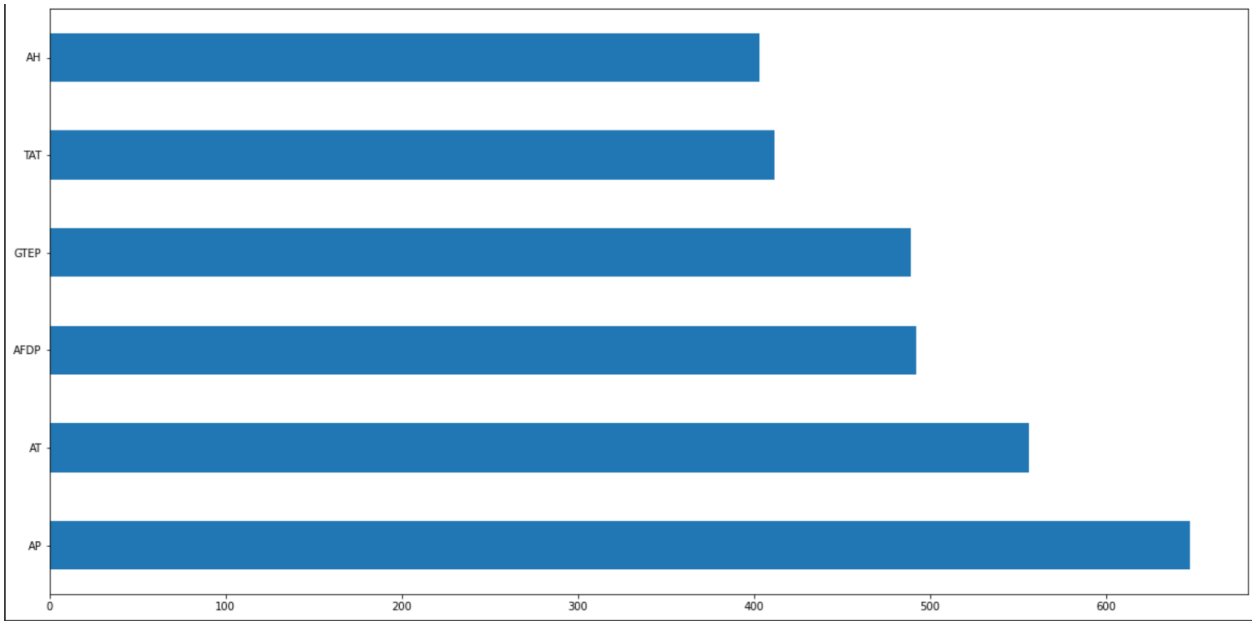
Predict Amount of NOx emitted

Objective 1:-

Model Description

- Shape of data - (7152, 11)
- Training data points - 5721
- Test data points - 1431
- Columns used for training model - ‘AT’, ‘AP’, ‘AH’, ‘AFDP’, ‘GTEP’, ‘TAT’
- RMSE on train data - 3.56
- RMSE on test data - 4.99
- Notebook

Feature Importance Plot



Feature Importance Table

|Column Name|Score|

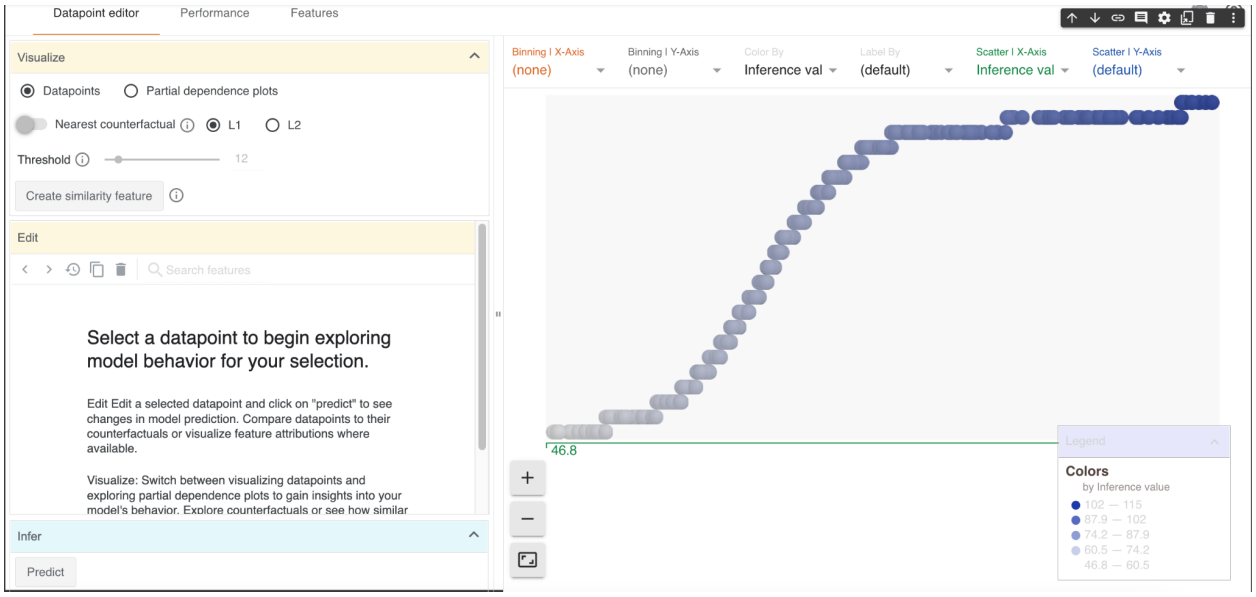
AT	556
AP	648
AH	403
AFDP	492
GTEP	489
TAT	412

Objective 2:-

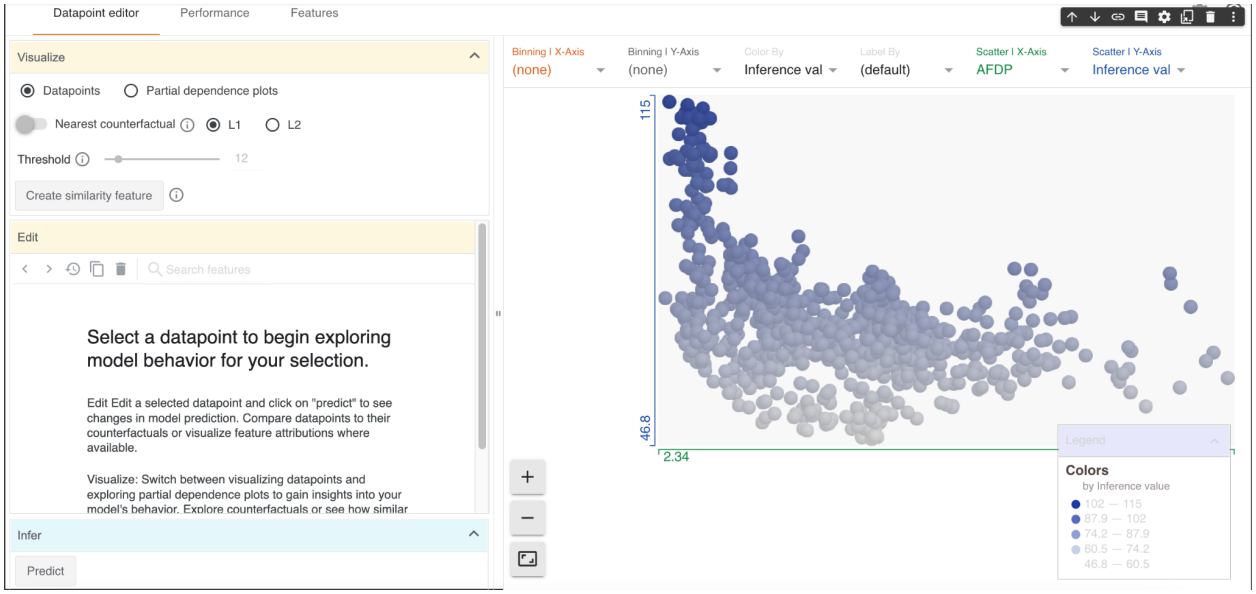
What If Tool Box

- Initial view

The plot shows us that the number of points on top half is higher than that of present in bottom half. This implies majority of datapoints have high amount of emitted CO.



