



From hyperspectral edge computing to offline algorithm based feedback-loops



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WE CONNECT SENSORS AND PROVIDE KEY DATA FOR
VALUE-DRIVEN BUSINESS DECISIONS
IN INDUSTRIAL SORTING AND MONITORING

EXPERT COMPANY

Sensor-based industrial imaging solutions for sorting and inspection

CORE EXPERTISE

Hyperspectral Imaging, Inductive Imaging, Machine Vision, Vision Data Analytics

COMPLETE SOLUTIONS

From data acquisition to business-driven decisions



Sorting



Monitoring



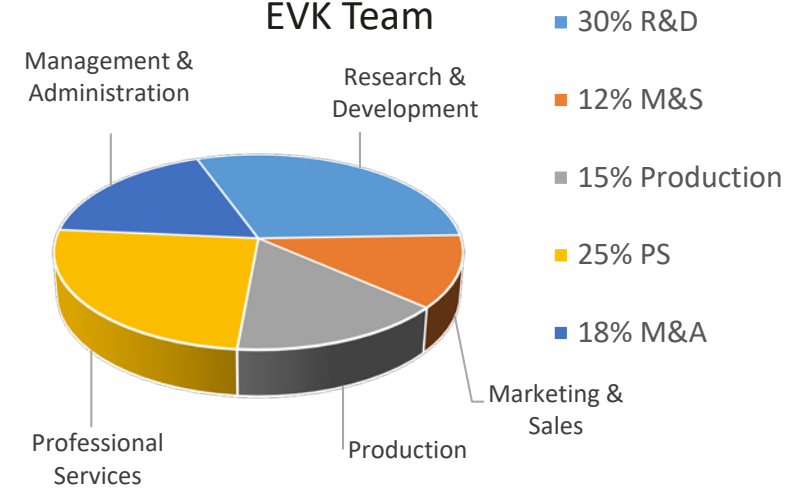
In-line Analytics



Target Markets

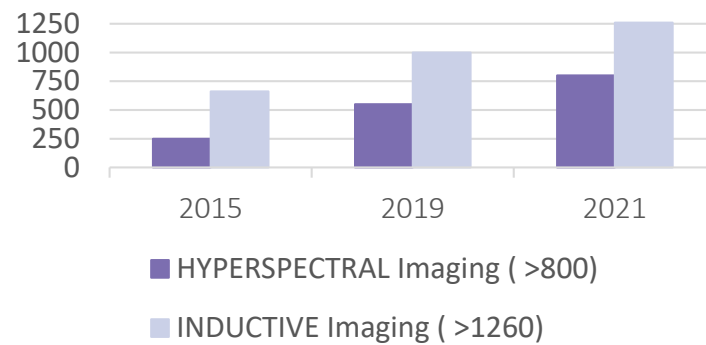


EVK Team

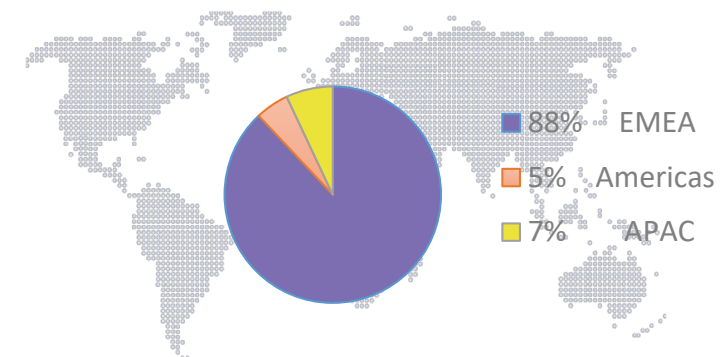


Installed Systems Base

(cumulated)



Turnover / Region



Innovation on demand



1986

From engineering service company

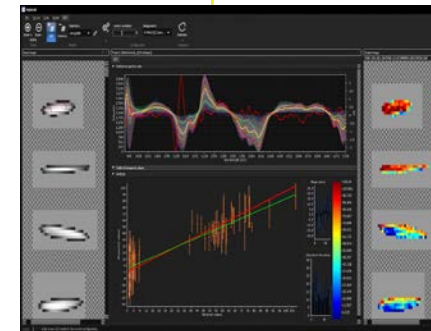
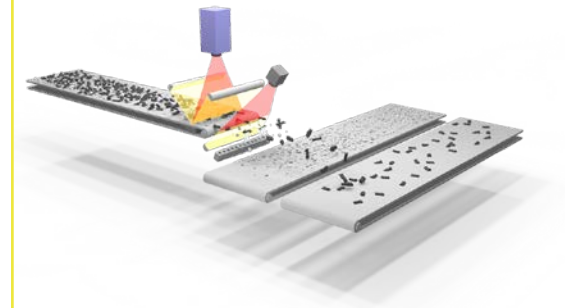
First customer specific products



