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csem

Machine Learning im Dienste der Landwirtschaft

Philipp Schmid
Head Robotics & Automation

Löwenberg Murten, 30.01.2018

Close to industry, leveraging Swiss academic research

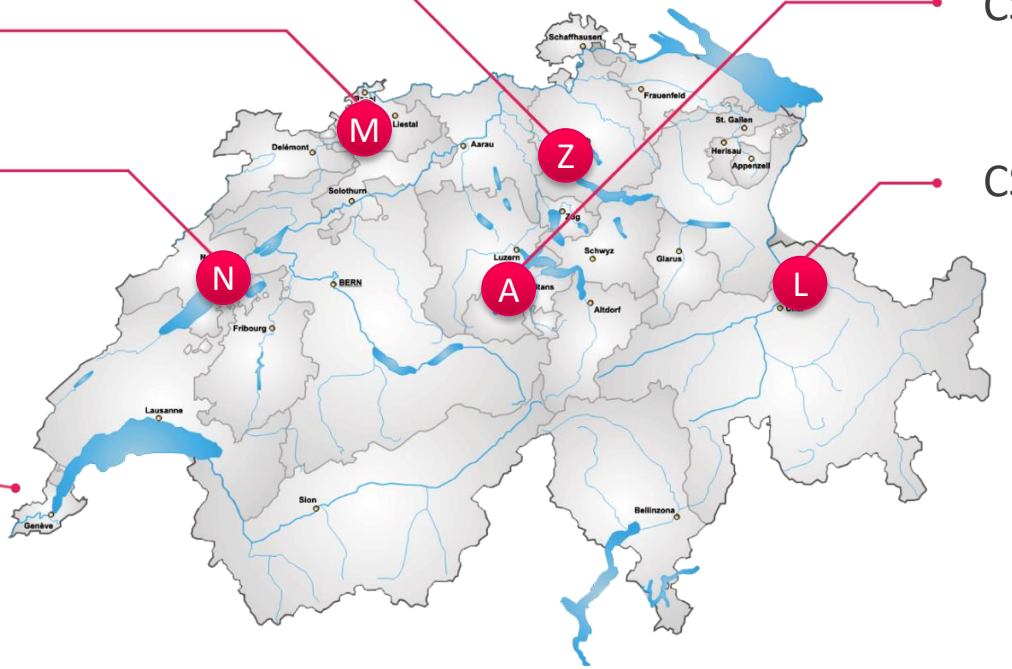
CSEM Zürich

CSEM Muttenz

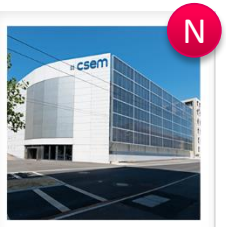
CSEM Neuchâtel

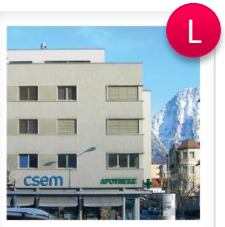
CSEM Alpnach

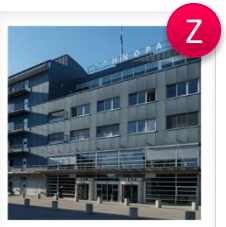
CSEM Landquart



CSEM Brasil







CSEM at a glance

79.3

Turnover (mio CHF)

