

BEYOND
TECHNOLOGY



Grupo Álava

grupoalava.com



45+ years of experience

Distribution of high-tech products and systems, specially sensors data-acquisition, calibration, testing, photonics, security, imaging and environmental technologies.

25+ years of experience

Instrumentation for the protection, supervisión and predictive diagnostics of industrial facilities and assets. Diagnostics services. AWM: Leading Maintenance Cloud Monitoring software.

5+ years of experience

Structural integrity monitoring. Definition, design, and commission of control systems in any infraestructure through design, execution, and operation phases. Diagnostics services.

Future...

Industry 4.0 solutions. Big Data, Industrial of Internet of Things (IIoT), Digital Twin and Data Analytics.

We seamlessly connect manufacturers, system integrators and end users

We identify needs and develop high-tech solutions

Distribution

Integration Solutions

Innovation, Know-How, Human Talent



Diagnostic Services

Wide range of products manufactured by our technology partners and add value by accompanying our clients every step of the way during the sales and post-sales process

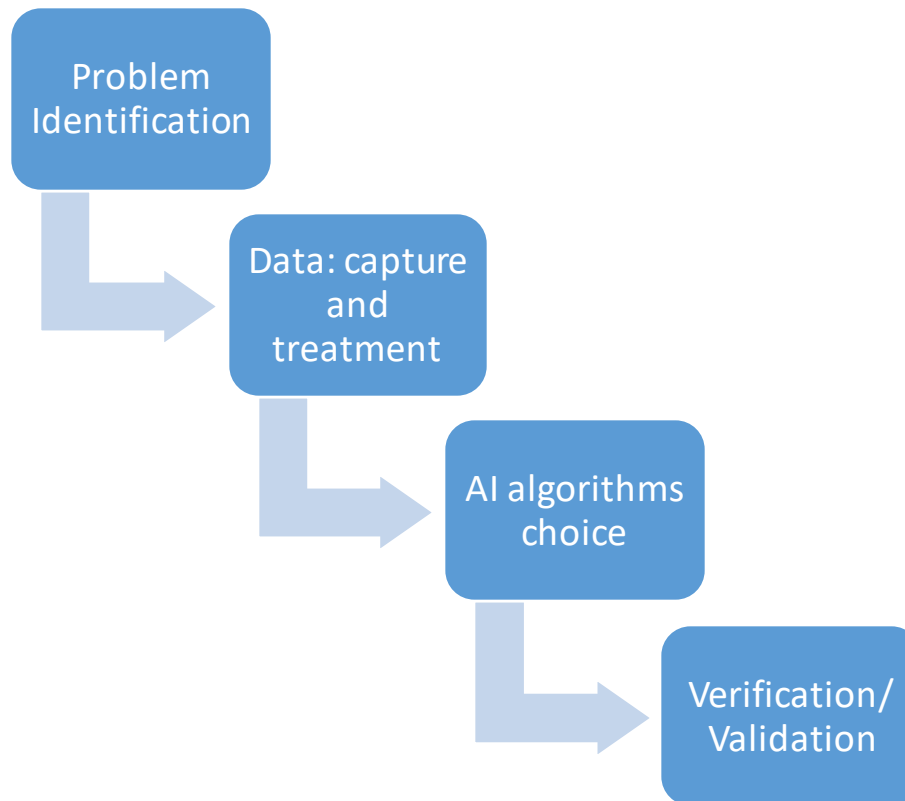
The dealing of **automation scenarios**





How can Machine Learning transform our business?

ML is an AI technique that allows creating intelligent systems from data to automate processes and devices, being one of the great objectives of the Industry.





Scenarios

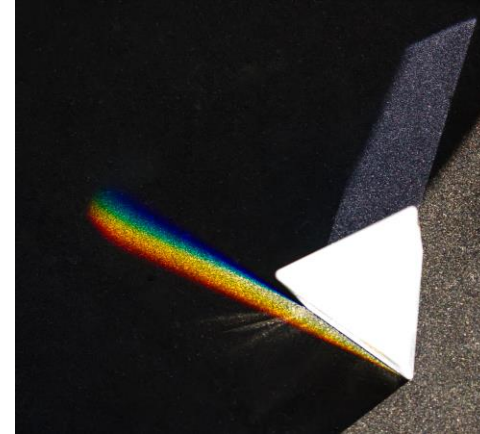
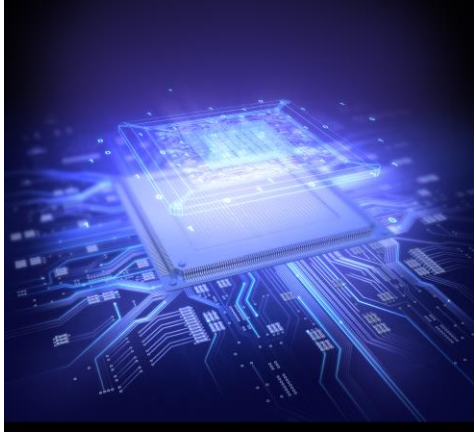