Expansion to **standard** products



Data processing-based sensor systems

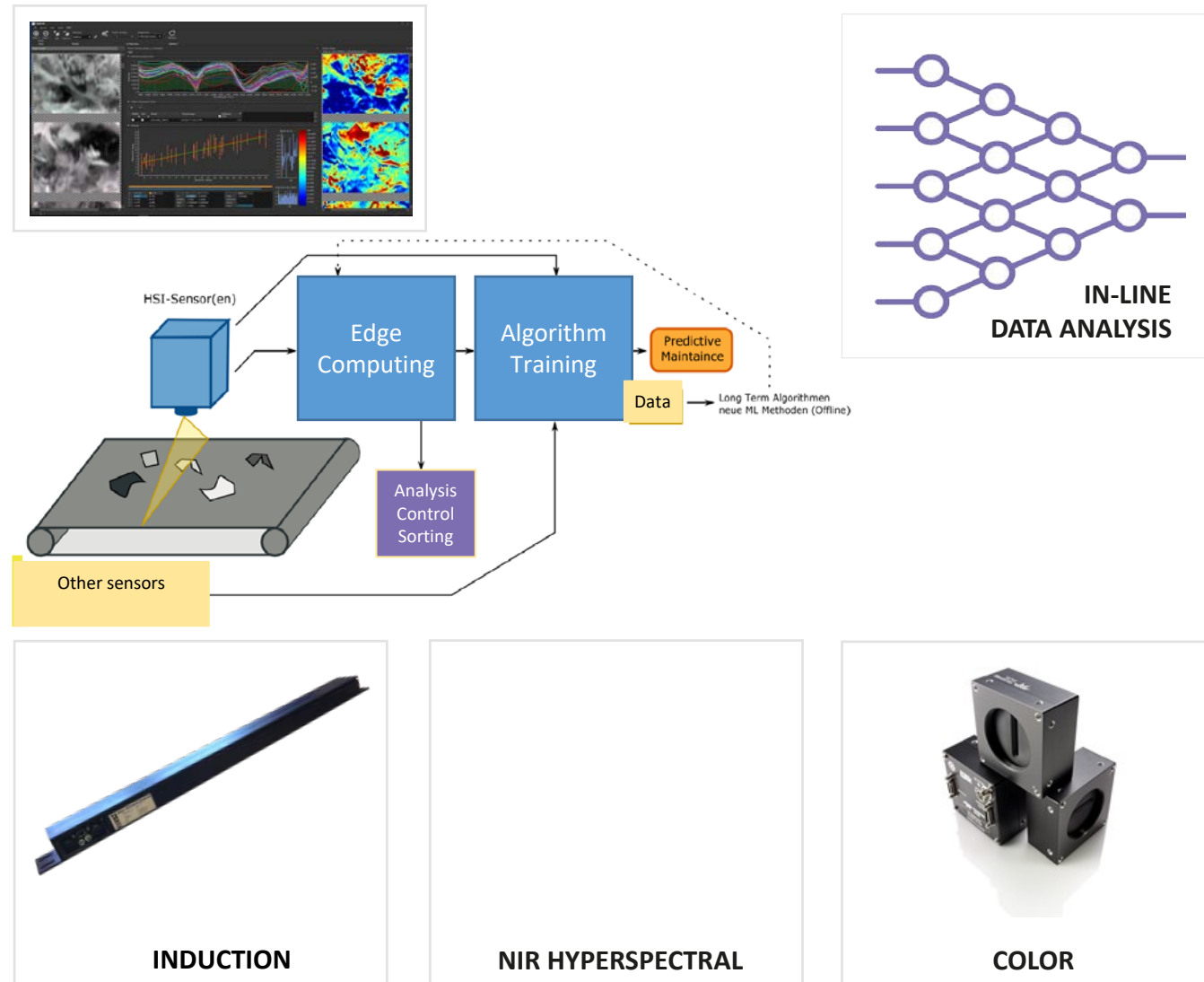


... to data service company

Data Processing

Actionable Decisions

Sensor Fusion



- Value chain starts with professional data acquisition
- No AI without good data („garbage in garbage out“)
- Key building blocks:
 - Illumination
 - Wavebands
 - Sensor Fusion
 - Resolution
 - DAQ-speed/bandwidth
- Ground truth reference (labelled) data



- High dimensional data
- Fast data-to-feature reduction
- Real-time applications (e.g. sorting)
- Key figures of merit:
 - Bandwidth
 - Latency
 - Jitter
 - Computing power
- Trade-off: Information loss