Simple Visual Analyses


Datapoint editor
Performance
Features
Visualize
Datapoints
Partial dependence plots
Nearest counterfactual
L1
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Threshold
12
Create similarity feature
Edit
Search features
Select a datapoint to begin exploring model behavior for your selection.
Edit Edit a selected datapoint and click on "predict" to see changes in model prediction. Compare datapoints to their counterfactuals or visualize feature attributions where available.
Visualize: Switch between visualizing datapoints and exploring partial dependence plots to gain insights into your model's behavior. Explore counterfactuals or see how similar
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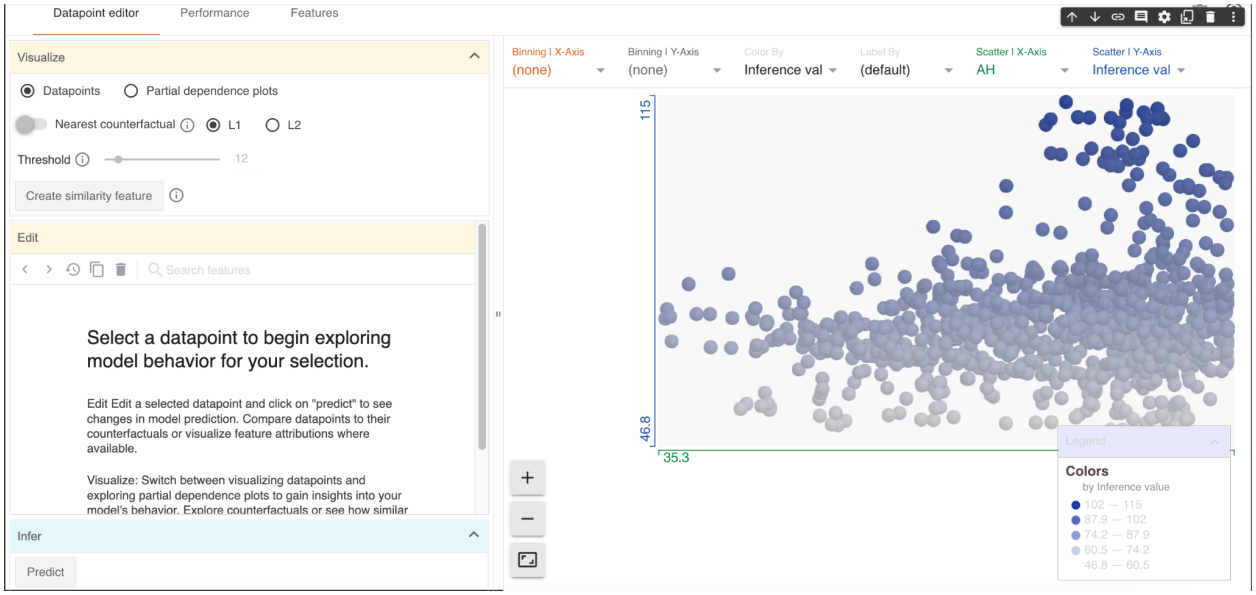
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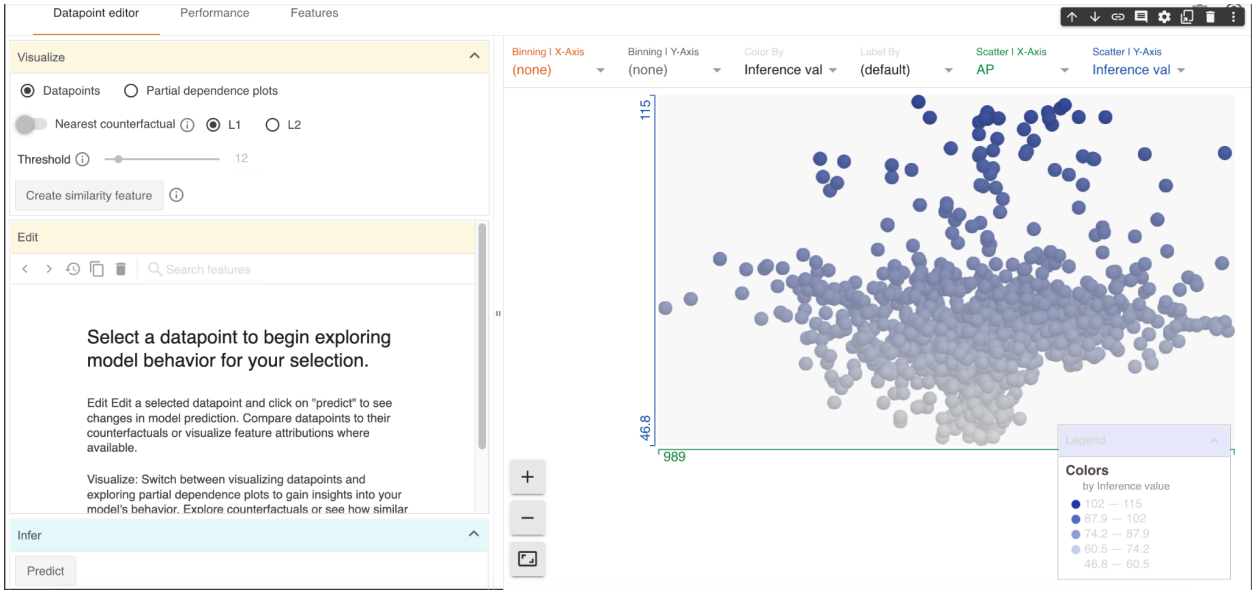