WHAT problem we have to resolve?

Which INFO do we need to obtain to resolve it?







Which data I need to resolve the problem?

Dataset

Choosing data sources





AI Algorithms



DEEP LEARNING APPLICATION IN COMPUTER VISION

Why and When

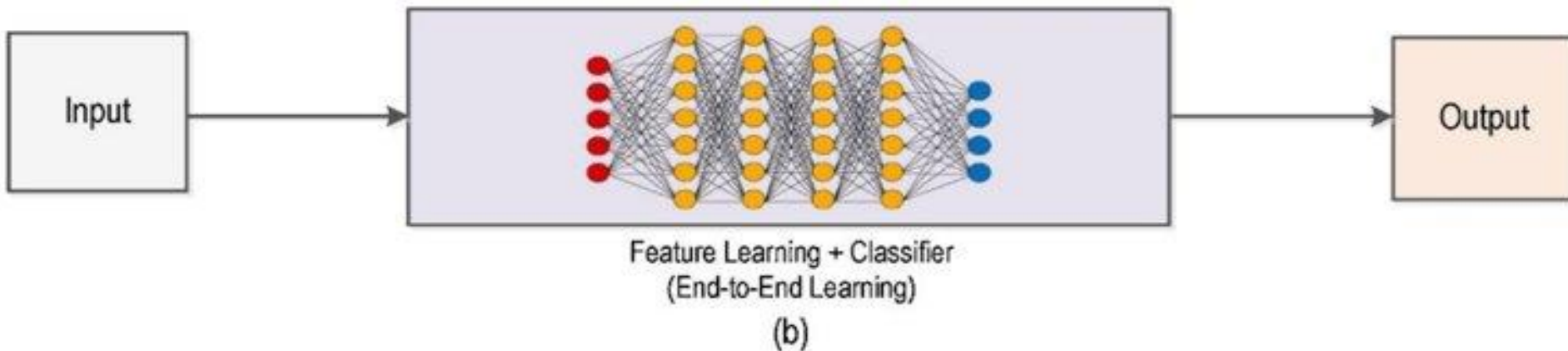
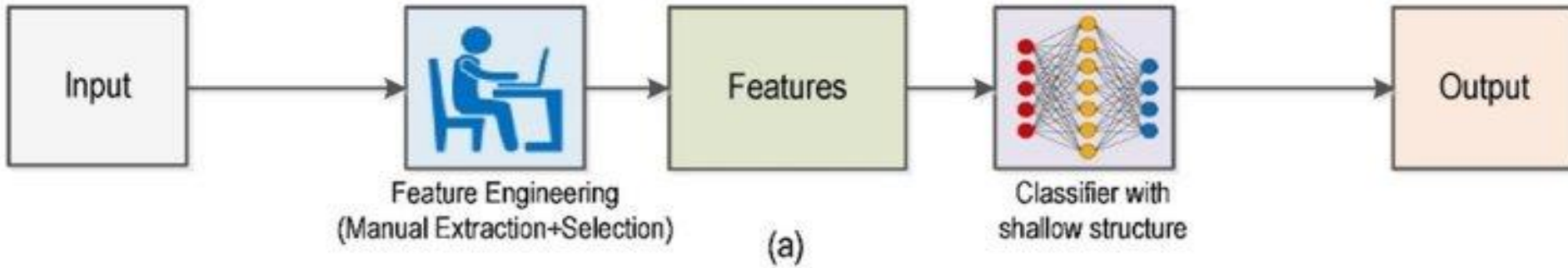
- In complex problems which cannot be solved using thresholds and known image feature extraction methods
- When we have lots of available data

Advantages

- The algorithm learns the best feature extraction methods
- State of the art performance

