PREDICTING PRODUCT QUALITY

Early prediction of flawed products in a production line safes energy, material and work.

Pro²Future

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MOTIVATION & GOALS

Production of **complex products** requires many production steps. Detection of **deviations** in early production steps and **prediction** of their impact on final **product quality** are key enablers to **skip obsolete work** on semi-finished, already broken products. Also, if possible, it is easier to fix problems by **reworking** directly after the deviation happened.

Following the main goals of the project

- Integrate several flows of measurement data
- Learn relationship between measurements and product quality
- Define and calibrate estimation models used for quality prediction
- Integrate quality prediction into production workflow

Project FactBox

Project Name CoSma
Project ID MFP II 2.2
Duration 30 Months

Area 2
Cognitive Robotics and Shop Floors

Project Lead
DI Michael Mayrhofer

APPROACH

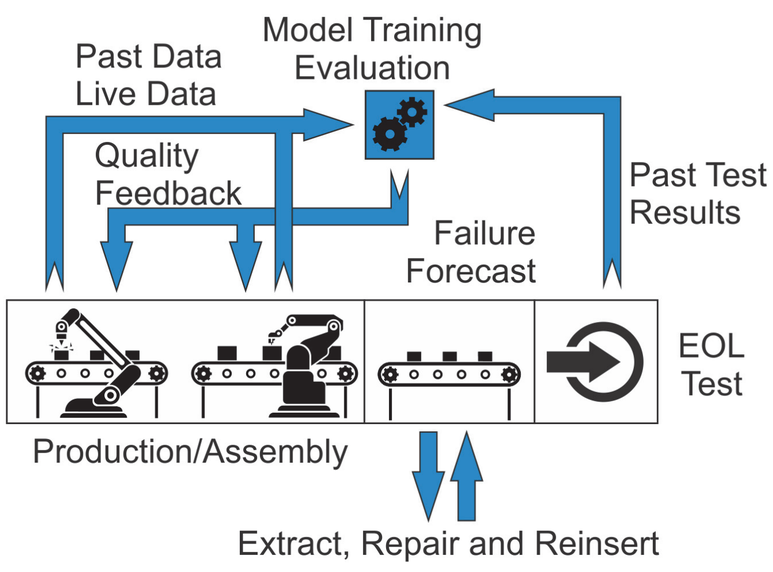
Measurement data is stored to a single data warehouse for uniform access. A combination of Deep Learning and classical Machine Learning are applied to identify relations between measurements and product quality. An ablation study along the station of the production line shows the tradeoffs between early prediction and prediction quality.

CONTRIBUTION

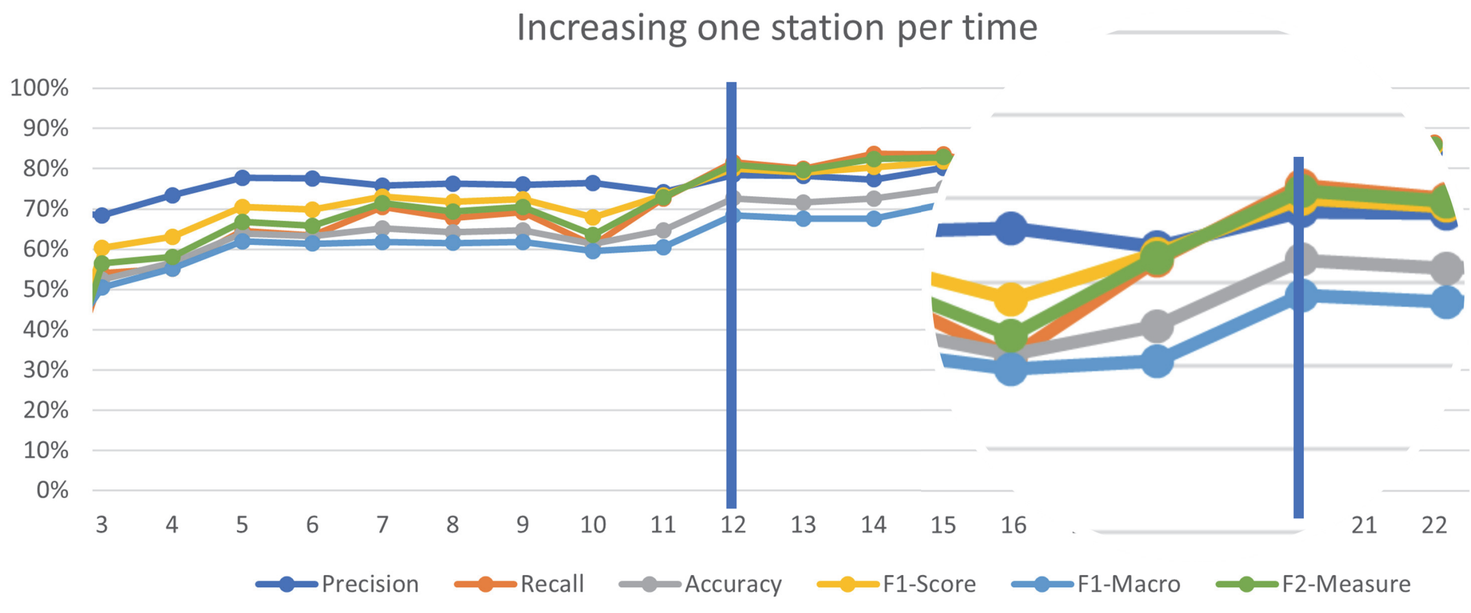
Scientific contribution
Combined use of classical machine learning and deep learning
Comparison of quality measures
Applying ablation study on a production line

Economic contribution
Feed-forward quality estimates allow to optimize EOL tests
Feed-back to stations allows to improve quality of work
Early predictions catch up to 85% of faulty products
Only a neglectable number of good products is misclassified
Early repairs save raw material, work and energy

OUTCOMES



Prediction is integrated with the production line



A sweet spot for early prediction exists after half of assembly steps have been executed

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