46.8 — 60.5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74.2 — 87.9
60.5 — 74.2
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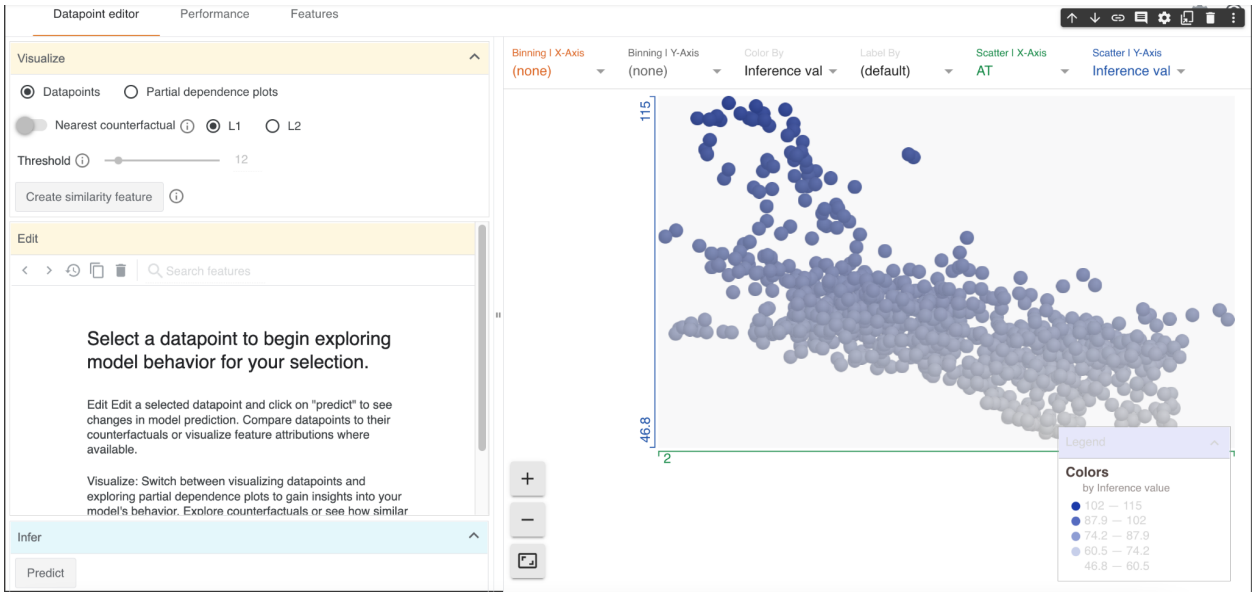
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74.2 — 87.9
60.5 — 74.2
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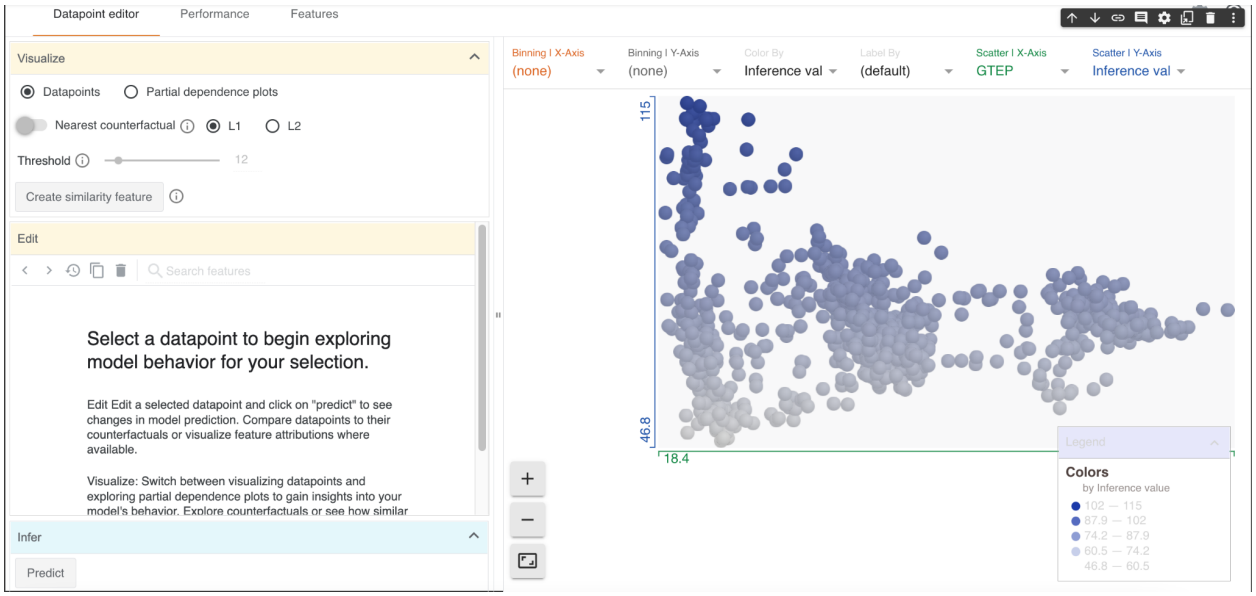
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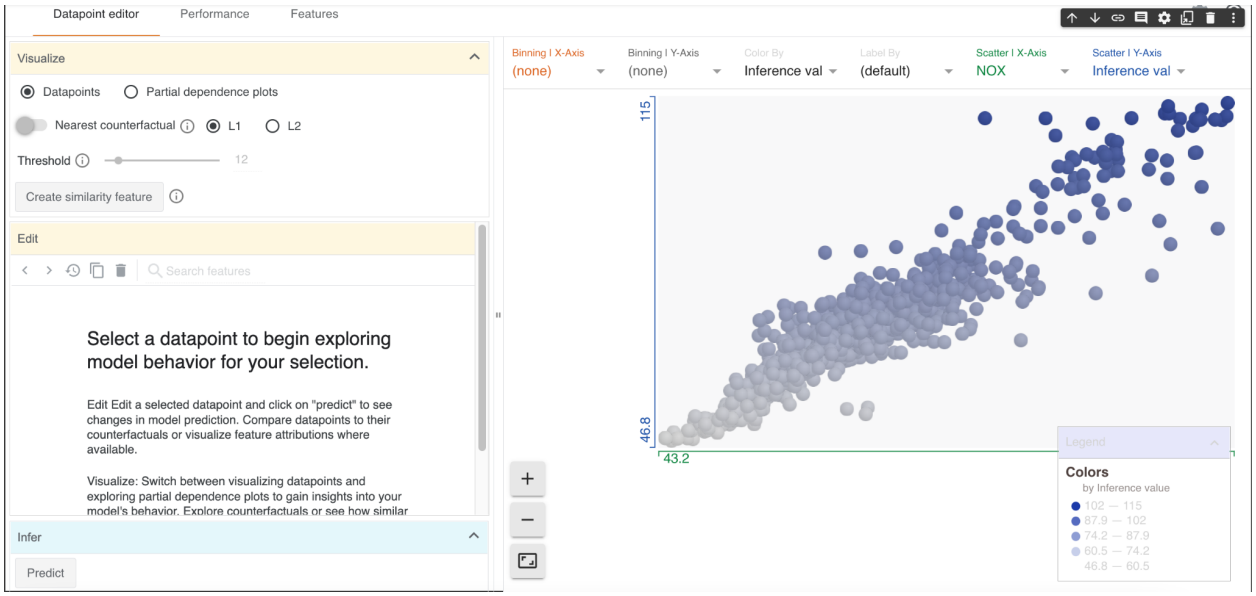
60.5 — 74.2
46.8 — 60.5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Color By
Inference val
Label By
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Scatter | X-Axis
NOX
Scatter | Y-Axis
Inference val
115
46.8
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Legend
Colors
by Inference value
102 — 115
87.9 — 102
74.2 — 87.9
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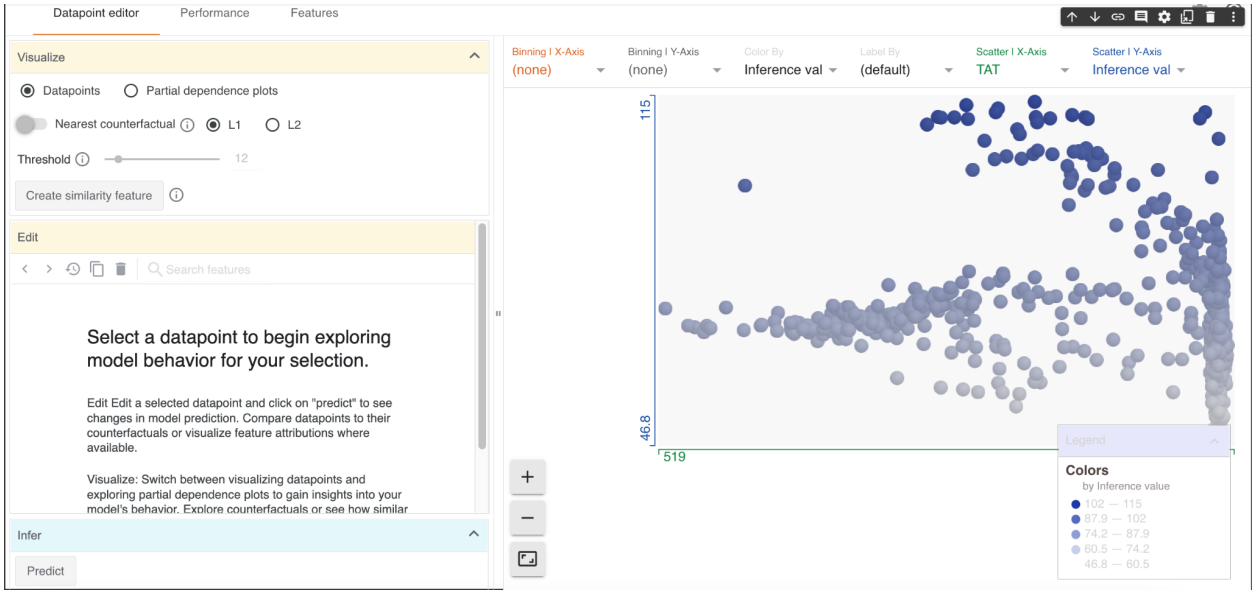
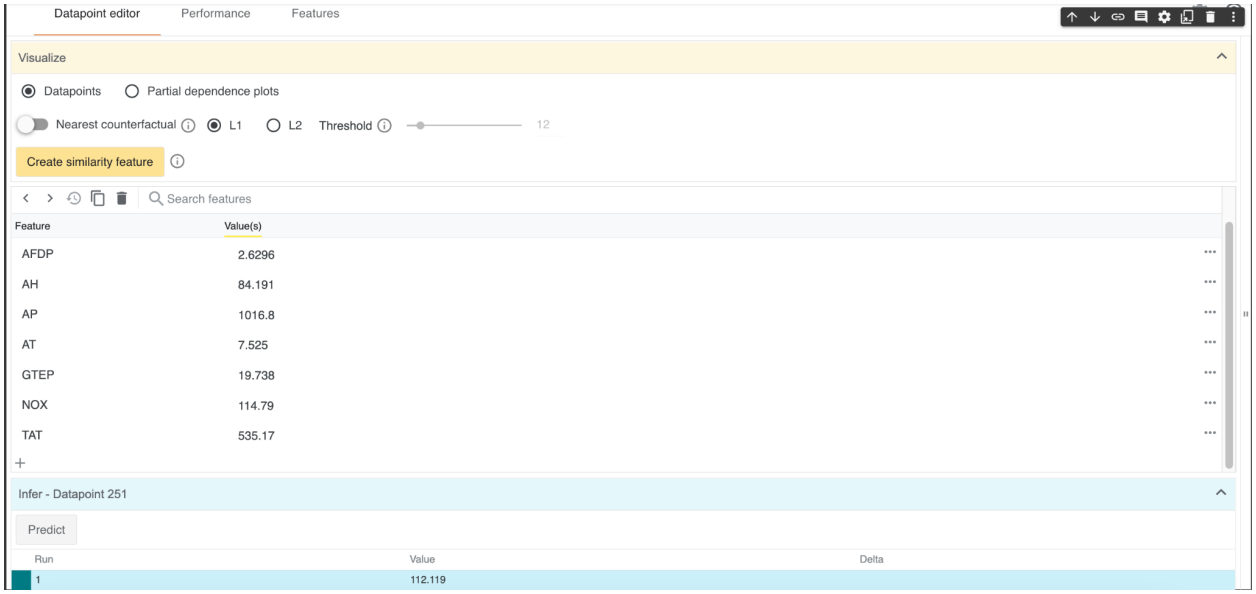
46.8 — 60.5