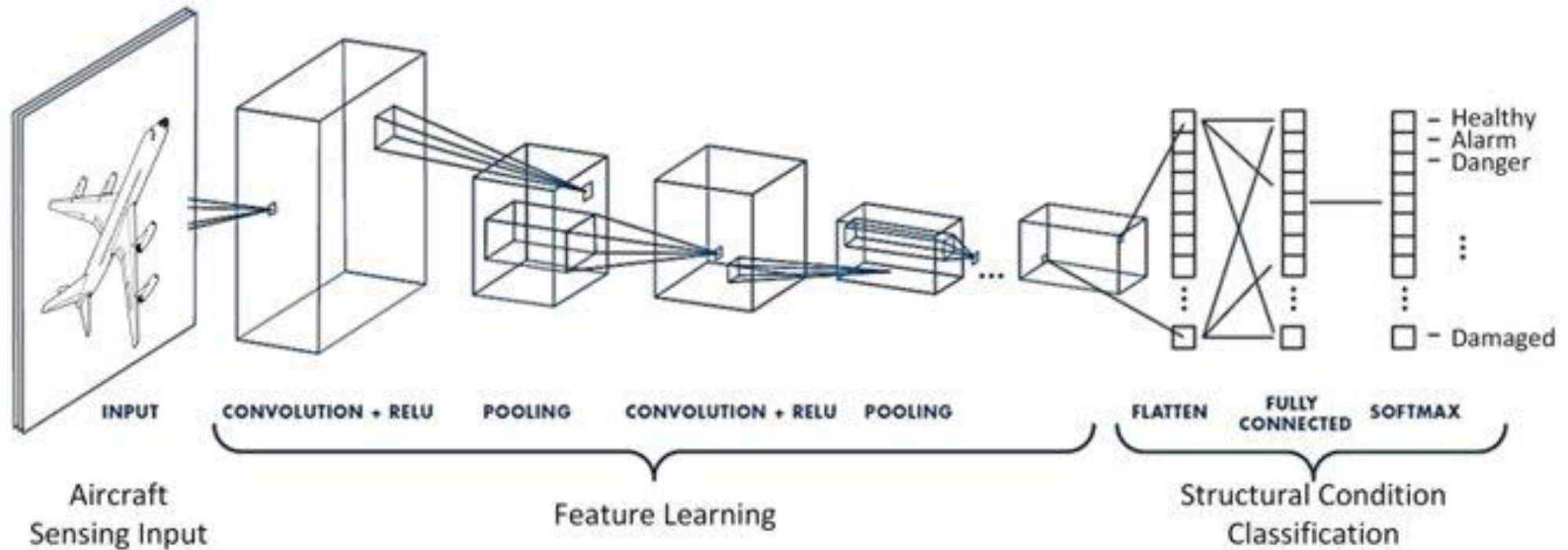
Disadvantages

- Need for powerful GPUs
- Need for skilled Deep Learning developers
- Need for large datasets or good data simulation/augmentation techniques



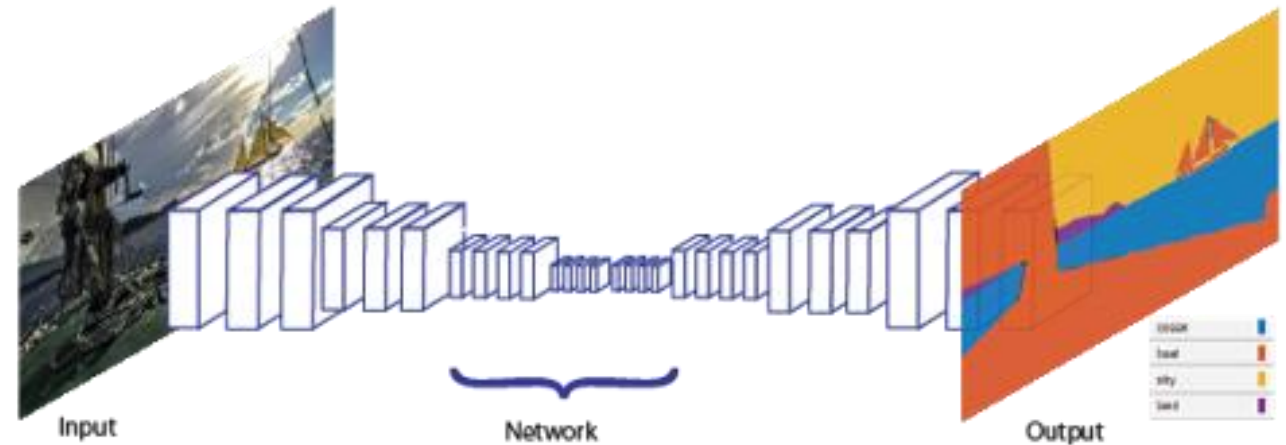
CLASSIFICATION | SEGMENTATION | REGRESSION | GENERATION

- We have images and want to classify them in some fixed categories:



