MACHINE DATA ANALYTICS & PRODUCT LIFE CYCLE

INTRODUCTION

Machines, systems and devices generate more and more data, and collecting this data centrally (by using IoT or any other data platform), or analysing it on premises are also both easier than ever before.

Under the form of sensor readings and log files containing information about internal processes steps, performance or user interaction for example, but also data external to the equipment, such as the properties of raw materials or ambient temperature and characteristics of the electrical network powering the system, this massive amount of information contains valuable, actionable insights.

Advances in machine learning and artificial intelligence make it possible to use this data to enhance most aspects and phases of a product's life cycle.

BENEFITS

for R&D

Better product design, more precise engineering requirements, higher reliability through better testing.

for Service & Support

Faster diagnostics & root-cause analysis for lower MTTR & more efficient service teams.

for Operations

Early warning of technical issues, prediction of failure for predictive maintenance.

DESIGN & ENGINEERING

The design and functions of the machine and its interfaces can be optimized and the importance of features can be defined.

The bill of materials reflects actual needs, and improvement prioritization can be based on cost and prevalence of issues.

Higher throughput can be achieved by identifying issues and bottlenecks.

Rarely used features can be dropped, while essential ones can be focused.

TESTING

Prioritizing the tests of features and functions based on their importance and detecting problems arising combinations of various sub-systems can be based on machine data.

Quickly detecting anomalies and performance issues in the first machines or prototypes and diagnose the root cause is also easier.

Products can thus be launched faster thanks to a shortened testing phase.

MANUFACTURING

End of line testing is important to ensure that shipped machines will perform reliably. Realistic testing scenarios and procedures are possible using machine data: they can be based on situations that caused a high stress for the equipment or have created technical problems.

Later, differences in reliability between different production sites and lines can be found.

OPERATIONS & MAINTENANCE

Early signs of issues can be detected and preventive actions ca be taken to avoid or limit downtime.

Signs of wear visible in the data and indicative of the condition of various machine parts or subsystems enable truly predictive maintenance.

The source of performance bottlenecks can be identified, settings can be optimized and issues solved.

All these aspects can significantly lower the cost of operations.

SERVICE & SUPPORT

Faster diagnostics and root-cause analysis of technical issues, and thus a lower MTTR, by making the service teams or support engineers more efficient.

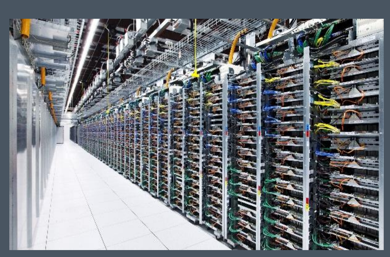
Predicting issues allows to take preventive measures and prioritizing them based on actual usage and workload of the equipment.

END OF LIFE

Manufacturers can make better informed decisions for EOL planning and in the design and sales approach of the new equipment.

Spare parts stock needs can also be precisely determined.

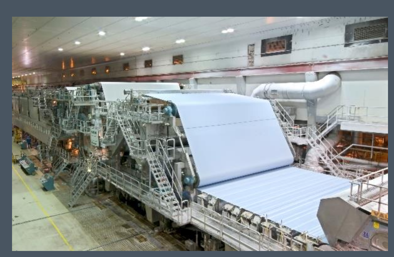
EXAMPLES OF APPLICATION DOMAINS


Telecom & Networking systems


Medical devices & equipment


Rolling stock


Commercial Coffee Makers


Industrial Production machines and lines


Industrial internet of things


Printers & Copiers


Smart TVs


EV Charging stations

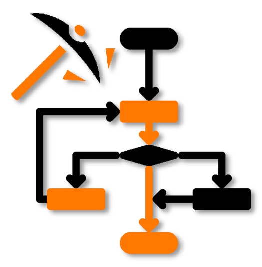
YANOMALY

To help our customers with the challenges they face in the field of machine data analytics, we have built an advanced anomaly detection and root cause analysis solution.

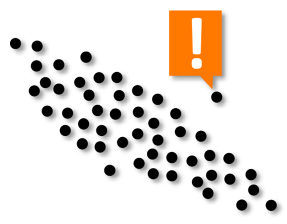
For machine-generated data, anomaly detection is the identification of unusual or abnormal events, values or patterns that are linked to or indicative of a technical issue.

When dealing with the large amount of data generated by machines, it is unrealistic to use rule-based anomaly detection (that rely on a human describing the normal situation and the possible exceptions), and algorithms can detect anomalies that the traditional rule-based approach misses.