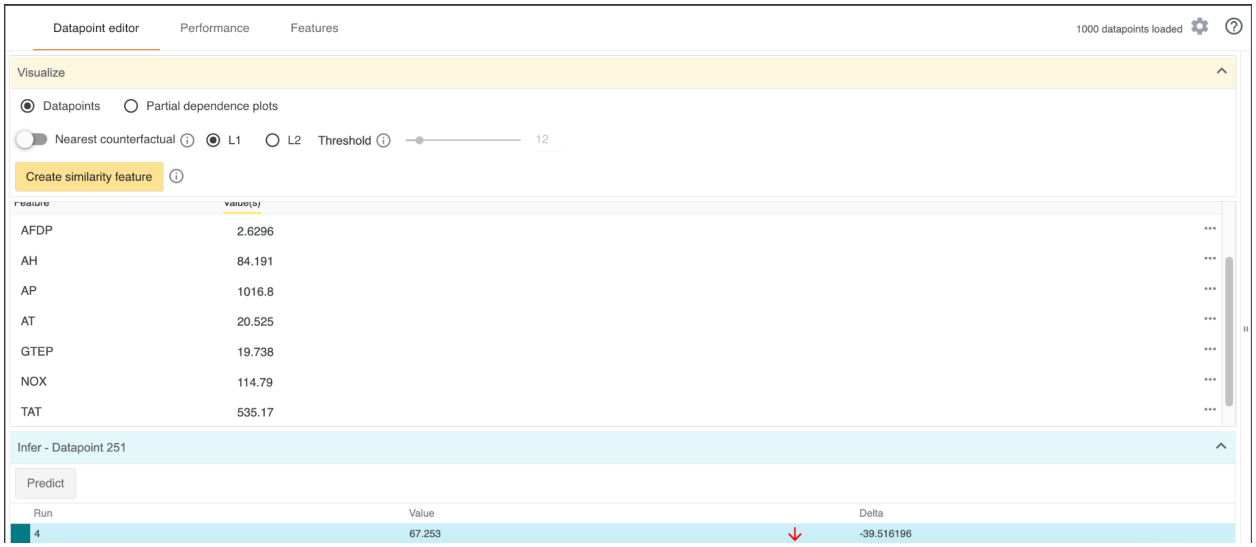
Scenario :-

The values below contain instances when NOx emitted is above average permissible level, and aim is to bring down the NOx emission to average permissible level by changing one parameter at a time.

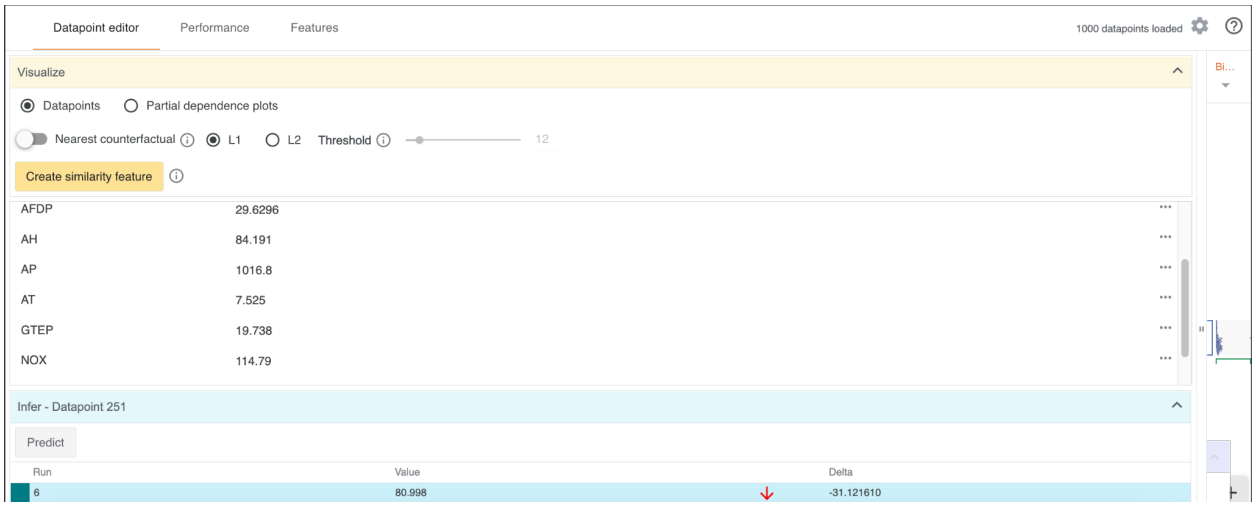
The amount of NOx emmited is 114 (from below figure), aim is to bring it down to 65 (average permissible level).



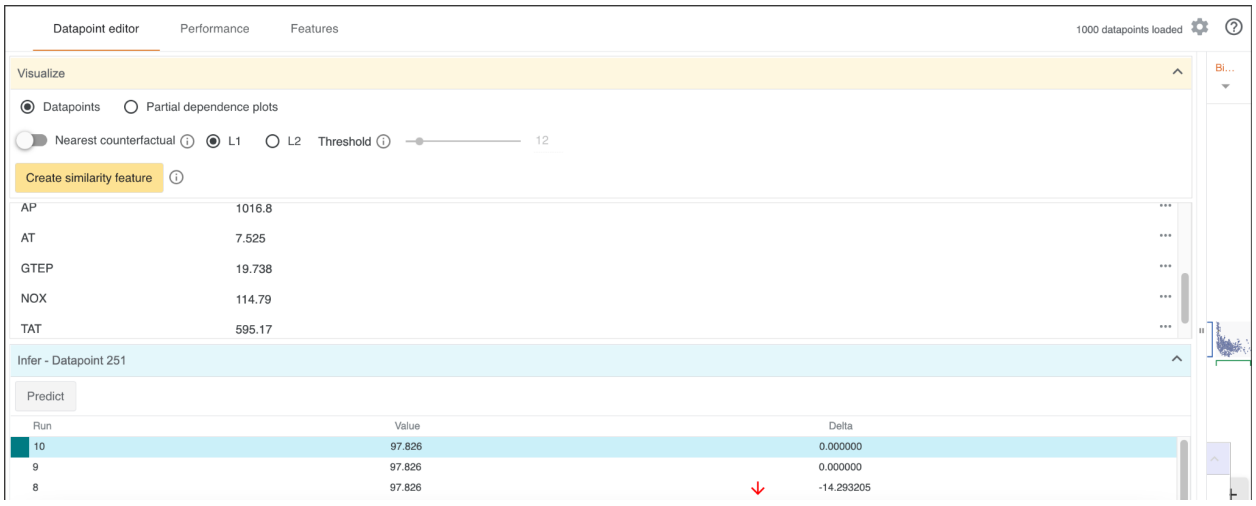
Change in NOx by Changing Ambient Temperature



Change in NOx by Changing Air Filter Difference Pressure



Change in NOx by Changing Turbine After Temperature



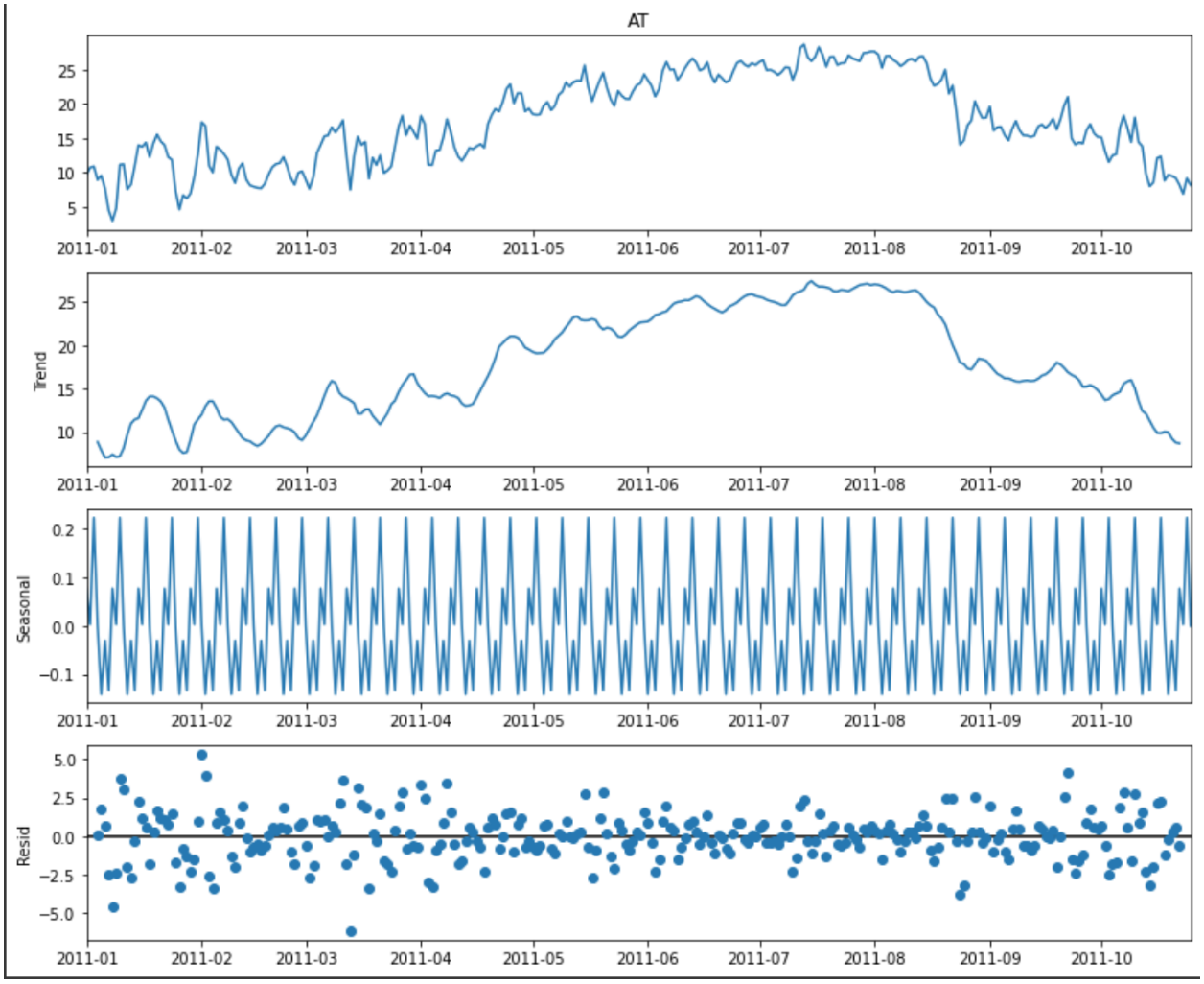
Changing TAT beyond a certain value doesn't make any difference to amount of NOx emitted.

