

## Machine learning to optimize Industry 4.0 processes

<b>What need was solved?</b>
The problems to be solved in this collaboration were focused on the application of machine learning methods to Industry 4.0. More specifically, the private company was interested in: (i) detecting anomalies during a laser surface heat treatment process recorded using a high-speed thermal camera by tracking the movement of the laser spot; (ii) detect the degradation of industrial motors in concept drifting data streams from sensors in rotating machinery; (iii) identifying the different devices running in the manufacturing plant using the whole plant electric consumption data and estimating the individual device energy consumption.
<b>What services were provided?</b>
New methodology based on machine learning was developed to address the previous problems: Dynamic Bayesian networks and kernel density estimation for (i); probabilistic model-based dynamic clustering for (ii); and multi-dimensional Bayesian network classifiers hybridized with decision trees for (iii).
<b>The relation with digitization</b>
All the developments are data-driven approaches requiring sensing technology implementation in their machine-tools and plants.
<b>Customer</b>
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