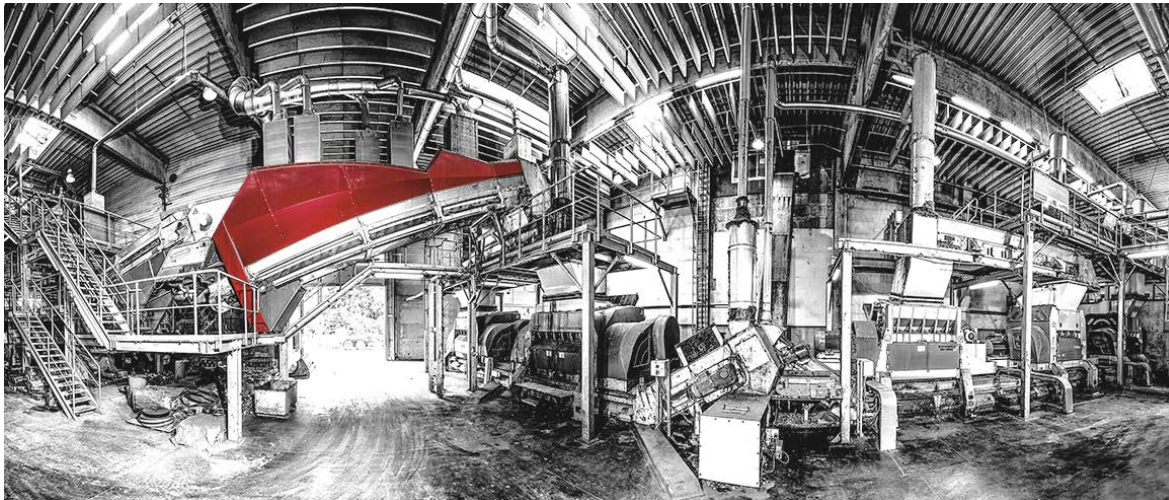


Real-time classification of hyper-spectral image (HSI) streams

- Reads GigE Vision input streams from hyper-spectral imaging (HSI) line cameras
- Classifies material in HSI input streams using classification/regression algorithms like EC3, Class32 or QCI3
- Outputs GigE Vision stream of classified material in RGB8 or Mono8
- Maximum input bandwidth of 1 Gbit/s
- Supports EVK Helios Hyperspectral and 3P Cameras



- Data becomes knowledge
- Information used by customer to optimize processes
- Monitoring input and output production streams provides data for high level statistical analyses
- Correlation with other plant data gives insight into unknown efficacy relevant production features

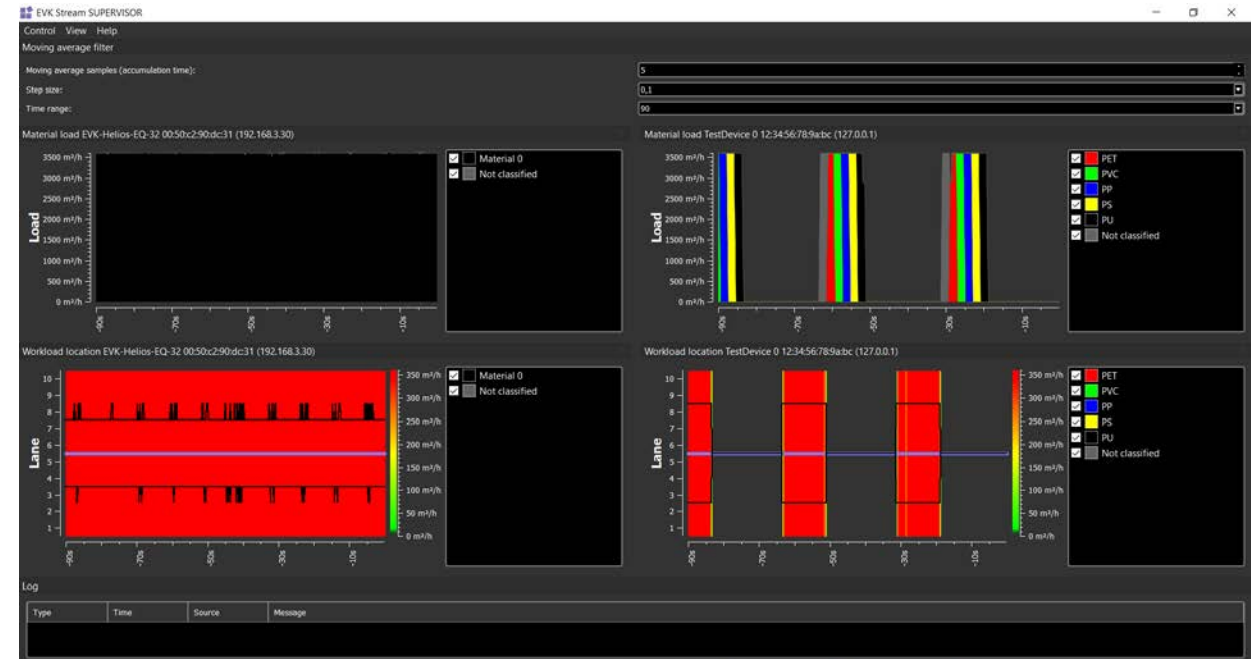


Courtesy: Saubermacher



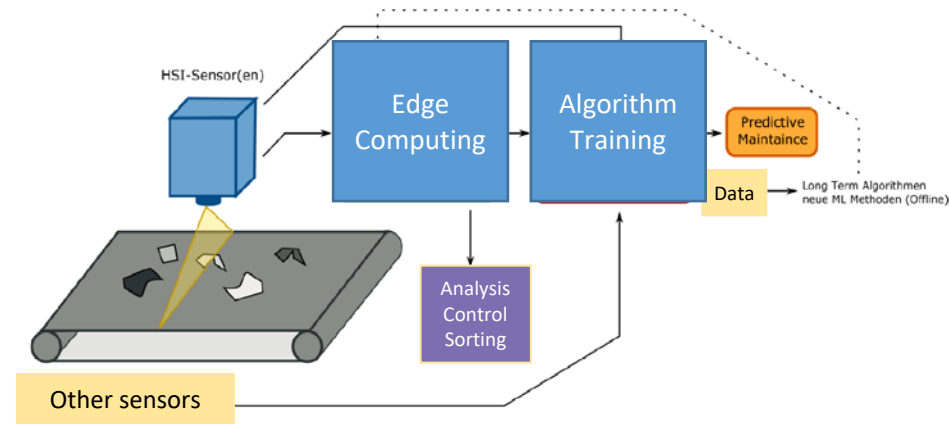
EVK Stream Supervisor

- Bulk flow monitoring using HSI
- Real time inference of product quality
- Multiple sensor input
- Continuous data export
- PLC-Communication using OPC UA
- Control of down-stream production units
- Compliant with EVK HELIOS EQ32