Objective 3:-

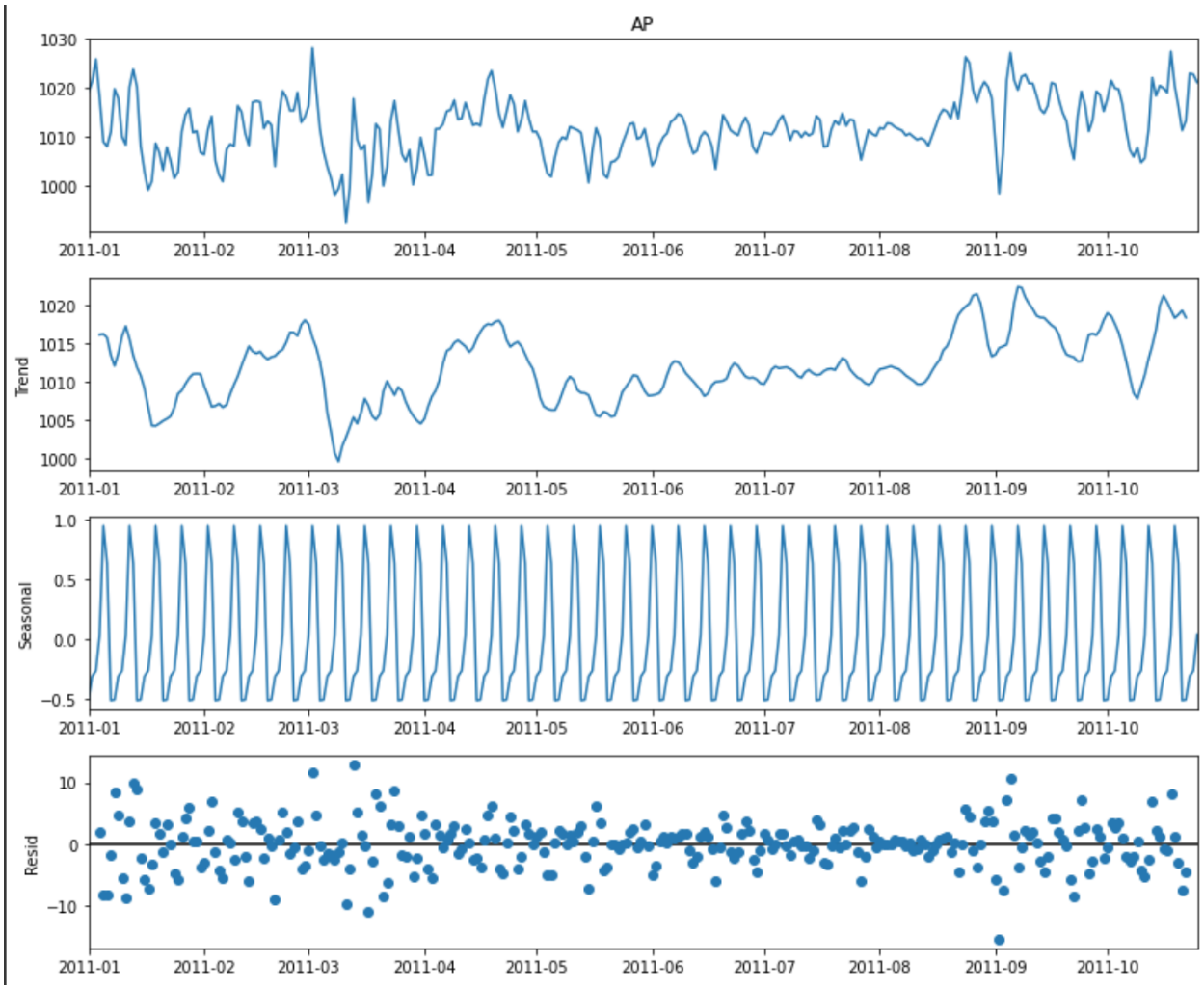
Timeseries Trend

[Notebook Link]