CLASSIFICATION | **SEGMENTATION** | REGRESSION | GENERATION

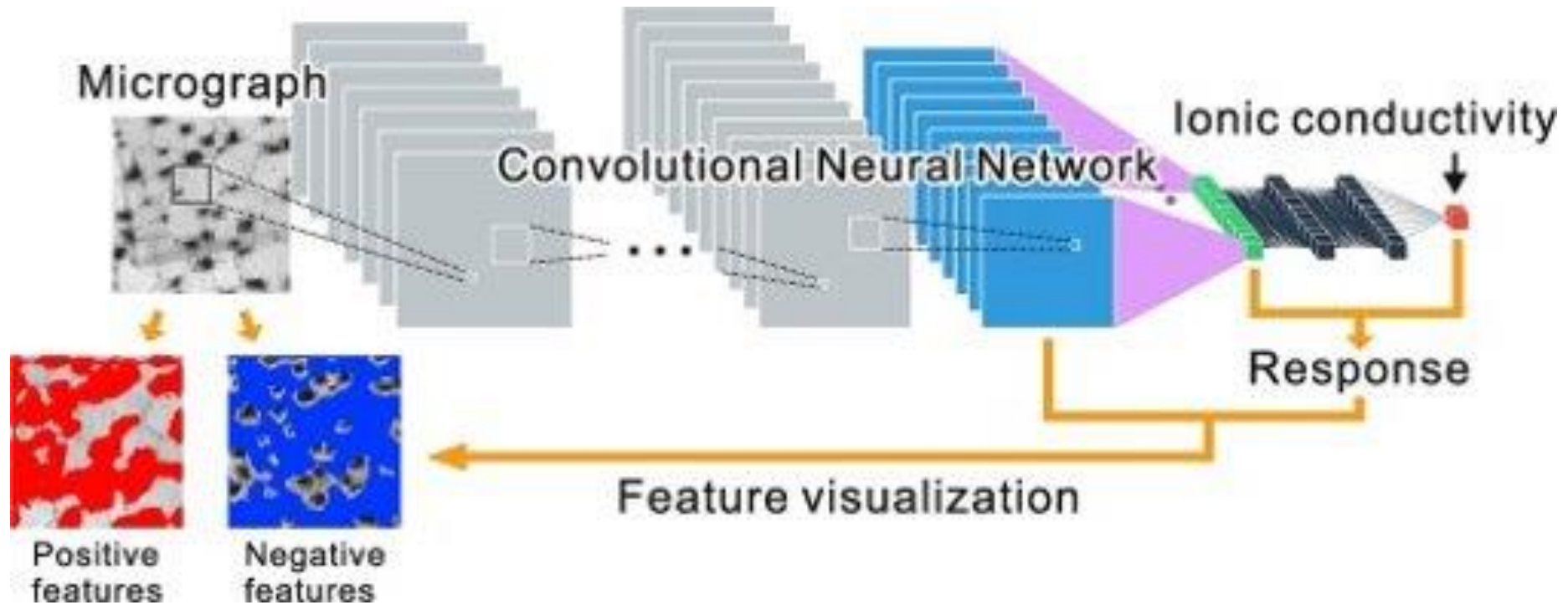
- In segmentation we want to know where the objects are (or parts of them) in an image. We can do it pixel-wise (with segmentation masks) or using bounding boxes.



We for example can segment the parts of a machine to perform individual evaluation of their deterioration level using another algorithm afterwards.