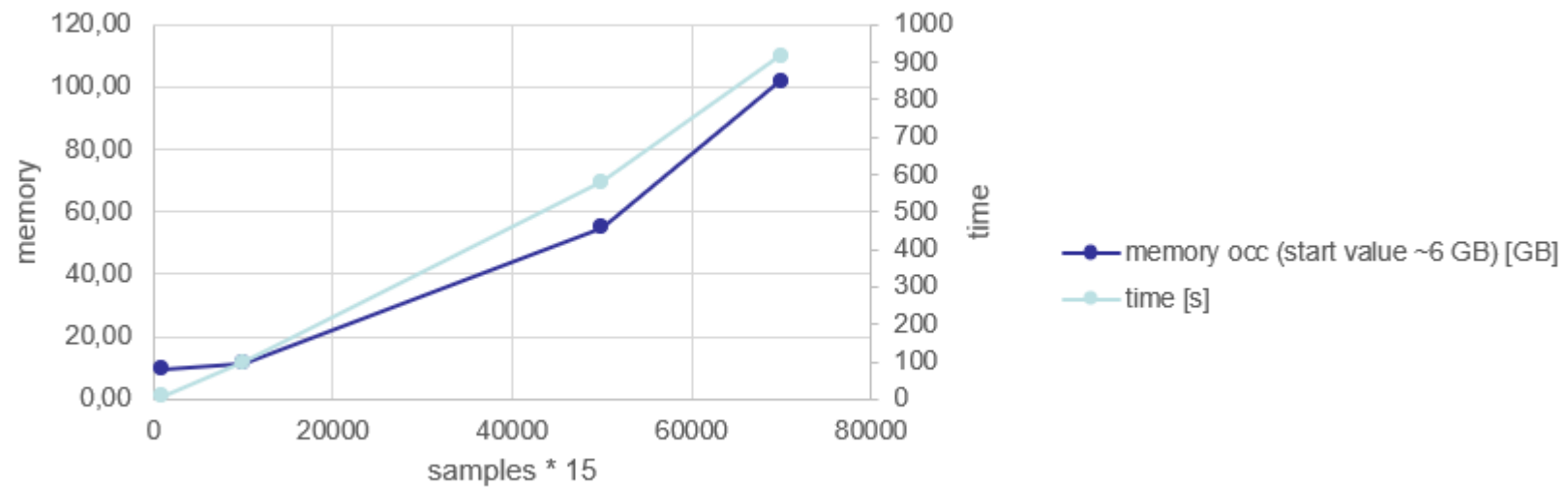
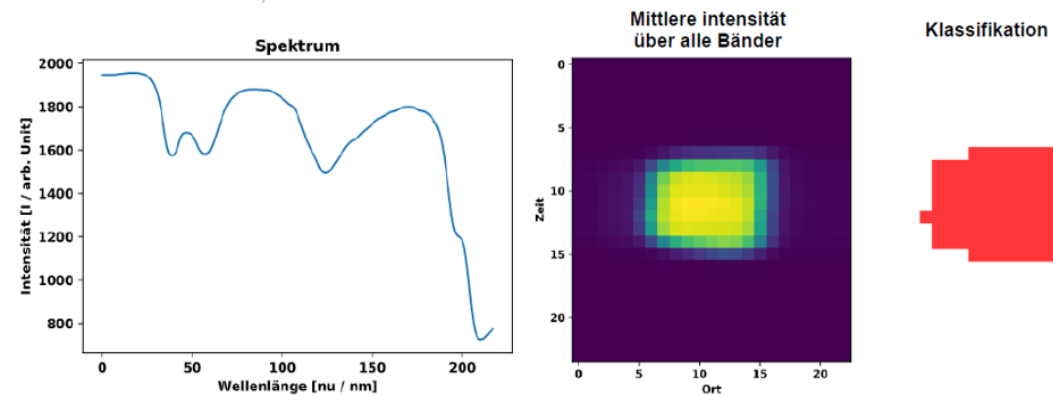


Assessing input stream composition and distribution
to increase plant efficiency and control output quality