40

Nationalities

437

Persons

43

New ventures

190

Industrial clients

196

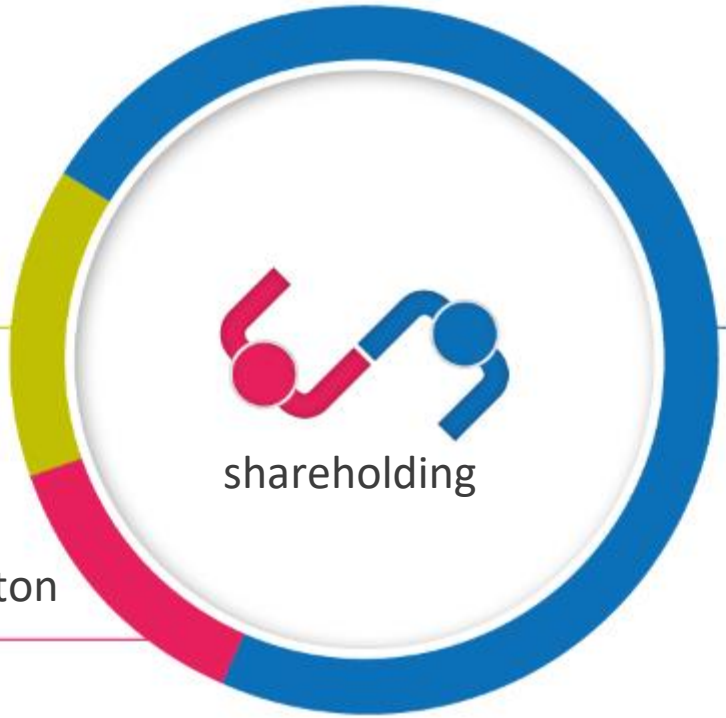
Patent families

62

European projects

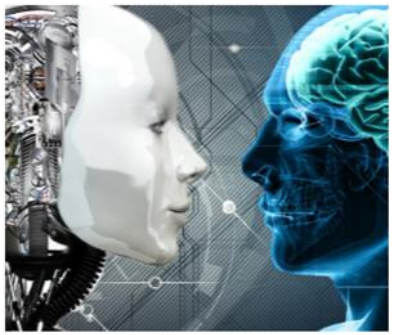
A public-private partnership

- Flexible and professional
- Industry friendly IP approach



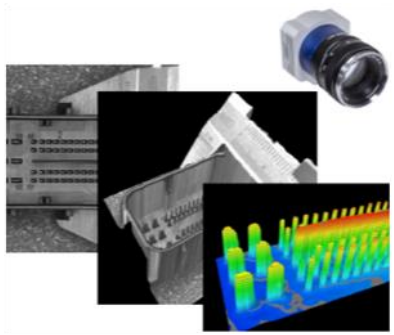
Robotics and Automation

Machine Learning



- Neural networks for data analysis
- Deep belief algorithms
- Data filtering and fitting

Industrial Vision



- Industrial vision hardware
- Advanced image processing and classification
- 3D light field camera and 3D measurement

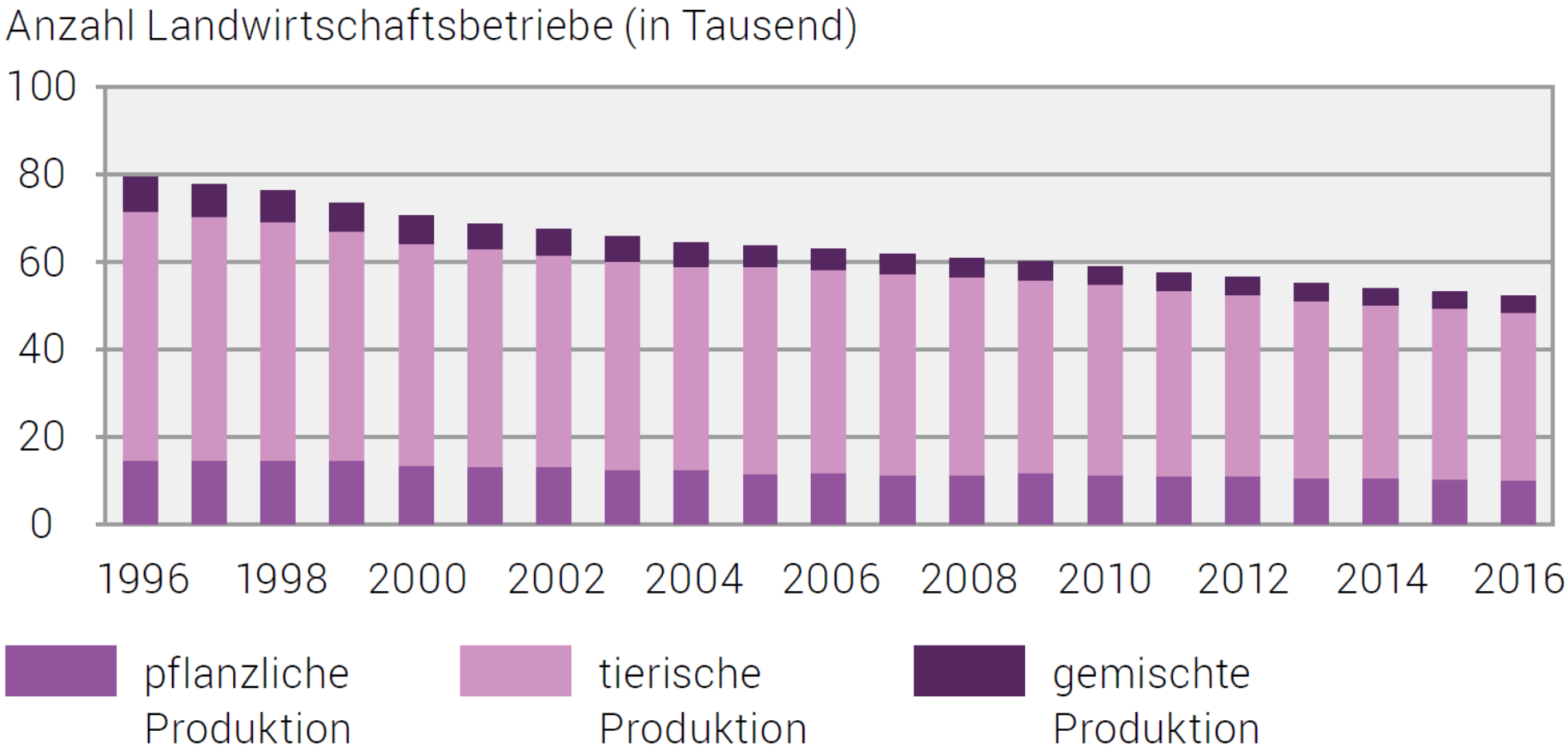
Robotics

- Robot system design and integration
- Tool and process design for automation
- Low- and high-level software integration