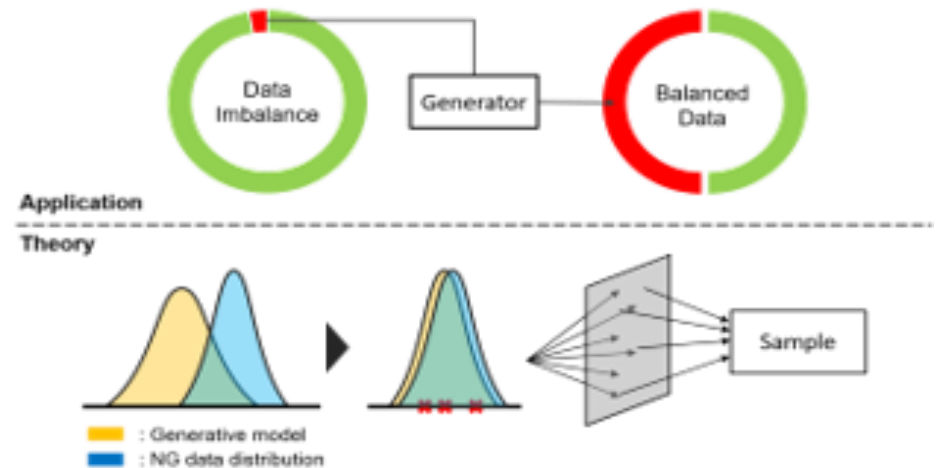
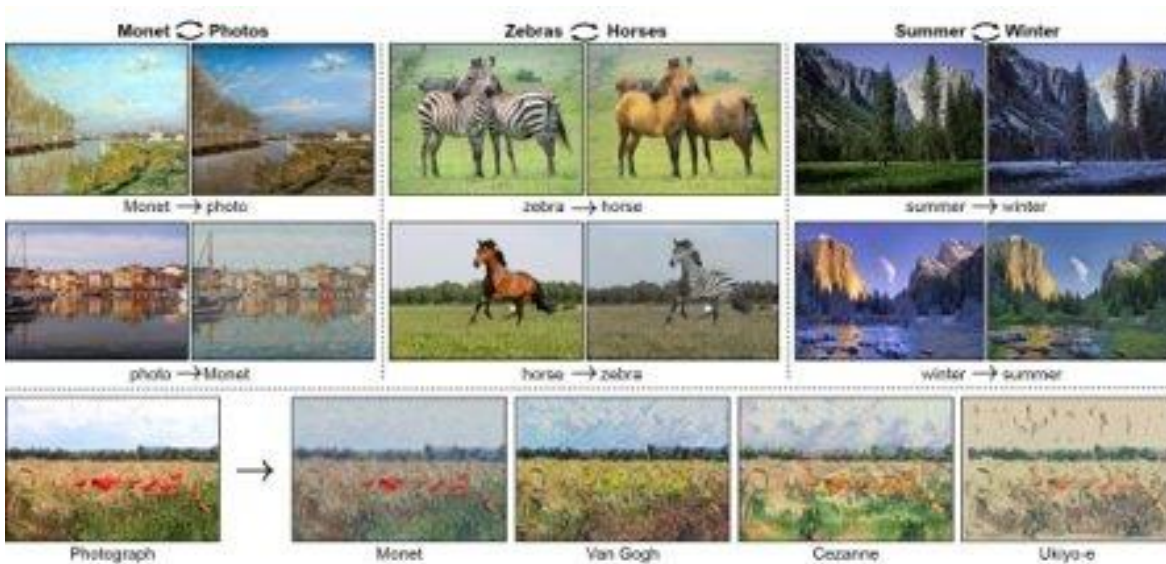
CLASSIFICATION | SEGMENTATION | REGRESSION | GENERATION

- With regression we obtain some concrete numeric metric, for example how much a machine part has deteriorated.



CLASSIFICATION | SEGMENTATION | REGRESSION | GENERATION

- We can also create new realistic images using Deep Learning: Data Augmentation technique to train classification/regression algorithms; or perform style-transfer for generating more samples of the underrepresented class in imbalanced datasets.



