

## Predict Plants Outage or Machine Failure

### Client Profile

During a workshop at client site a use case came up on top of the list. How to reduce or even predict. Manufacturing plants outage hours or days in advance.

### The Business Challenge

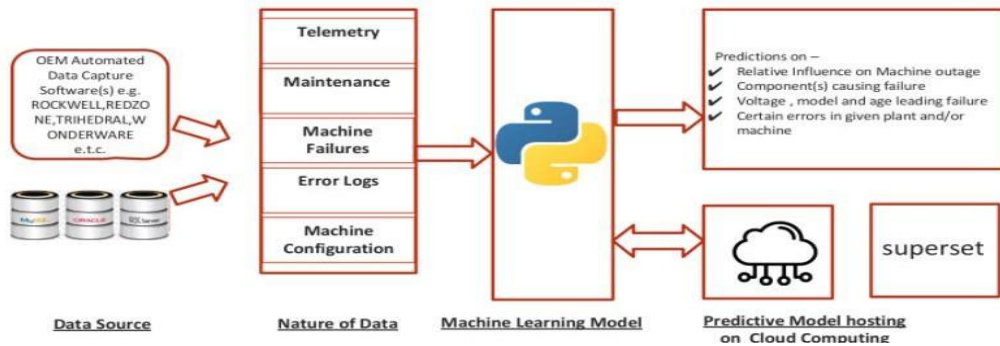
In plants there is a need of Predictive maintenance (PdM) that monitors the performance and condition of equipment while it is in use to reduce the risk of failure. Predictive maintenance, also known as condition-based maintenance, has been used in the industrial sector since the 1990s.

### Canspirit Predictive Analytics Approach

Canspirit Team uses Google Cloud to implement the solution

- This model comprises of another Manufacturing unit’s dataset, sources are telemetry, machine failure, error logs, maintenance, and machines configuration(age).
- Canspirit team will built a predictive model using this dataset, leveraging statistical techniques to identify the influence of certain errors, machine unique ID and machine components which are predicted to fail.

### Architecture of Predict Plants Outage or Machine Failure



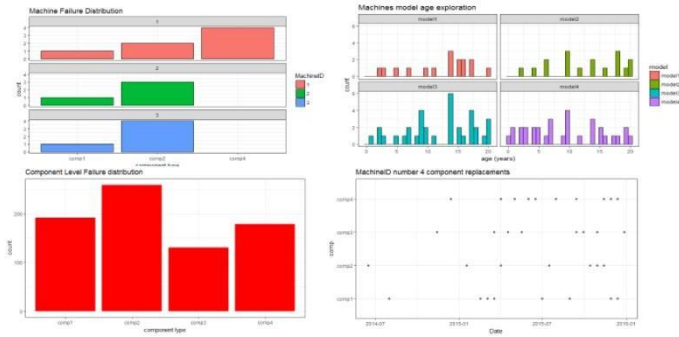
### A sample data of Predict Plants Outage or Machine Failure to decide whether the Model is effective:

Telemetry	datetime	machineID	volt	rotate	pressure	vibration
	1/1/2015 6:00	1	176.217853	418.5040782	113.0779355	45.08768576
	1/1/2015 7:00	1	162.8792229	402.7474896	95.46052538	43.41397268
Maintenance	datetime	machineID	comp			
	6/1/2014 6:00	1	comp2			
	7/16/2014 6:00	1	comp4			
Machine Failures	datetime	machineID	failure			
	1/5/2015 6:00	1	comp4			
	3/6/2015 6:00	1	comp1			
Error Logs	datetime	machineID	errorID			
	1/3/2015 7:00	1	error1			
	1/3/2015 20:00	1	error3			
Machine Configuration	machineID	model	age			
	1	model3	18			
	2	model4	7			

- Components are categorized comp1 to comp5
- Models are categorized as model1 to model5
- Machines are given unique ID 1 to 100

Data Source

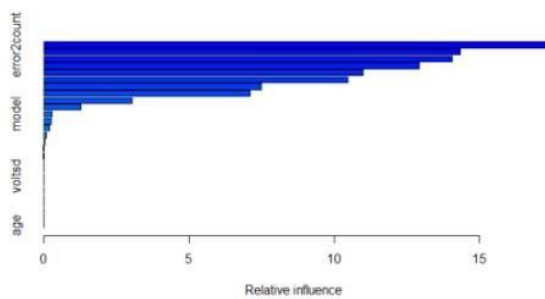
## A Dataset View:



## Exploration on Dataset



## Insights to Predictions :



variable	Relative Influence
error2count	17.55478
error5count	14.92207
voltmean_24hrs	14.2271
vibrationmean_24hrs	12.93978
error3count	11.03276
pressuremean_24hrs	9.595632
rotatemean_24hrs	7.292141
error1count	6.80328
error4count	3.716549
sineslastcomp1	1.364124
model	0.3032902
sineslastcomp3	0.2124723
vibrationmean	0.05653781
rotatemean	0.03527521
pressure_24hrs	0.02871147
sineslastcomp4	0.02720787
age	0.02229394
voltmean	0.01600519
pressure_24hrs	0.0131631
vibrations_24hrs	0.006623297
pressuremean	0
voltad	0
rotatad	0
voltad_24hrs	0
rotatad_24hrs	0
vibrations_24hrs	0
sineslastcomp2	0

**Summary** – Variable **error2count** is predicted to influence most to cause a certain machine to fail. On the other hand **vibrations\_24hrs** and **pressuremean** are predicted not to cause any failure in next 24 hours (as per the dataset used).

## Technologies and Tools

- Python
- ROCKWELL
- REDZONE
- TRIHEDRAL
- WONDERWARE
- Google Cloud

## Challenges and Solutions

- The machines and Components were categorized manually:
  - Components are categorized comp1 to comp5
  - Models are categorized as model1 to model5
  - Machines are given unique ID 1 to 100
- Data set and training of model was done using the company's requirement and Different OEM Automated Data Capture Software's were used.

## Business Benefits

- The Company was able to predict manufacturing plants outage hours or days in advance.
- Prevention of Machine Failure reduced up to 40%.

## Bottom Line

**Canspirit** leveraged its Data Science, machine learning and Cloud Computing skills to Predict Manufacturing Analytics to Predict Outage and Machine Failure.

**For a discussion on how we can help you grow your business, email us now at:**  
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