

TEAM MEMBERS

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Visualization

Team A - TeamInges

Baker Hughes Hackaton 2022
Data Science

Problem description

Having a fleet of gas turbines from the Aeroderivative technology, the corporate wants to have a **tool** that could help **identify, control and reduce** emissions from operations.

Therefore, this tool needs to find a way to communicate the most valuable information that could lead us to reach our goal of deploying the most efficient and least emissive technologies

Site data

- Customers
- Plants
- Location of plants
- Lower heating value of the fuel

Engine data

- Customers
- Plants
- Engine ID

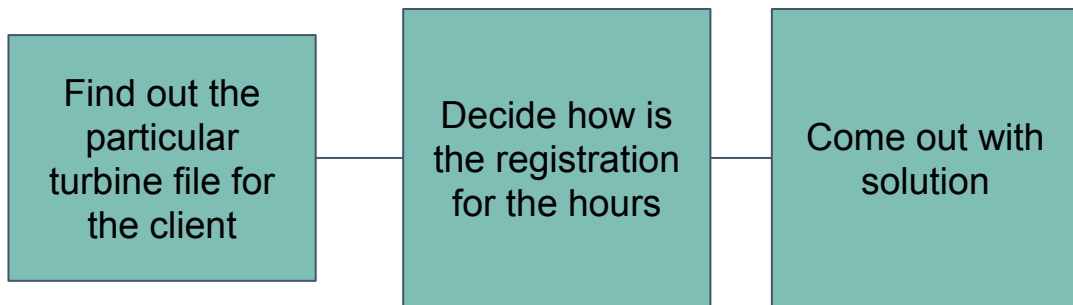
Engine File

- Date - 1 year of measurements
- Speed of compressor
- Power output from Low Pressure Turbine
- Fuel Flow into the combustor
- Emissions of CO2

Consider that we are presenting these solution to managers who are interested in knowing the performance of the turbines.

Proposed solution – Productive HOURS

The reason for which we decided to look for visualization solutions was because our **client BUSY** asked us about the **hours that in the year their Turbine 3 worked at their plant "ANCIENT WASP"**



```
# Convert dates in hours
def to_hours(date):
    return date.seconds//3600

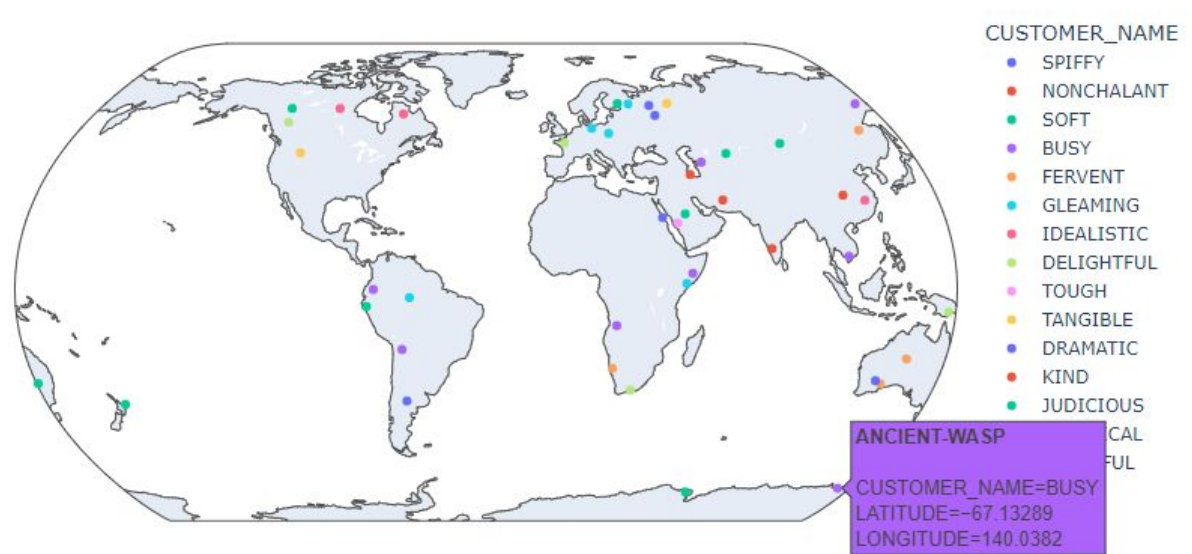
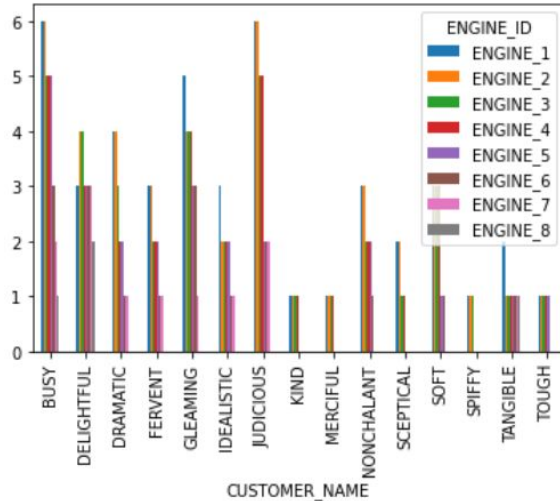
# Calculate Operating Hours
acum = 0
hours = []
count= []
for i in range (0, len(df.Time)):
    count.append(i) #ID
    if df.CMP_SPEED[i]>0 and df.CMP_SPEED[i+1]>0:
        acum = acum +
to_hours(df.Time[i+1]-df.Time[i])
        hours.append(acum)
    else:
        hours.append(acum)
list_tuples = list(zip(count, hours))
OperatingHours = pd.DataFrame(list_tuples,
columns=['ID', 'HOURS'])
OperatingHours.to_csv('Visualization_Team-1A.csv',
index=False)
OperatingHours
```



