Shayp chooses AI for intelligent and sustainable water management

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In many countries, access to fresh water is very limited. Moreover, old and poorly maintained water installations are at risk of leaking, leading to massive wastage. To detect those leakages earlier, Shayp started analysing water consumption data in a cloud-based environment.

Brussels-based organisation Shayp gives new water consumption insights in buildings with the goal to eradicate water waste and improve water efficiency.

Water consumption highly depends on the type of building that is being monitored - schools, residential homes, offices, etc., but even per type, a variety of consumption data patterns can be observed. Hence, identifying a leakage via consumption data analysis is not a trivial task. The data are also severely altered by the particular strength of a leakage, which makes it even harder to distinguish abnormal patterns.

In addition, Shayp does not just want to provide a binary warning of ‘leakage’ or ‘no leakage’, but the company aims to provide an additional risk score of a leakage – as quickly as possible.

Detecting abnormal consumption patterns

Shayp and Sirris set out to detect abnormal consumption patterns by means of a resource-efficient data-driven approach, which was sufficiently light to run on a battery-driven microcontroller, a so-called ‘edge device’.

To optimize the stream of messages between the edge device and the central cloud-based solution, and by that extending the battery lifetime of Shayp’s device, researchers of Sirris explored a compression-based method. This approach took into account that leaking and non-leaking devices produce different messaging signatures.

Two types of compression methods (run-length encoding and Fibonacci encoding) helped spot those different signatures and, as a result, enabled a leakage risk calculation. This risk calculation allowed the edge device to decide whether to alert the cloud back end right away or not. Results were highly accurate.

Secure data transmission

However, the risk-based messaging approach posed a security risk since one could derive leakage data from mere message statistics – without having to actually read the message itself. That is why the messaging mechanism was equipped with a stochastic vector, creating random sending times to guarantee a secure data transmission.

With their lightweight approach, in a first prototype the battery lifetime could be extended by four years, while detecting leakages earlier and ensuring a secure and privacy-preserving sending schema.

This case was realised as a part of the MIRAI project, supported by ITEA and funded by the Brussels-Capital Region – Innoviris.

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