# analytik

Agro & Food

- ▸ Plant phenotyping
  - ▸ segmenting plant parts
  - ▸ disease detection (virus and fungal infections)
  - ▸ estimation of plant stress / nitrogen content / ...
  - ▸ estimation and mapping of dry matter content
- ▸ Food authenticity by geographical origin and variety
- ▸ Foreign object detection in food processing
  (stone, plastic, nut shells, wood)
- ▸ Food sorting applications such as
  - ▸ Detect greening, rot and peel in French fries
  - ▸ Detect seed potato diseases
- ▸ Detect overripe or firm fruit
- ▸ Sort by brix, acidity, limonin content in fruit
- ▸ Characterize meat marbling, fat content
- ▸ Estimate protein content in animal feed
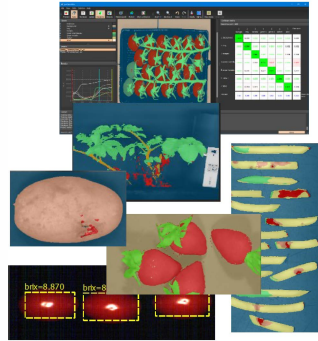
Recycling & Material Science

- ▸ Plastic separation
- ▸ Sorting of textiles by material
  irrespective of color (also dark textiles)
- ▸ Paper sorting
- ▸ Material transition identification
- ▸ Characterization of microplastics
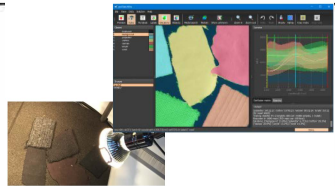
Medical & Pharma, Forensic

- ▸ Tissue classification
- ▸ Pill type identification
- ▸ Blood smear analysis
- ▸ Detecting sufficient oxygenation
- ▸ Wound assessment
- ▸ Blood detection
- ▸ Crime-scene documentation
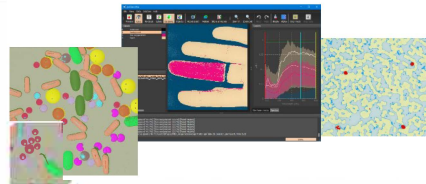
Remote Sensing & Environmental

- ▸ Land cover classification
- ▸ In-flight image segmentation for drone
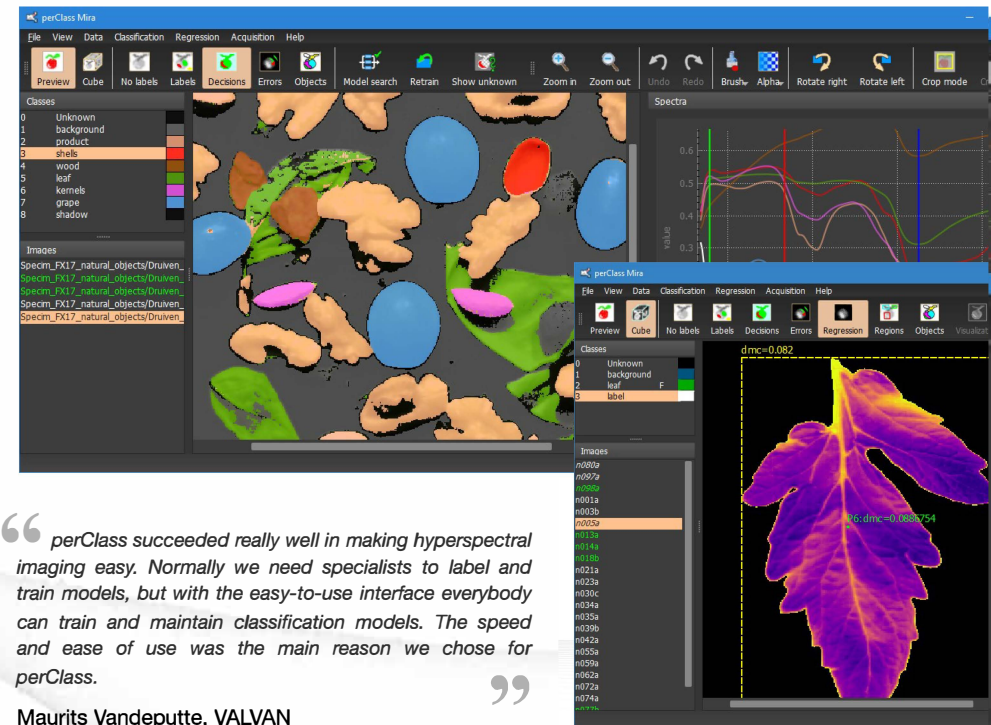 operations (plants, soil types, fruit)
- ▸ Cloud removal
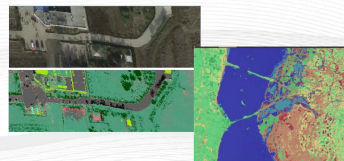
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perClass Mira®

The easiest user interface for spectral imaging with real-time deployment

> perClass succeeded really well in making hyperspectral imaging easy. Normally we need specialists to label and train models, but with the easy-to-use interface everybody can train and maintain classification models. The speed and ease of use was the main reason we chose for perClass.