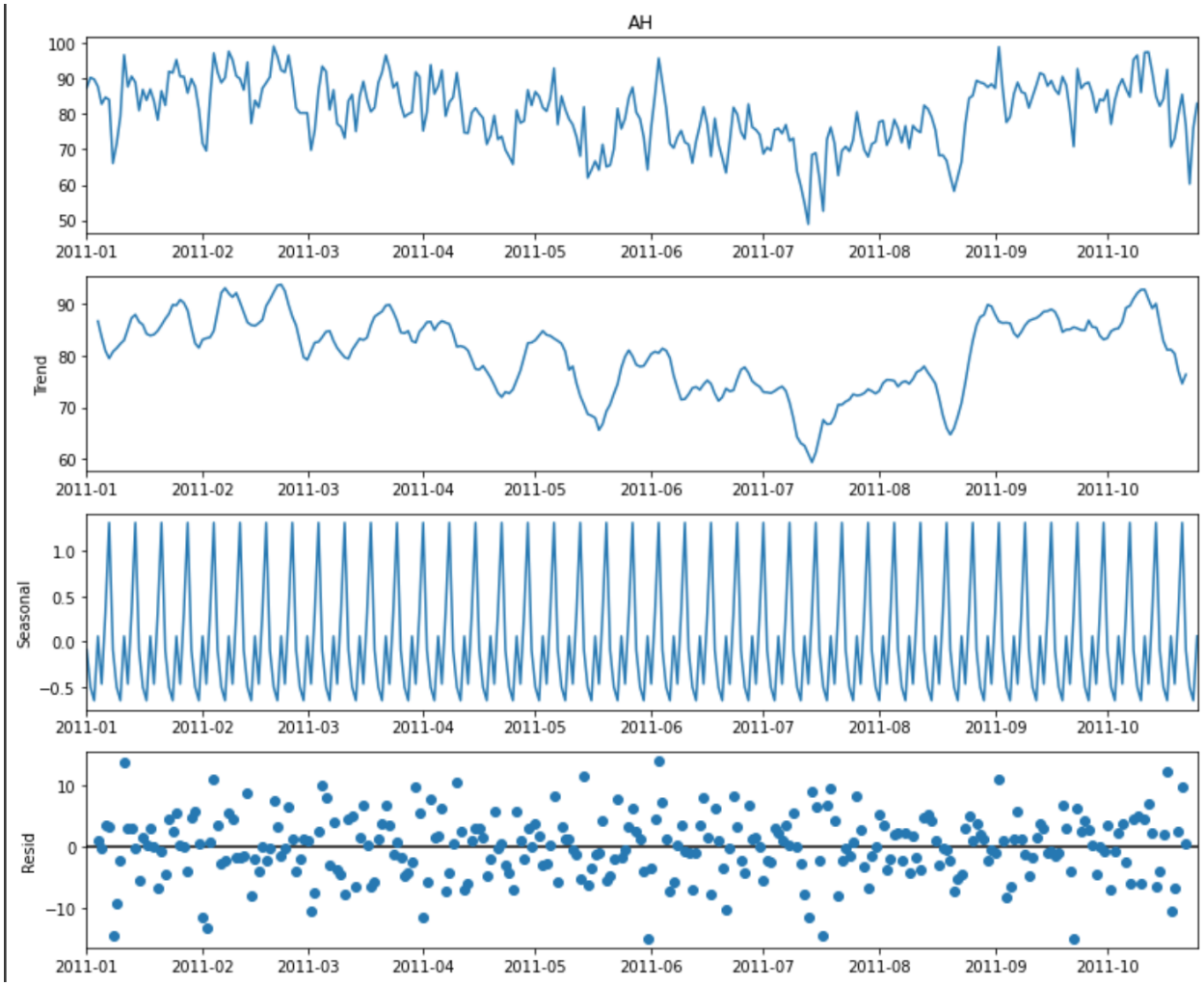
Ambient Temperature



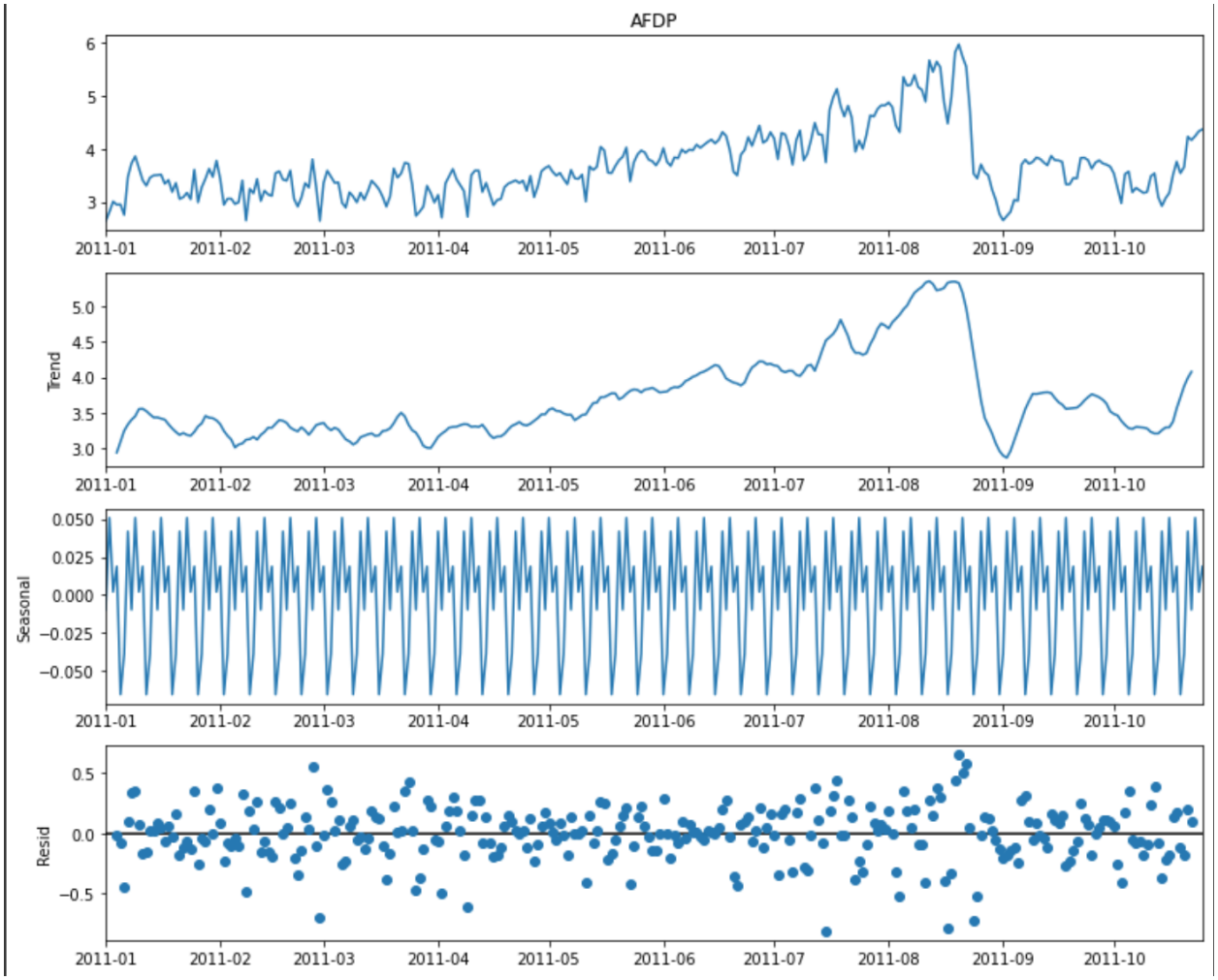
Ambient Pressure



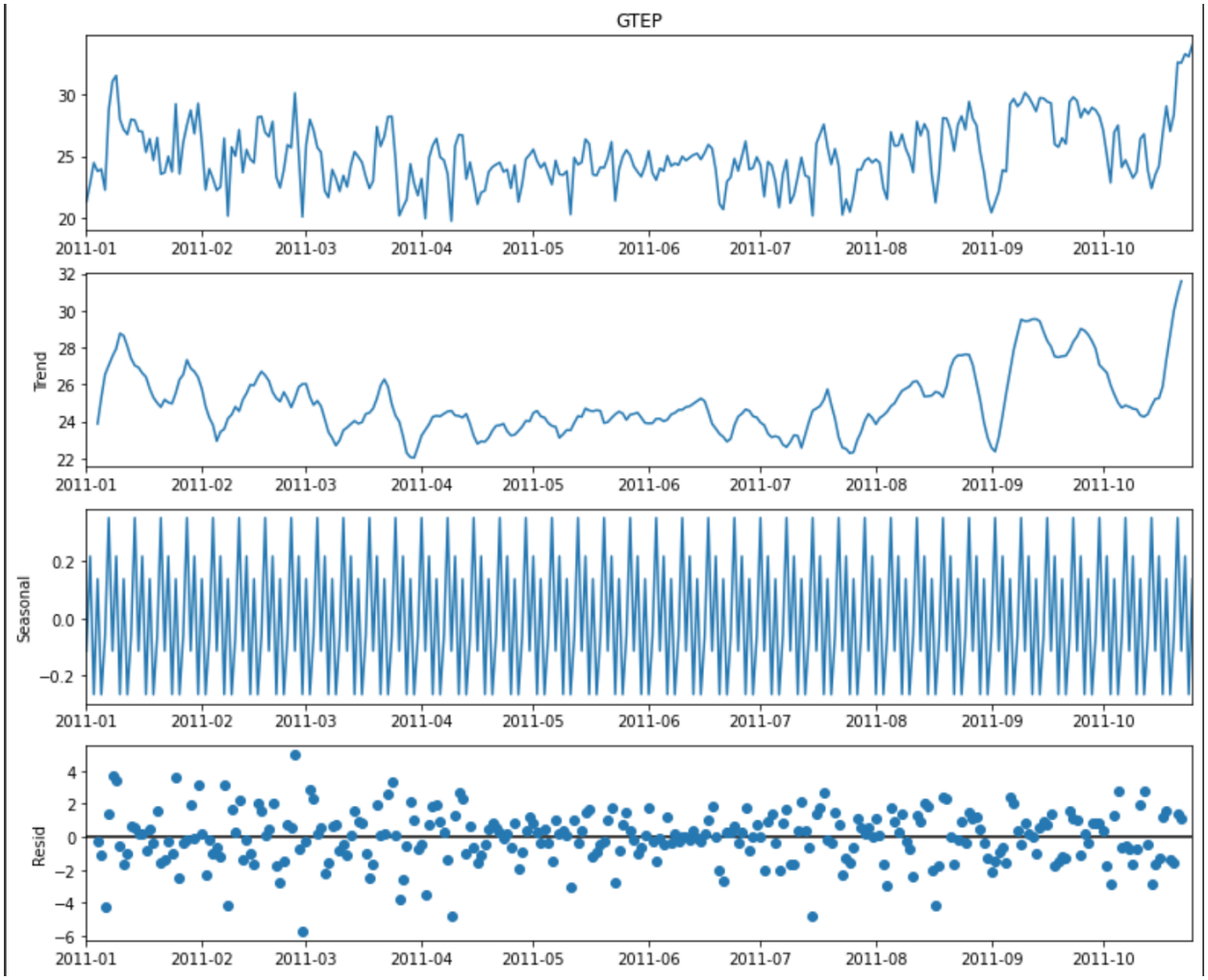
Ambient Humidity



