Component Failure Analysis in Automobile Engineering and Manufacturing

In real-world situations, data scientists often start an analysis with a simple and easy-to-implement model such as Regression or classification. There are various advantages of this approach such as getting a sense of the data with a minimum cost and giving food for thought on how to solve a business problem.

Everyday, we depend on many systems and machines. We use a car to travel , a lift goes up and down, and a plane to fly. Electricity comes through turbines and in a hospital machine keeps us alive. These systems can fail. Some failures are just an inconvenience, while others could mean life or death.

Component Failure analysis is the process of analyzing the component data or the component itself to determine the reason(s) for degraded performance or catastrophic failure of a component either, during component manufacturing, performance testing, and during incoming inspection, or after delivery to the customer, at the final application.

Collecting and analyzing data is vital to deciding on remedial action and preventing future occurrence.

When stakes are high, we perform regular check and predictive analysis on our systems.

For example, Lifts, cars are check once every few months and aircrafts are checked on daily basis to avoid any accident.

#Brief Description dataset

"""
This dataset reflects real component failure prediction encountered in the automobile and other industries with measurements from real equipment. The features description: -

The six features are: -

Type: the quality of the product, consisting of a letter L, M, or H.
    Meaning low, medium, and high, respectively.

Air temperature [K]: generated using a random walk process .

Process temperature [K]: generated using a random walk process .

Rotational speed [rpm]: calculated from power of 2860 W, overlaid with a
    normally distributed noise.

Torque [Nm]: torque values are normally distributed around 40 Nm

Tool wear: The quality variants H/M/L of tool wear
in the process.

The targets are:
Target: failure or no failure (to perform binary classification).
Failure Type: type of failure (to perform multiclass classification).