Proposed solution – Visualization of turbines performance

After answering the initial question from our client we decided to propose a series of graphs that could be of use for the visualization of the data, having as a result the following:

Distribution of Gas Turbines by Clients

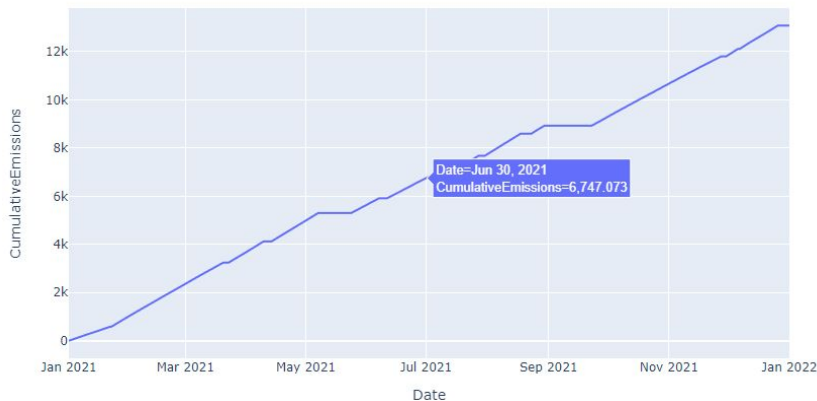


For us, Baker Hughes a global view of the clients we have and the plants where our turbines are making an impact.

