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How to detect faulty sensors before they cause trouble?

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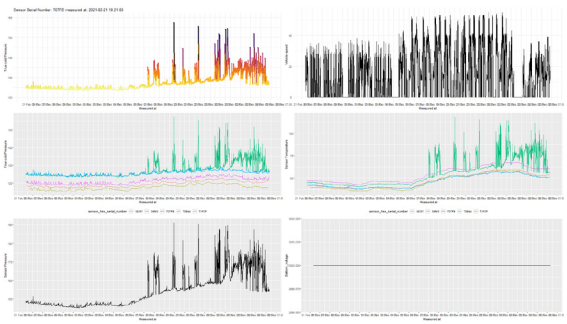
Statement of the Problem: The 4.0 industry revolution made us dependent on various (IoT) sensors that may cause troubles when stop working. Faulty sensors either become silent or start transmitting unreliable data. While the first case is easy to spot, the second one represents a considerable challenge, especially when the transmitted signals are noisy. Early detection of faulty sensors is very important for the maintenance of provided services to customers, keeping their operations safe and functional.

Methodology & Theoretical Orientation: Data received from sensors are usually voluminous, therefore is it impossible to look at each signal in detail. To detect obvious anomalies, we first look at first differences of the signal and their moving average. This way we are able to preselect a sample of (thousands of) suspicious signals (out of billions received). Such signals are further analysed by advanced time-series methods to narrow down the selection and remove falsely classified sensors.

Findings: The analysis of sensor data cannot be undertaken without good understanding of the underlying industry and business problem. It is essential to intensively interact with industry professionals, on-site engineers and monitoring teams. Mainly thanks to their feedback we were able to finetune our criteria for the detection of faulty sensors.

Conclusion & Significance: We managed to detect all faulty sensors and minimise the misclassification of healthy sensors; the achieved accuracy was above 90%. This significantly improved the provided service since our customers could always rely on the installed sensors that guaranteed them smooth and safe operation. Moreover, the monitoring team did not have to visually inspect the functionality of installed sensors anymore, which released their capacity for further improvement of the quality of provided services.



Biography

Tibor is a highly educated (5 university degrees) and experienced (20+ years) expert in Data Science, Machine Learning, Statistics, Economics, Finance and Insurance. He has excellent analytical, programming, management, communication and presentation skills, acquired by working in various industries, such as academia, (central) bank, (re-)insurance, AI start-up, consultancy, entertainment, energy, mining and software engineering. He is a very creative and innovative person with strong business acumen, great problem-solving aptitude and prodigious drive to achieve results.Tibor holds a PhD in Applied Economics and four Masters in Mathematics, Operations Research, Statistics and Econometrics that he obtained from universities in Slovakia, Czech Republic, Russia, France and the Netherlands. He has attended courses and conferences all around the world and is always eager to extend his knowledge in new areas.