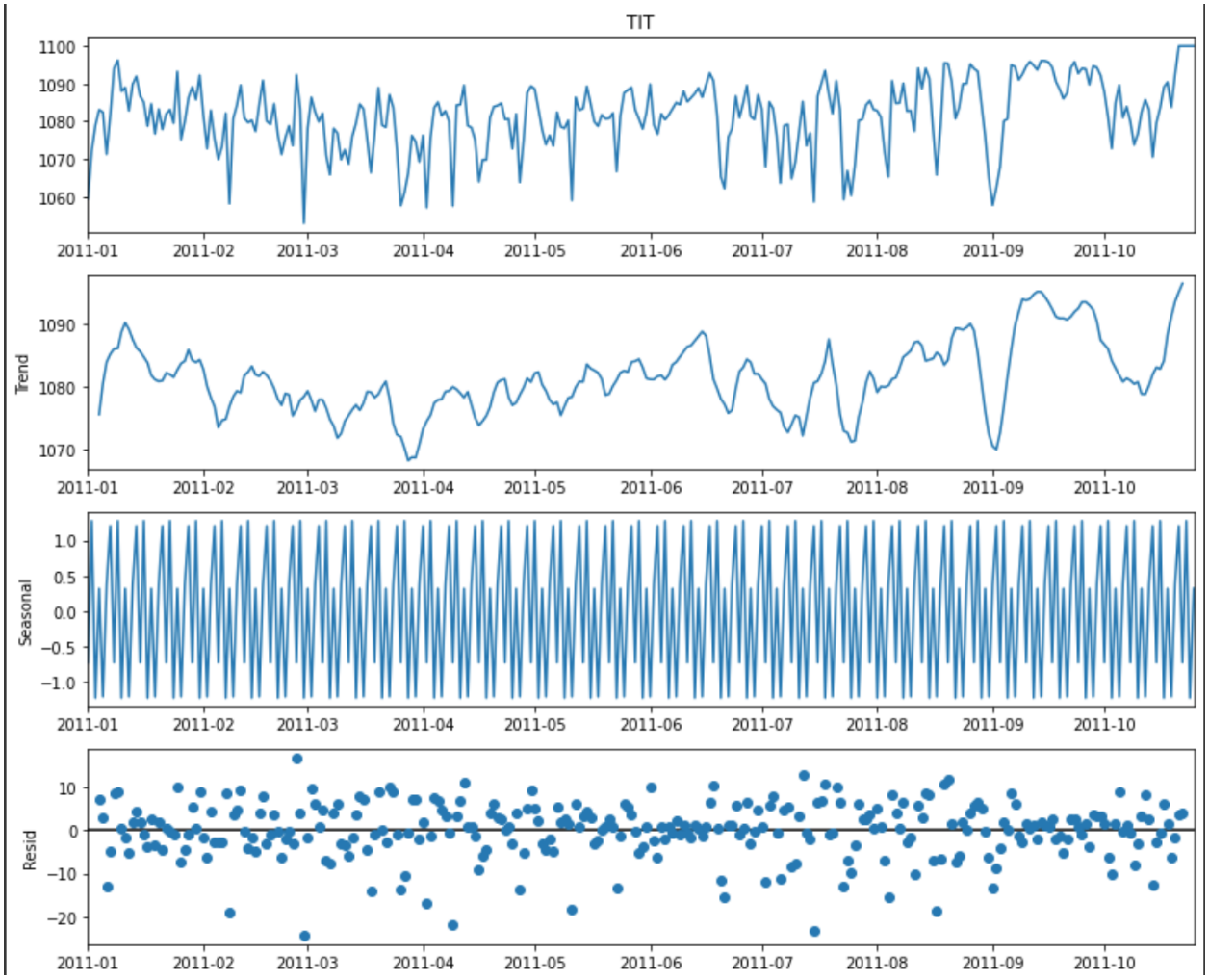
Air Filter Difference Pressure



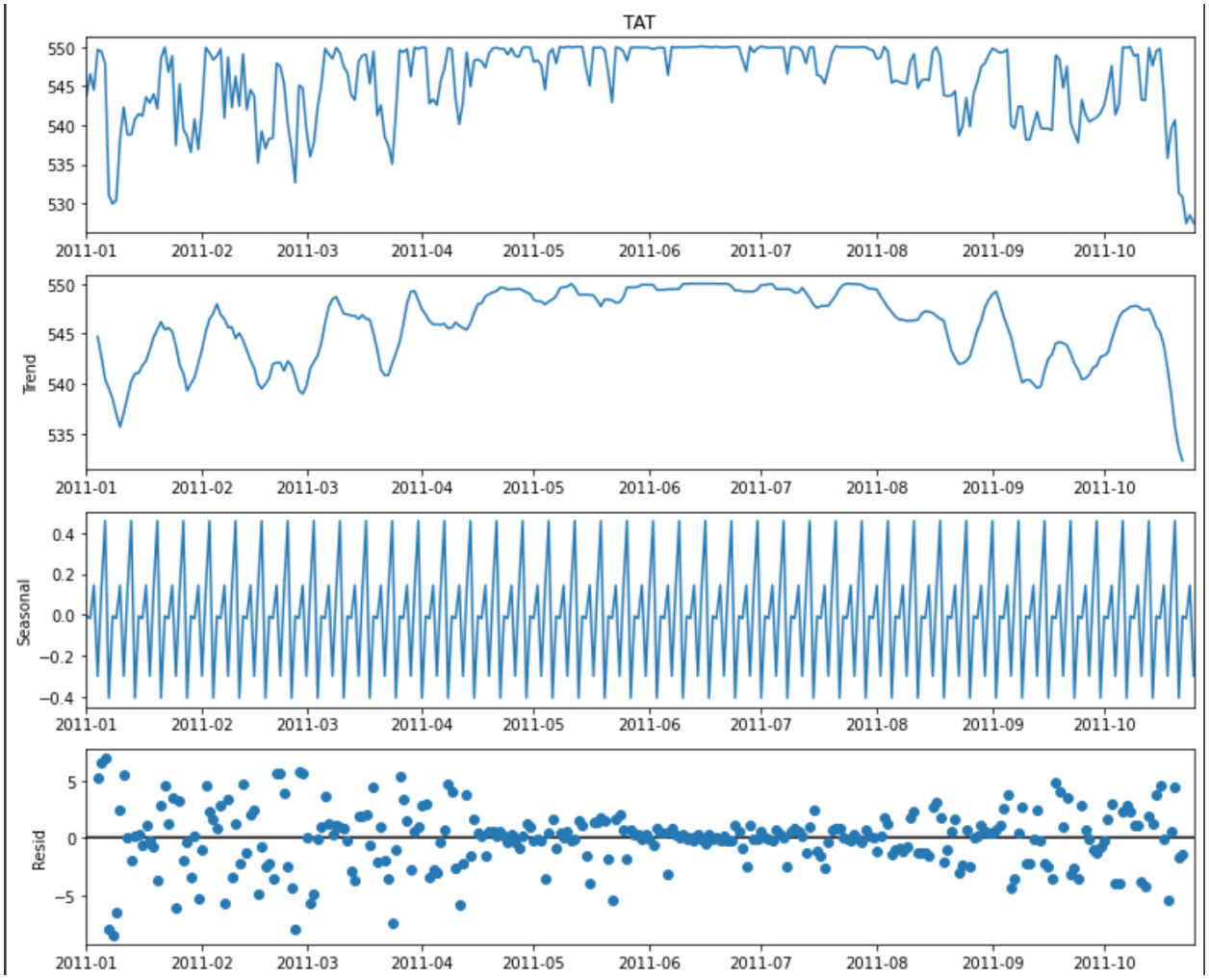
Gas Turbine Exhaust Pressure



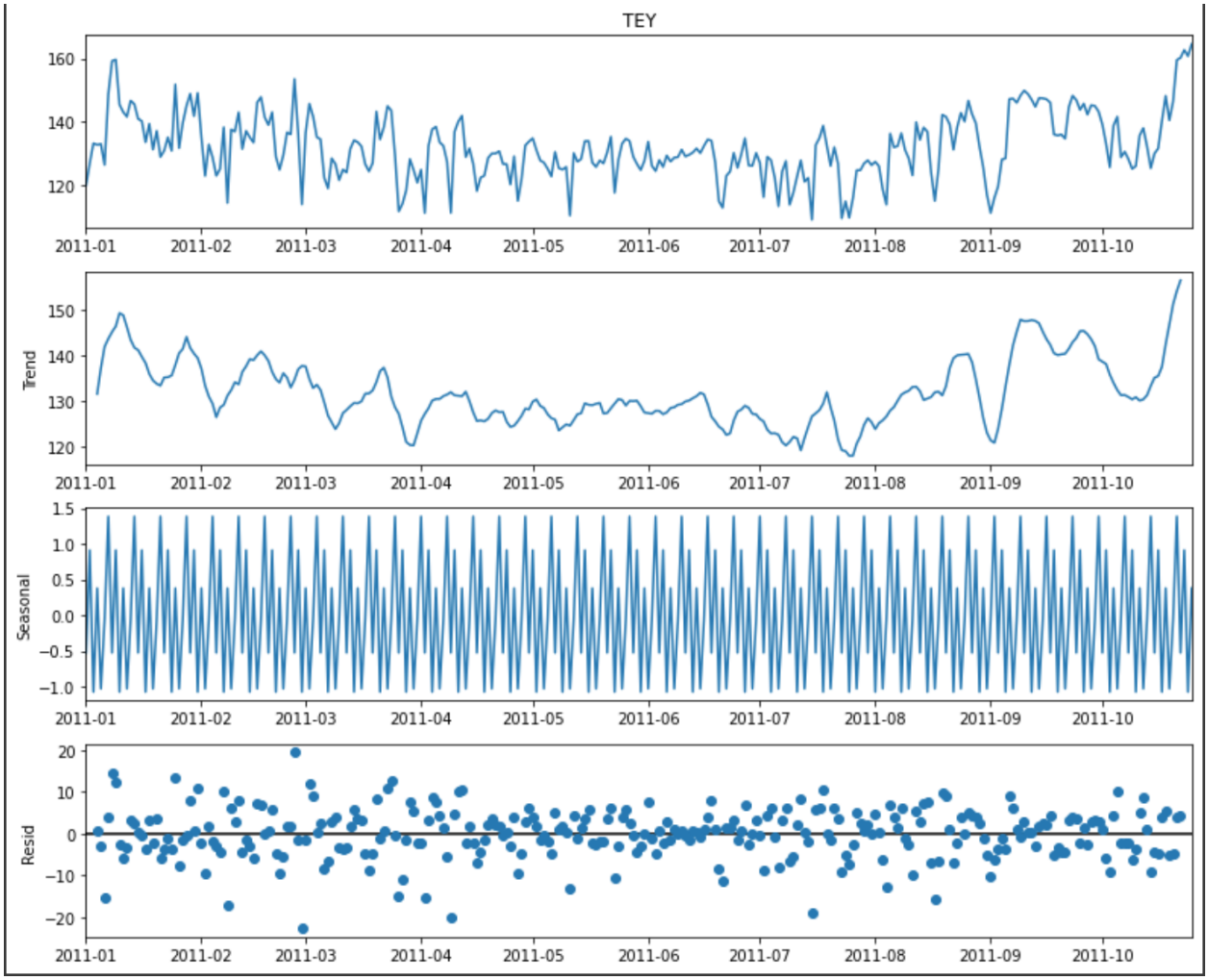
Turbine Inlet Temperature