AI application in PdM for rotating machinery



Why and When

- To automatically detect anomalies in machine behaviors
- To automatically detect and identify known faults
- To correctly estimate the RUL of a machine

Advantages

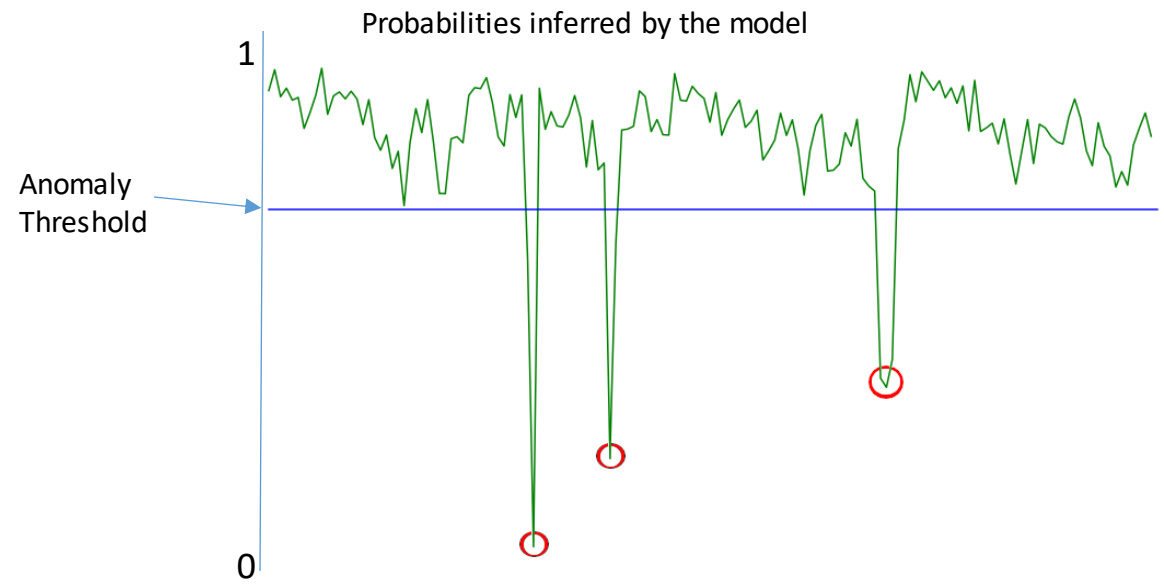
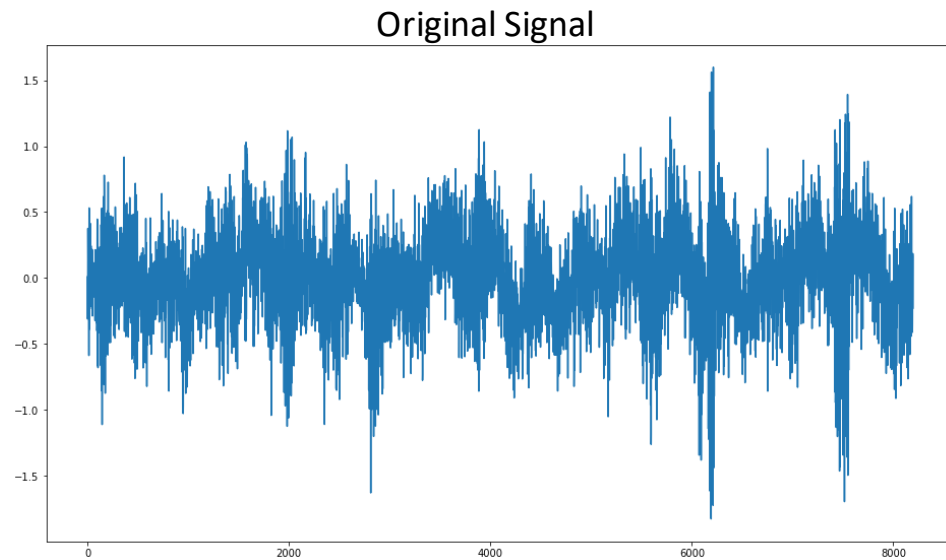
- We can detect and identify faults in rotating machinery before they cause losses
- We can optimize the maintenance process just fixing what it is broken
- There is less human intervention required so we can scale easier

Disadvantages

- We must have a Data Science team to develop those algorithms
- We need data that it is labeled by experts in the field before we can train any model