Maurits Vandeputte, VALVAN

The Challenge

Modern spectral sensors provide **gigabytes of high-resolution images** with hundreds of bands. The interpretation process is currently **very time-consuming**. It typically requires **programming** and a high-level of expertise in applied statistics, machine learning and chemometrics. The path to **real-time production** is often unclear and deployed solutions are **not easily reconfigurable**.
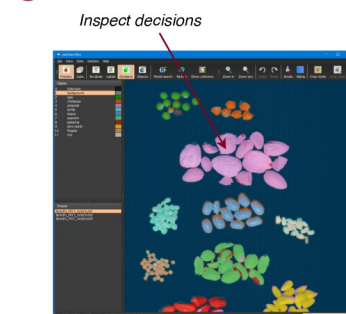
The Solution

perClass Mira enables anyone to create and deploy automatic interpretation solutions without programming or machine learning expertise.
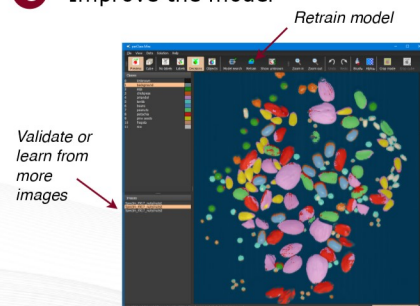
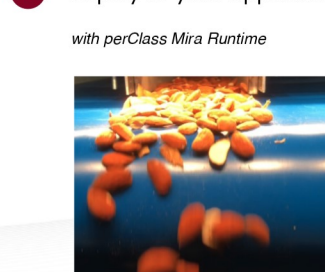## The Workflow

1 Define classes of interest

Paint labels

Load one or more images
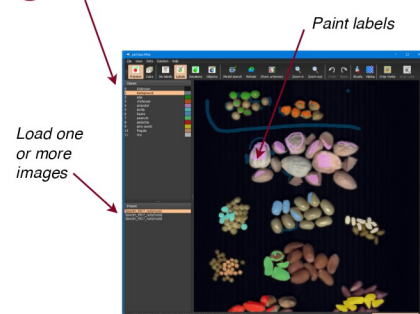
2 Automatic model-search

Inspect decisions

3 Improve the model

Retrain model

Validate or learn from more images

Active Learning guidance to paint new relevant labels

4 Deploy in your application

with perClass Mira Runtime

Validate speed directly from GUI with live acquisition.
*Runtime provides object coordinates to drive actuators.*

Key features

▸ Easy-to-use, results in minutes
▸ **Automatic model building** using state-of-the-art Machine Learning
▸ **Intuitive and precise** labeling and annotation tools
▸ Higher quality labeling with Active Learning guidance
▸ **Scalability** to hundreds of scans
▸ Batch export of data extracted per scan or per object
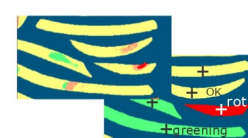▸ Apply models to **live data stream** from supported cameras

Use-cases

Foreign object detection
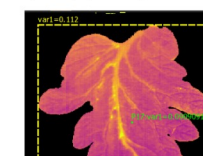Example: Nut shells removal
Object coordinates/sizes
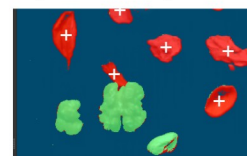
Object classification
Example: French fries grading
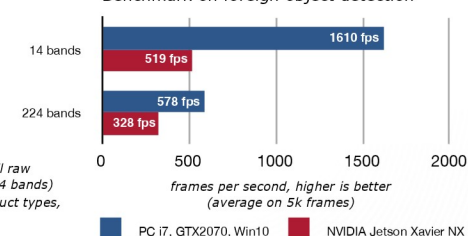Content-based object decisions

Object quality
Example: Moisture content
Quality per-object and pixel

High-speed deployment with perClass Mira Runtime

▸ Easy integration (<1h)
▸ Line-scan and snapshot processing
▸ Delivers object positions
▸ Reconfigurable reflectance correction
▸ Multi-core CPU and GPU support
▸ Real-time capable

Benchmark on foreign object detection

14 bands — 1610 fps / 519 fps
224 bands — 578 fps / 328 fps

frames per second, higher is better
(average on 5k frames)

■ PC i7, GTX2070, Win10   ■ NVIDIA Jetson Xavier NX

Measuring processing speed starting from full raw frames of a line-scan camera (640 pixels, 224 bands) until object coordinates. Classifying two product types, four contaminants.

Data formats

▸ Generic format support (ENVI cubes, Matlab® .mat files, Tiff files)
▸ Presets for common camera types such as Corning, Cubert, IMEC, Inno-spec, Headwall, Hyspex, OceanInsight, Resonon, Senop, Specim, Silios

System requirements

▸ **perClass Mira GUI**
▸ MS Windows 10, 64-bit
▸ Optional NVIDIA GPU
  with CUDA10 and later or OpenCL

▸ **perClass Mira Runtime DLL**
▸ MS Windows 10, 64-bit
▸ Linux 64-bit (NVIDIA® Jetson™)