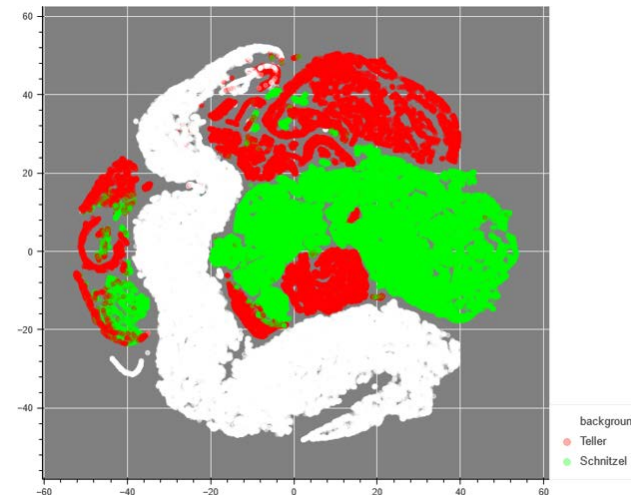
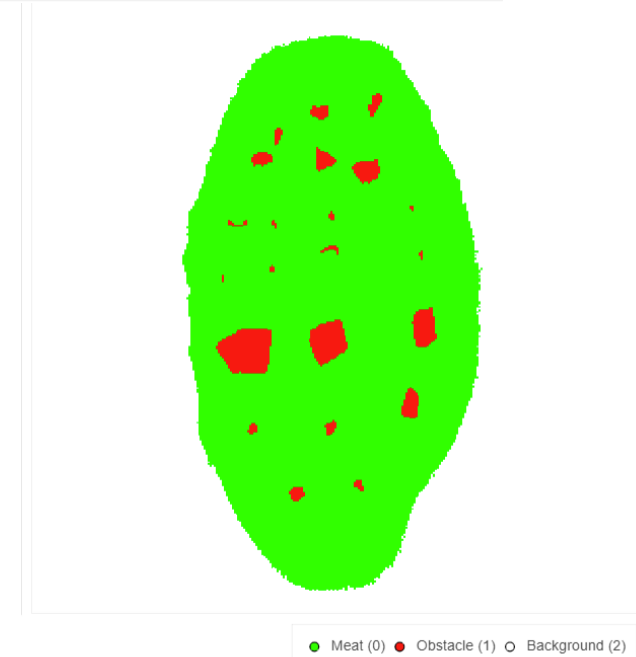
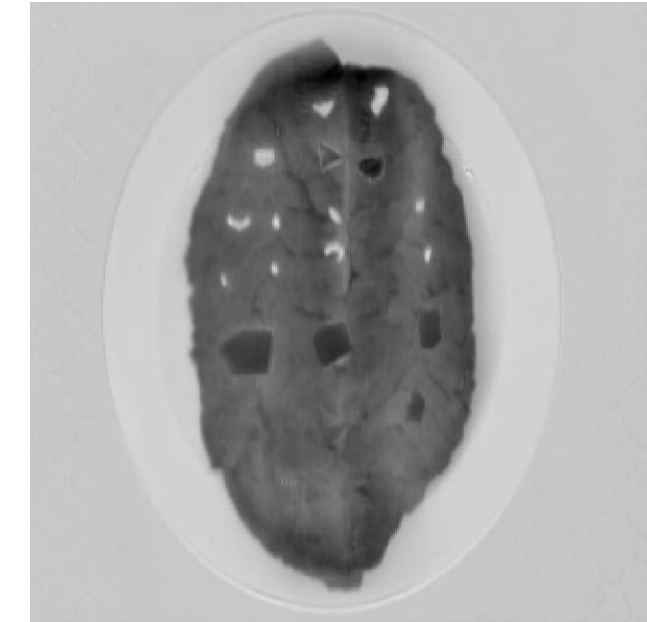
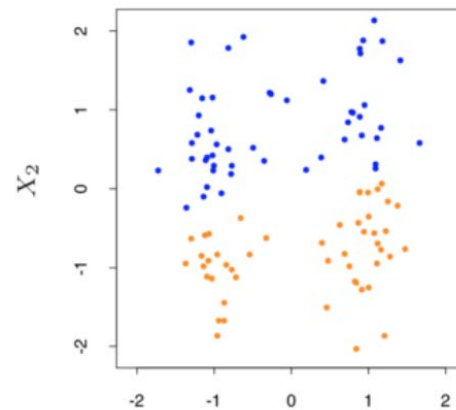
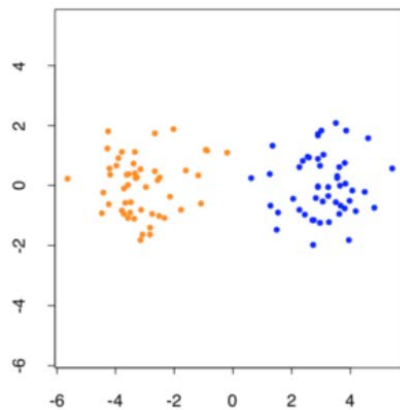
- Sensor data upload to data base
- Key information assessment
- Identification of best-in-class algorithms
- Training of customized classifiers
- Deployment to edge (sorter)
- Feedback loop/model-machine-maintenance