Centred around two core technologies, it uses artificial intelligence to automatically learn normal machine (fleet) operation and detect anomalies.



Process Mining: The ability to learn automatically from data models that describe how the machines, devices and systems have been used and which process steps were executed by those systems. Process Mining is used to build a model of the ways a system behaves (Process Discovery), and to analyse if new events comply with the model (Process matching).

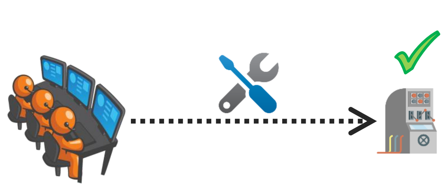


Multivariate context dependent anomaly detection: The ability to detect in real-time anomalies or abnormal process execution and complex events in both numerical data and log files, while taking into account the context in which the system operates.

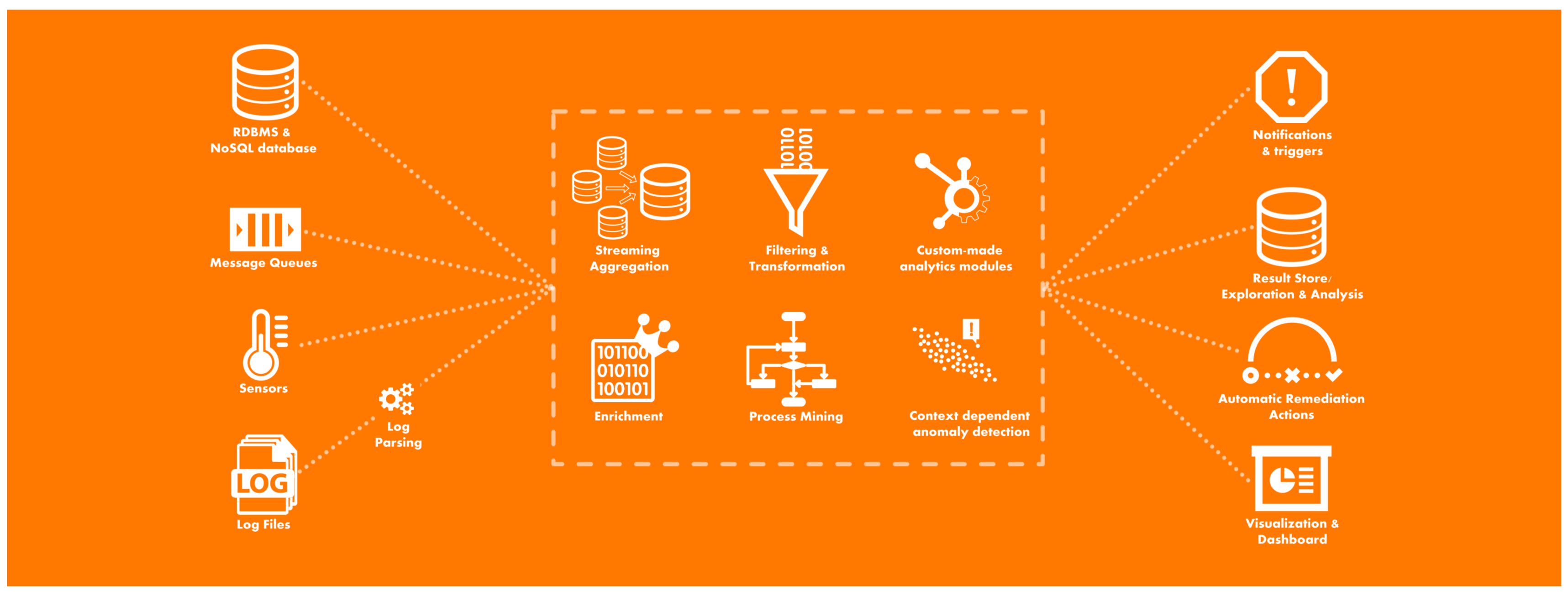
EXAMPLE FOR REMOTE MONITORING

Alert: A remote monitoring team watches over a fleet of machines. The data can either be sent centrally, or processed on premises. When an anomaly is detected on a machine, an alert is sent.

Diagnostic: The team investigates the incident. To make their work more efficient, only the information relative to anomalies is shown, making finding the root cause of the problem easier and faster.



Repair: Having found the source of the issue, the remote monitoring team can take measures to fix it, thus limiting or even avoiding downtime.



With its modular highly scalable architecture and flexible licensing, YANOMALY can be offered as a complete customized solution or integrated into existing (remote) monitoring platforms.

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