LogicPlum

CASE STUDY

IS IT POSSIBLE TO REDUCE MANUFACTURING FAILURES?

BOSCH

Company Info

Name: Bosch

Location: Gerlingen, Germany

Industry: Engineering

Bosch has an imperative to ensure that the recipes for the production of its advanced mechanical components are of the highest quality and safety standards.

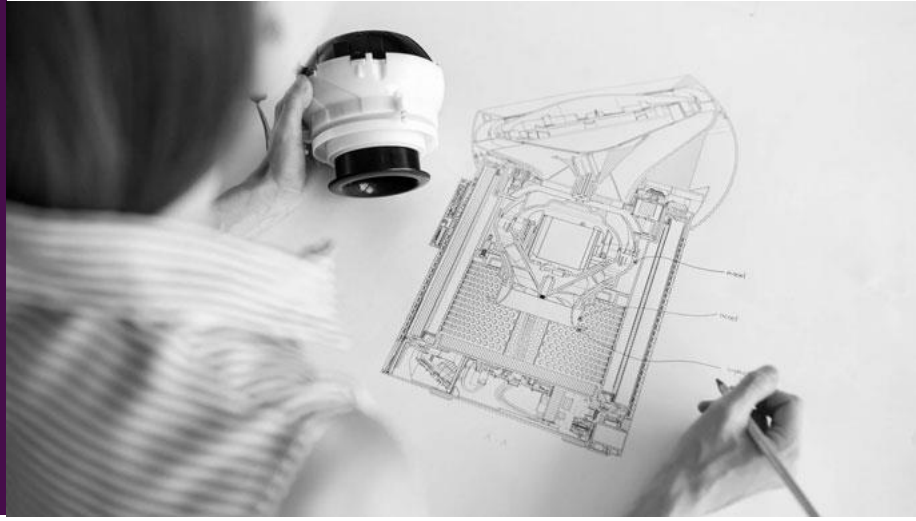
'I WOULD RATHER LOSE MONEY THAN TRUST.'

Robert Bosch

When a company such as Bosch addresses a problem, the world listens. It's time to learn. This was the case when years ago, Bosch, a world-renowned firm, famous for the precision and quality of its products, was interested in applying modern AI and machine learning tools to improve the monitoring of their production lines.

Started in 1886 by Robert Bosch, a German engineer, and inventor, the company had developed a name for uncompromising precision and quality since its beginning. Now, an international corporation present in almost 60 countries, the legacy had to live on.

“Within an hour the team had what they wanted. No time had been wasted.“



Identifying The Problem

Their problem was clear and straightforward. Throughout the past years, they had gathered tons of data from their assembly lines and tests performed. Now, they wanted to transform it into decision-making information by developing a tool capable of predicting internal failures, which would enable them to bring quality products at lower costs to their end-users.

Based on this data, Bosch's engineers assembled a dataset that represented parts' measurements as they moved through their production lines. Their question was: is it possible to predict which parts will fail their strict quality control?

Introducing LogicPlum

When data scientists at LogicPlum learn about this problem, they became enthusiastic. *"We realized that our platform was the right tool to solve it successfully and quickly,"* explained one of them. *"Our platform is a system used by firms to tackle different problems, and search solutions based on AI and machine learning,"* continued the data scientist, *"and we saw that the main modules we could use were Model and R.E.A.S.O.N."*. Model is the core component, which helps users create autonomous modeling for complex problems and includes state-of-the-art technologies in time series, classification, regression, computer vision, and anomaly detection.

The platform also includes R.E.A.S.O.N., which stands for Relating, Explaining, Adapting, Selecting, Outlining, and Navigating. It is a powerful tool that can help users create comprehensive reports about an AI project.

Answering Questions

The dataset consisted of a massive amount of features. So, LogicPlum's data scientists decided to use the dataset in the form of chunks. Then, they went to analyze the different variables. As the number of features included was huge, they decided to apply dimension reduction. The data analysts worked as a team, discussing and analyzing, separating those features with empty and single values from those with multiple values. They also analyzed variances and covariances to determine relationships and their importance. The graphical capabilities of LogicPlum's platform became essential during this step.

This initial hard work paid off. From almost 2000 variables in the data set, the number was reduced to about 500 significant ones. With this manageable set, the scientists decided to continue with the process. It was the moment for LogicPlum's system to show what it could do!

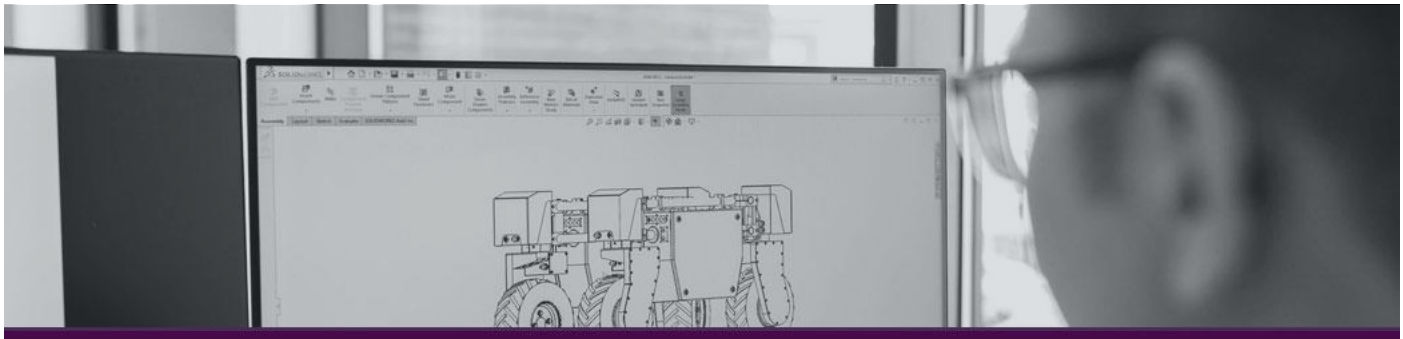
Transforming Data into Prediction

With LogicPlum's platform, the team tried hundreds of different models. The platform's possibilities were enormous: from Random Forest Classifiers to Hidden Markov Models, passing through Fourier series and deep neural networks. Internally, they felt amazed by the options available, and at having a tool on hand that could consider all of them at a very rapid pace.

From the beginning, they saw that the data showed a clear periodic pattern. Thus, they decided to look at different production stations and make a graph of their efficiencies. To their surprise, unit 32 showed a high failure percentage of 4.7% compared to a mean error rate of 0.6%. Finding new questions while using the platform was something they were accustomed to. Answering why was something they could investigate at a later stage.

The team converged into a set of metrics used by LogicPlum's platform to rank the different generated algorithms' performance. The scientist was delighted to see that years of production data had been translated into a prediction tool. It was now time to test the results.

LogicPlum determined with a 90 % AUC that their best algorithm could predict the manufacturing failure/success of a part as it moved through the production line.



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