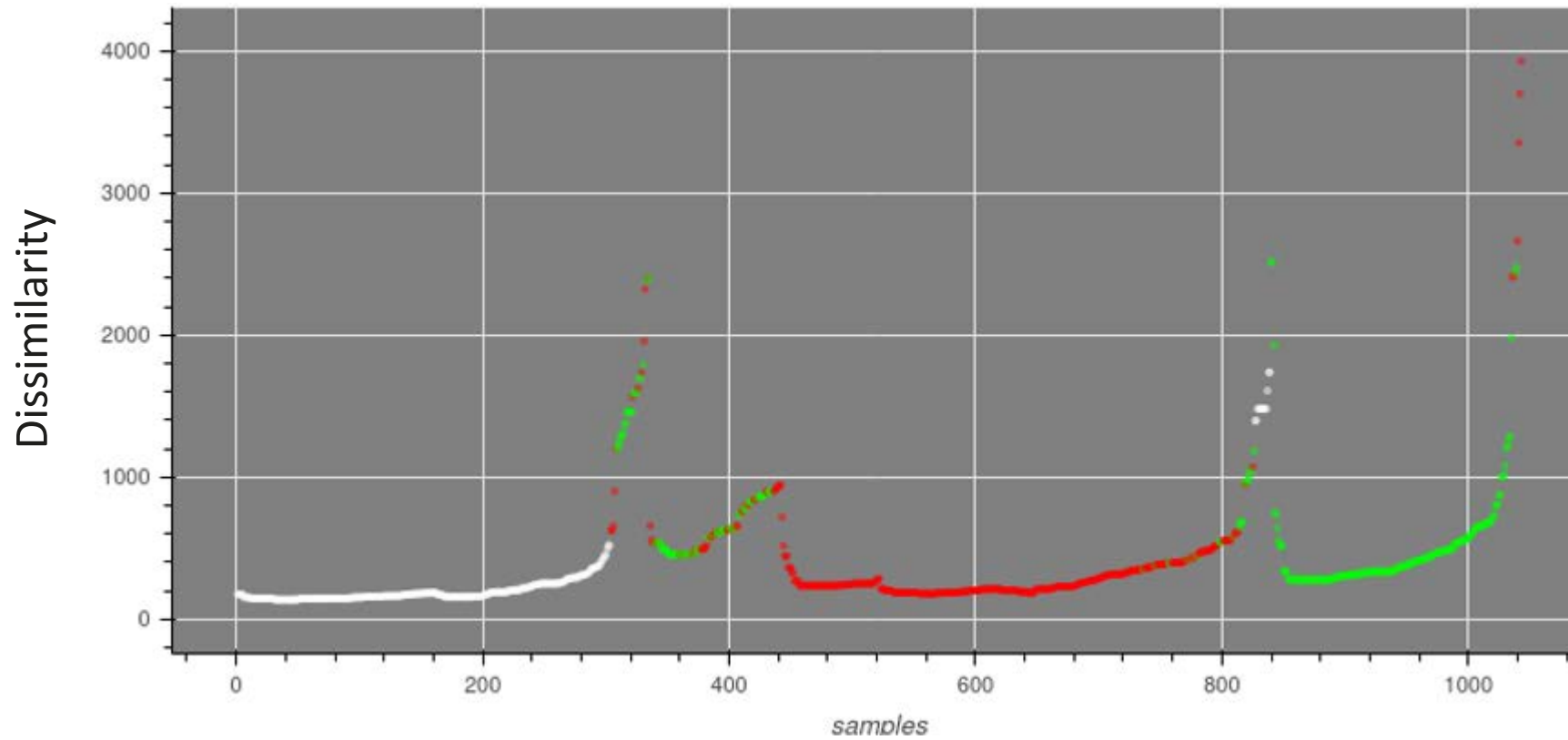


- Vast amount of data
- Computationally costly
- Metrics for data quality

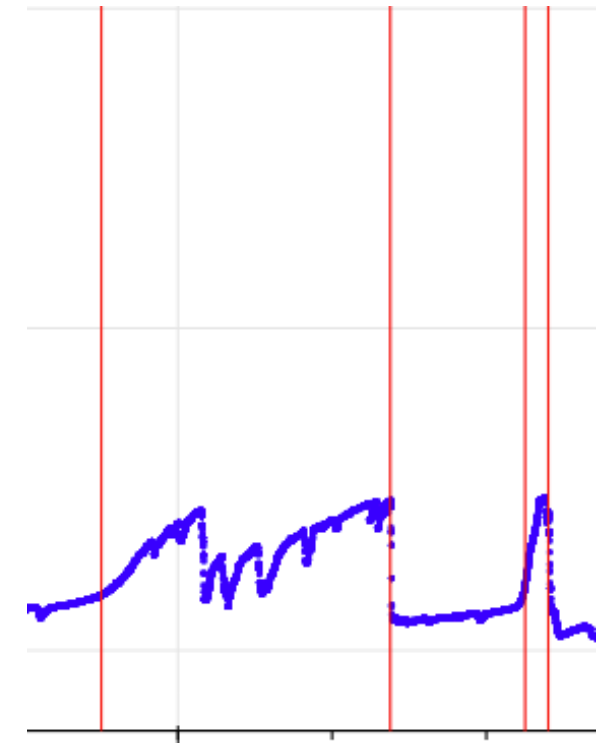
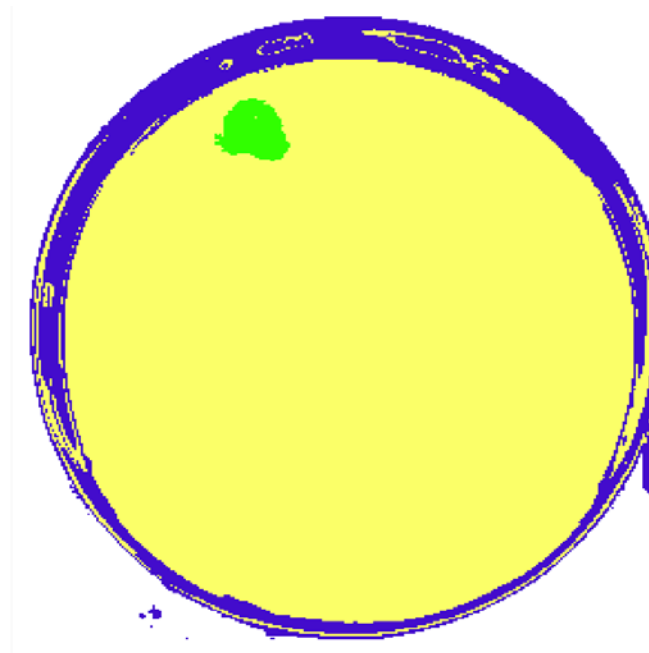