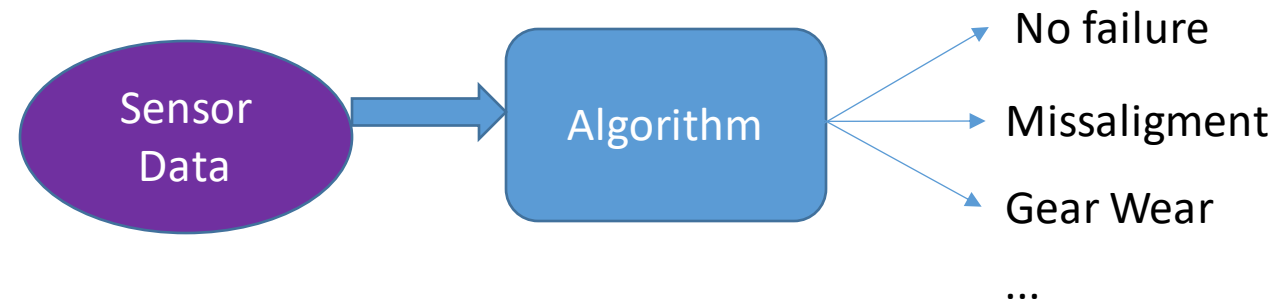
ANOMALY DETECTION | FAULT DIAGNOSIS | RUL

- These models consist of detecting if something unusual is happening on a system, without saying what exactly. They are used to indicate if a machine is working within normality or if it is behaving abnormally (unlikely). We may use semi-supervised anomaly detection algorithms such as Autoencoders or GHMM for this task.



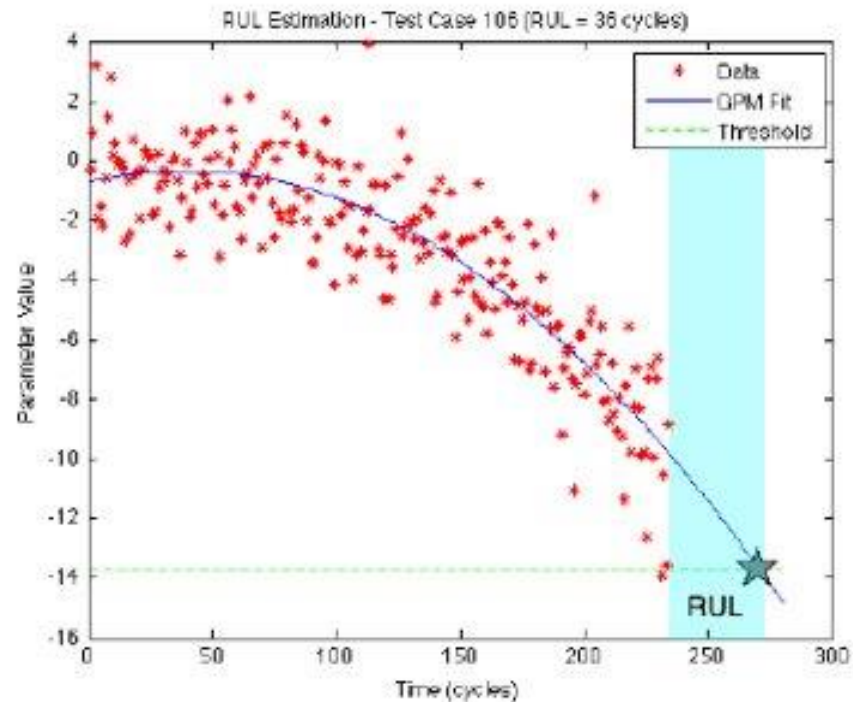
ANOMALY DETECTION | FAULT DIAGNOSIS | RUL

- ❑ These models follow the classification approach. In other words, they apply when we have several examples of cataloged failures, and we train a model with these to tell us what type of failure it is. We may use classification algorithms such as MLPC or SVC for this task.



ANOMALY DETECTION | FAULT DIAGNOSIS | RUL

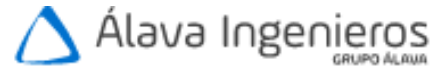
- In these models the objective is to create a numerical indicator that is related to the current state of health of the machine and therefore to its RUL (Remaining Useful Life). They usually try to predict how long it will take for the machine to stop working. We may use time series forecasting algorithms such as LSTM or GRU for this task.



WE PROVIDE TECHNOLOGY THAT CONTRIBUTES TO SOCIAL DEVELOPMENT

- We are a flexible organization, with significant human talent and know-how, that focuses on personalized customer service.
- We have amassed a wealth of knowledge about cutting-edge applications in leading industrial sectors and offer our clients a comprehensive portfolio of technologies.
- We work in alliance with manufacturers and technological leaders worldwide. Our tech partners drive innovation forward and share our philosophy.





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