PREDICT VENT

AMBIENT INTELLIGENCE

ADVICE FOR DATABASE TO EASILY STORE AND RETRIEVE INFORMATION

Together with Malvern Panalytical, the Saxion research group (lectoraat) Ambient Intelligence is working on data-driven, predictive maintenance in the project *Predict to Prevent*. Malvern Panalytical is a high-tech, leading provider in solutions for measurement of elemental concentrations and material structures in physical samples. They serve many markets: from mining to cosmetics, and pharma to nanomaterials. Their instruments are costly, and maintenance on these instruments should be done timely and efficiently. Downtime of these instruments at the customers of Malvern Panalytical should be prevented as much as possible. In this context, their goal is to change from a reactive and preventive service for maintenance to a predictive service, that is, to go towards zero unplanned downtime.

Nowadays, maintenance engineers of Malvern Panalytical check their instruments (such as the Zetium in the picture) regularly and if they suspect a part to malfunction in the coming period, they replace it already. Besides, when the machine stops working, they are not always sure which part is broken, leading to swapping elements which are still in good condition. To optimize this maintenance process, we want to introduce *predictive maintenance*, through which *machine learning* can be used to predict when a machine will stop working and to show which part is the one that needs to be replaced.

TASK DESCRIPTION

The data used to predict the malfunctions consist of multiple (300+) time series variables with varying units, frequencies, and levels of detail. Over 30 instruments have collected such data for the past two years, for approximately 5 GB per month. Currently, for analyses of these data, daily data dumps are made in the form of .CSV files, but accessing and searching through these is laborious. Therefore, Malvern Panalytical collaborates with Saxion to improve the accessibility, speed and capacity of their database solution, and we are happy to welcome you to join our team!

In this assignment, your task is to design a database that meets the requirements set out by Malvern Panalytical. You will:

- Do literature research on data warehousing solutions for large and real-time data.
- Design and experiment with different solutions for the extract-transform-load process.
- Implement and evaluate the best solution for data management.
- Operate within a team of experienced data scientists and data engineers of both Malvern Panalytical and Saxion.

PRACTICAL INFORMATION

- **Student profile:** HBO-ICT graduation, profile Software Engineering/ Business (specialization Big Data Technologies or Business Improvement with Data).
- **Duration:** February 2023 – July 2023
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