- Data and spaces
- Data and information
- Ground truth knowledge
- Huge phase space

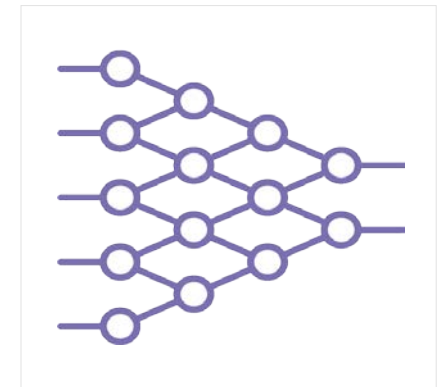
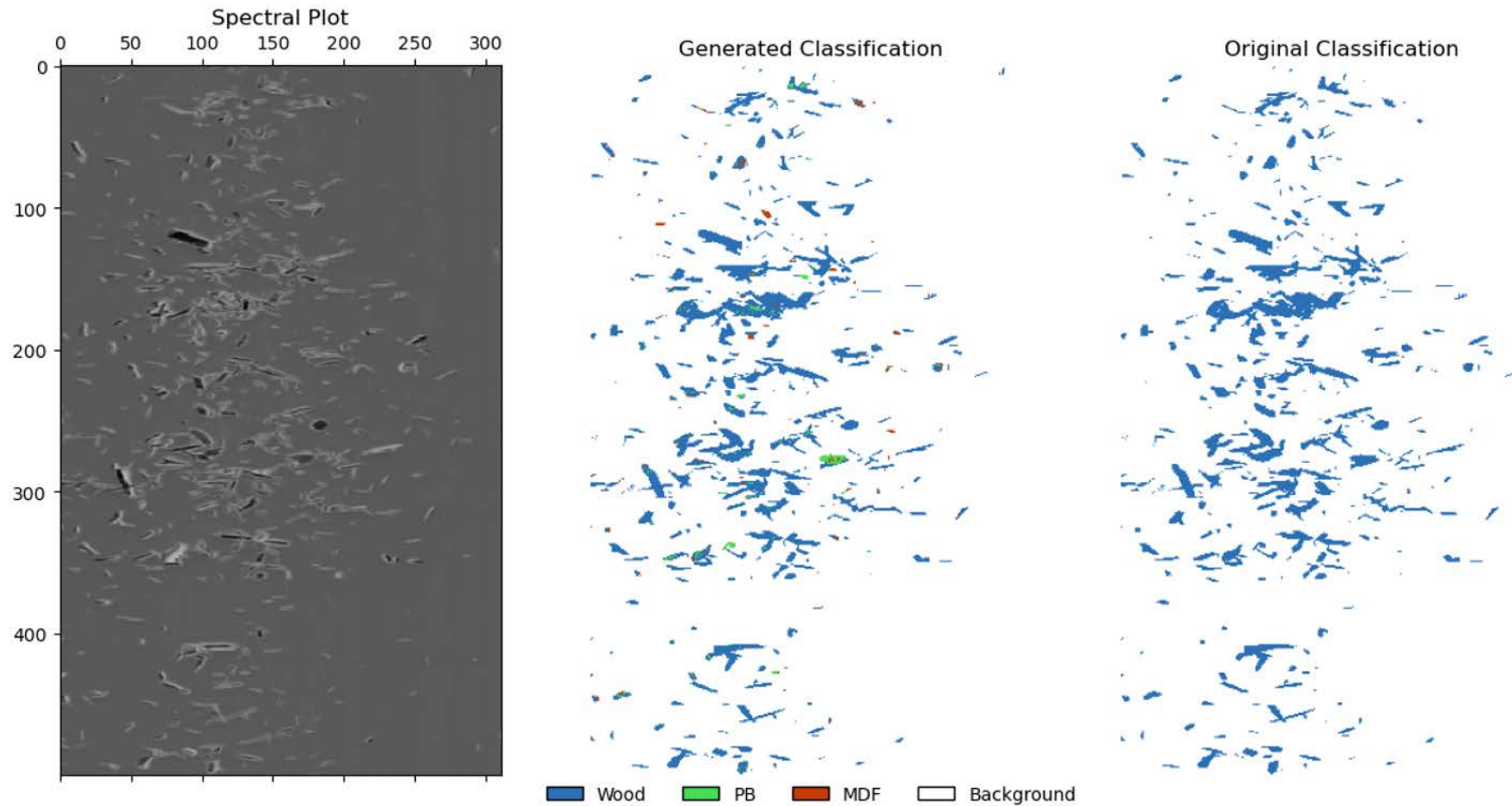