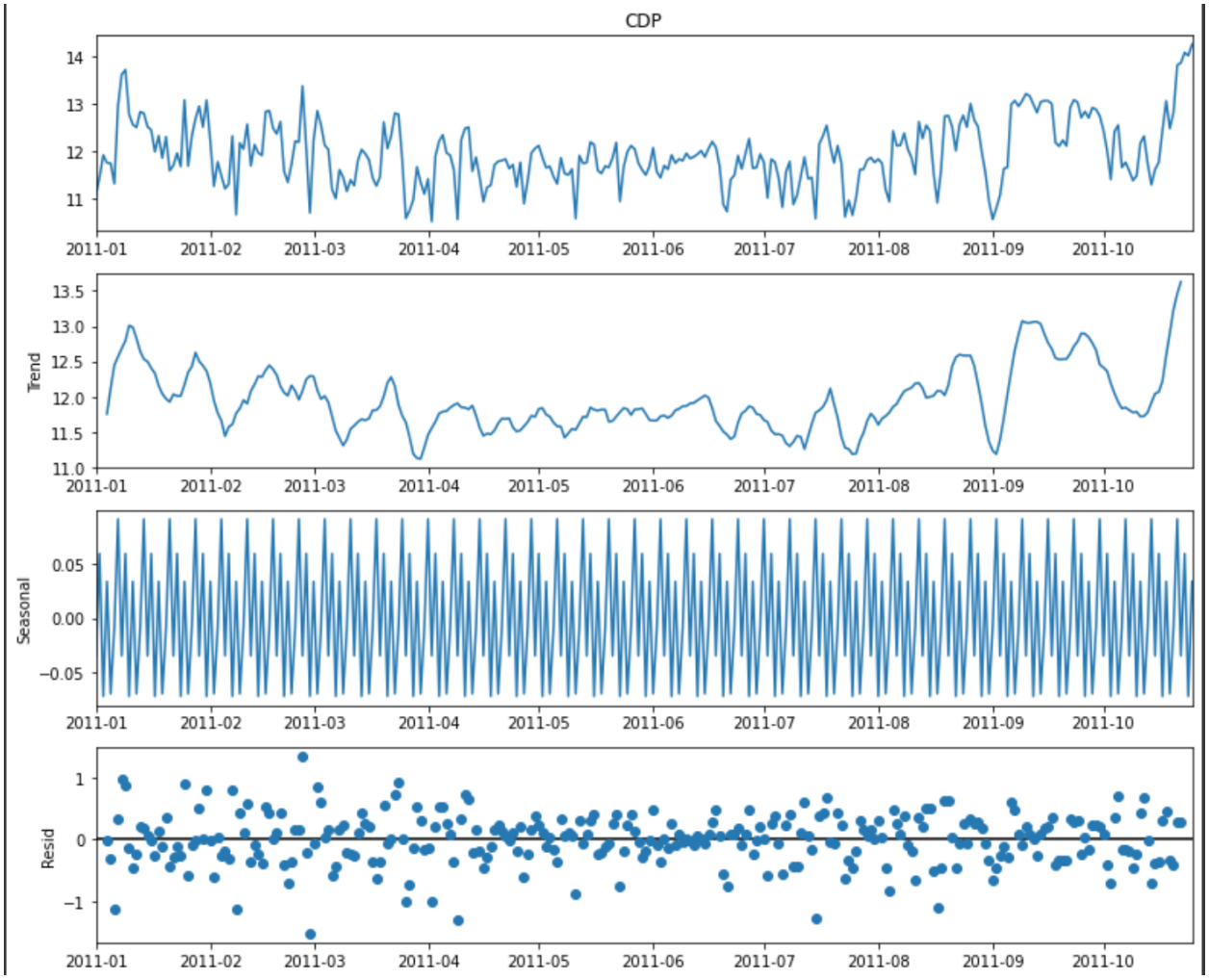
Turbine After Temperature



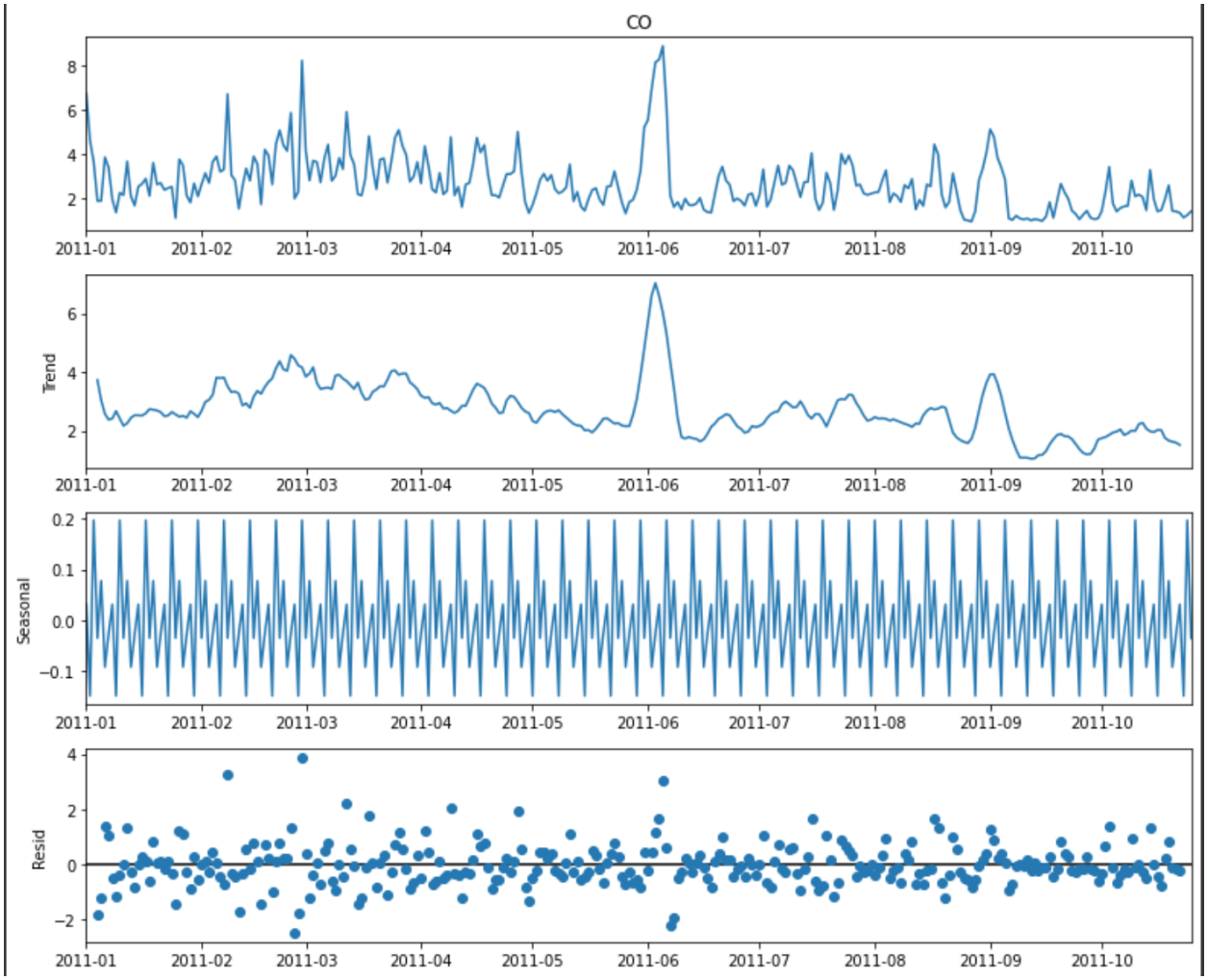
Turbine Energy Yield



Compressor Discharge Pressure



Carbon Monoxide



Nitrogen Oxides