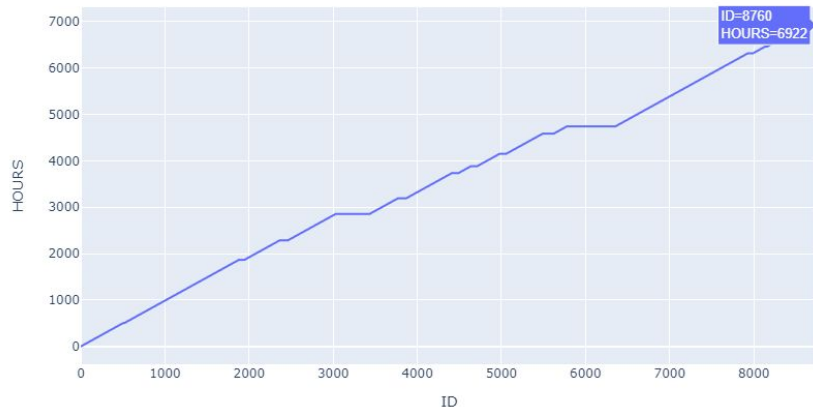


Proposed solution – Visualization of turbines performance

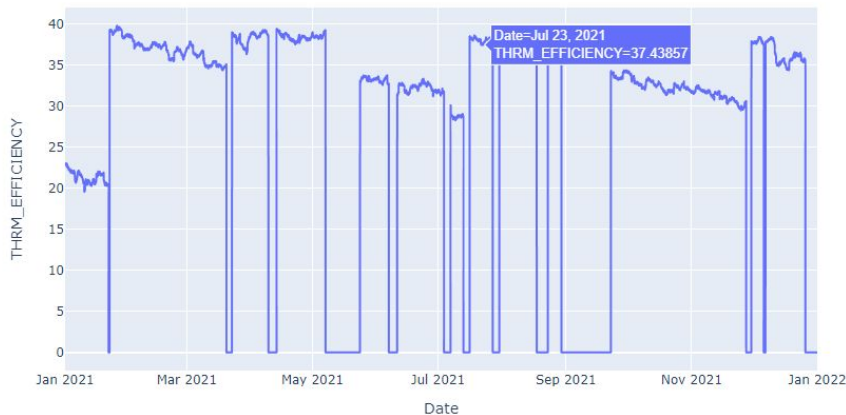
CO2 Emmissions



Operating HOURS



Thermic Efficiency along the year



3 Key Performance Indicators:

- CO2 Emissions
- Operating Hours
- Thermal Efficiency

Proposal: these are the behaviours for year 2021 as years go by and we plot over this KPIS we expect to see improvement



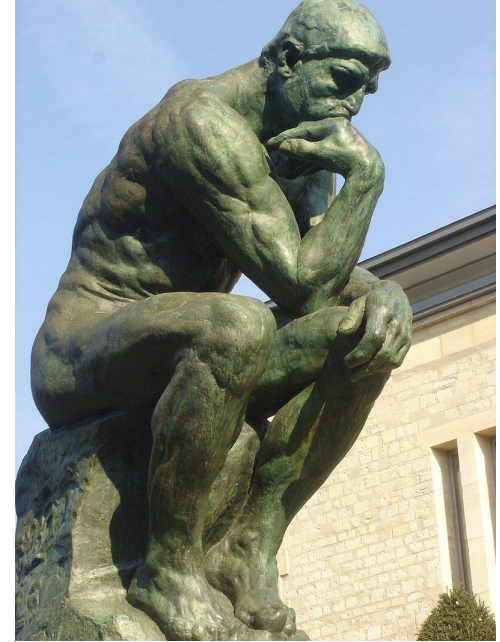
Lessons learned

- Visualization is a powerful tool, in order to be able to make an improvement first we have to know which opportunity areas we have.
- Management of data is vital for this.
- There are lots of tools from which we can choose to obtain a result, the path for success is to have clear what's the final goal.
- Research regarding gas turbines is complex.
- Programming languages and plotting libraries can be challenging but are useful for us to communicate with customers.
- Python is a powerful tool for data analysis. The environment is friendly and nowadays is used all around the globe.

Github repository: <https://github.com/Davali9807/Team1-Visualization/>

Thank you

Time for questions.



All of the information new was
learnt from the libraries shared
with us at the hackaton rules

https://pandas.pydata.org/pandas-docs/stable/user_guide/10min.html
https://pandas.pydata.org/pandas-docs/stable/user_guide/10min.html
<https://matplotlib.org/>
<https://plotly.com/python/>
<https://youtu.be/MiiANxRHSv4>
<https://youtu.be/8EMW7io4rSI>