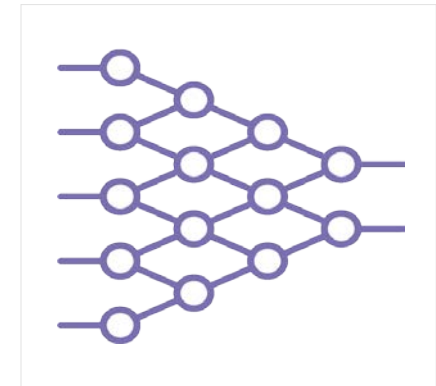
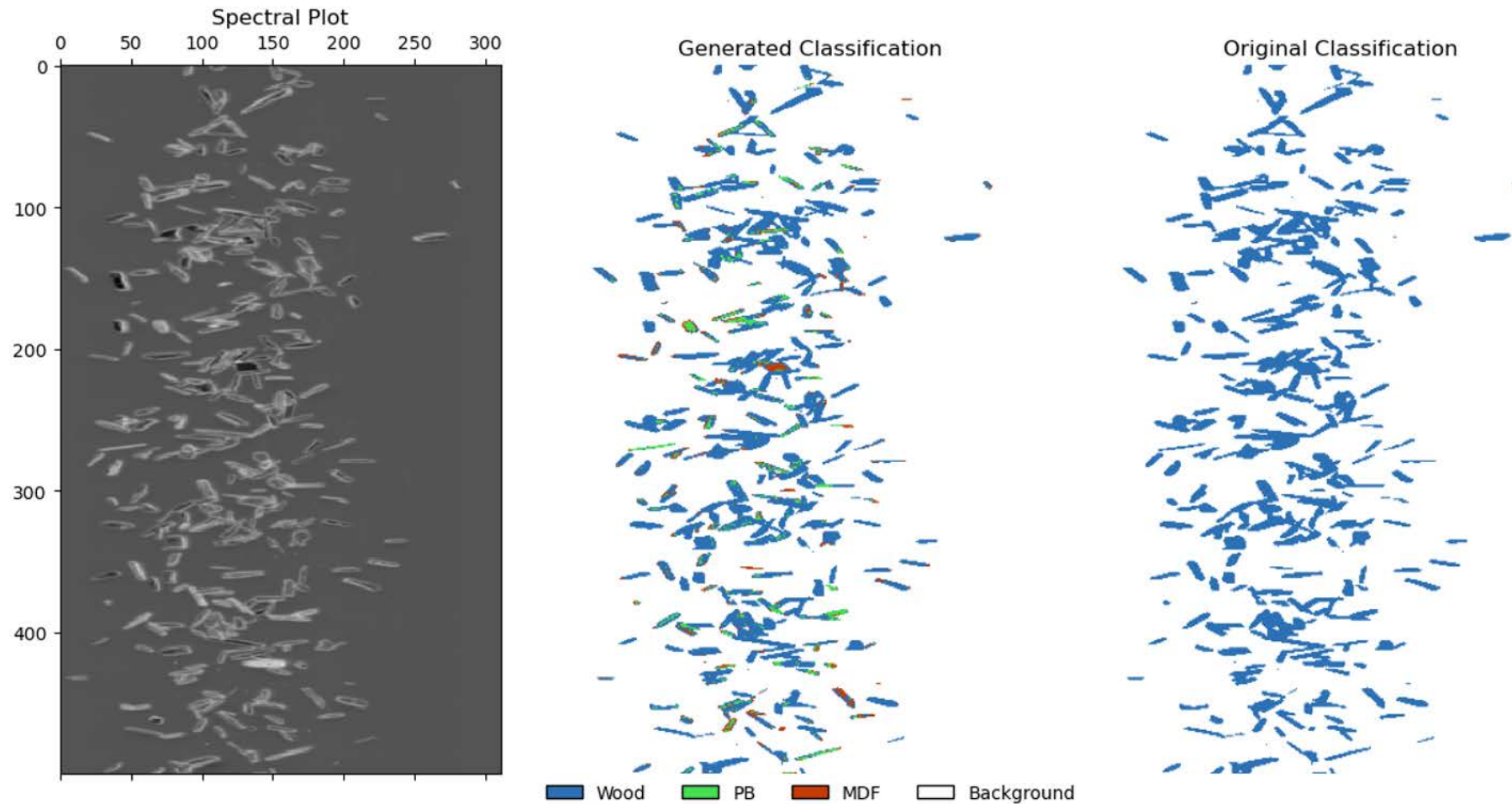
Automatic key information retrieval metric



Deep learning wood classification - dry



Deep learning wood classification - wet



- Data vs. relevant information
- Inference of key information is costly
- Phase space for classifiers is huge
- Lengthy process to understand whether key information exists in the data set („trial-and-error“)

- Is the key information contained in the data at all?
- Which is the best classifier given the data?
- What is the theoretically best performance I can get in the edge?

State of the art offline algorithms allow for quantifiable
assessment of data quality

„We are open to industrial partners
to join us in exploring hidden
potentials of their data sets and
developing applications“