Control

- Sensor fusion for complex systems
- Efficient implementation of control algorithms

Strukturelle Veränderungen



Quelle: BFS 2017

Landwirtschaft im Umbruch

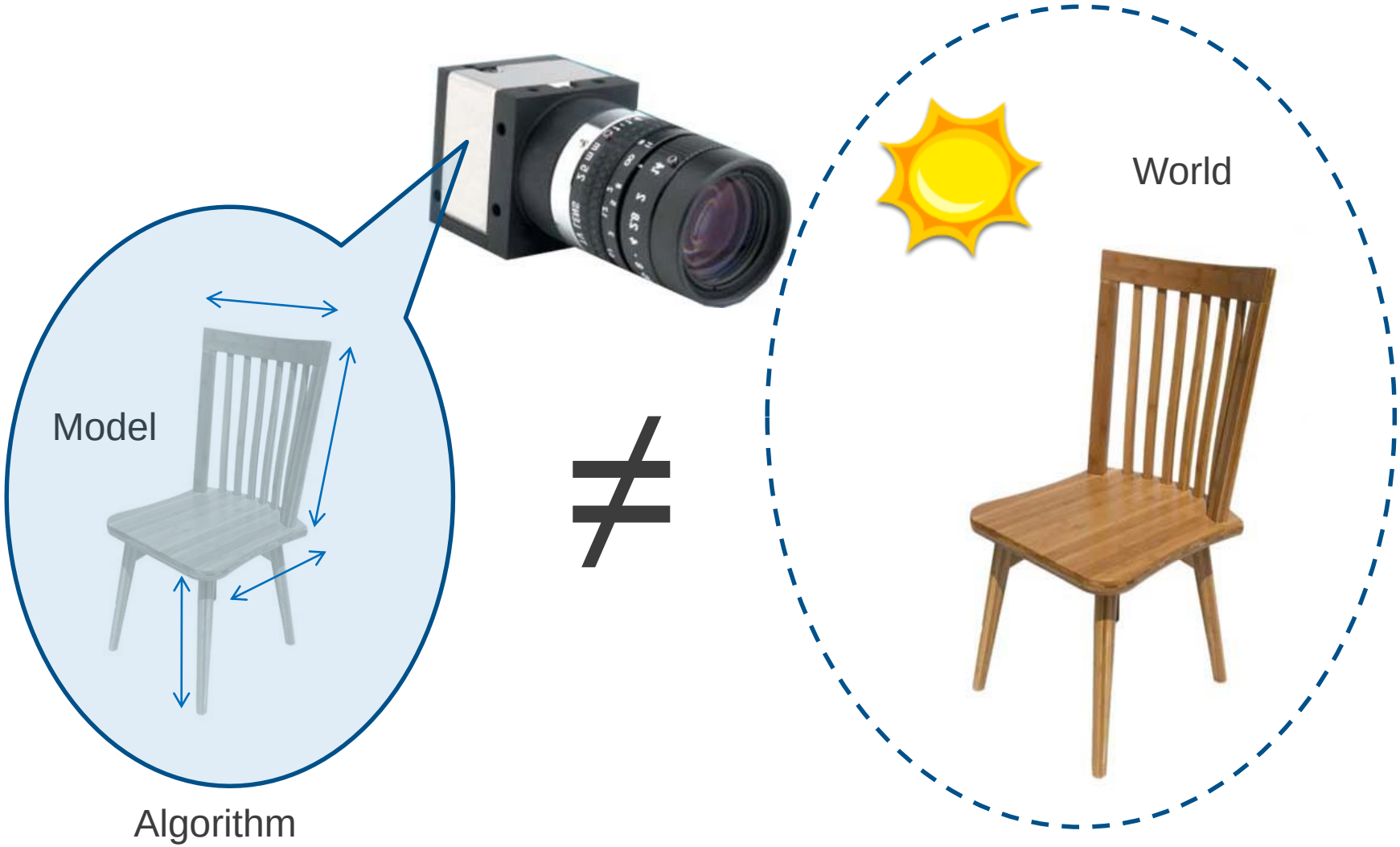
BIOSUISSE

naturaplan BIO

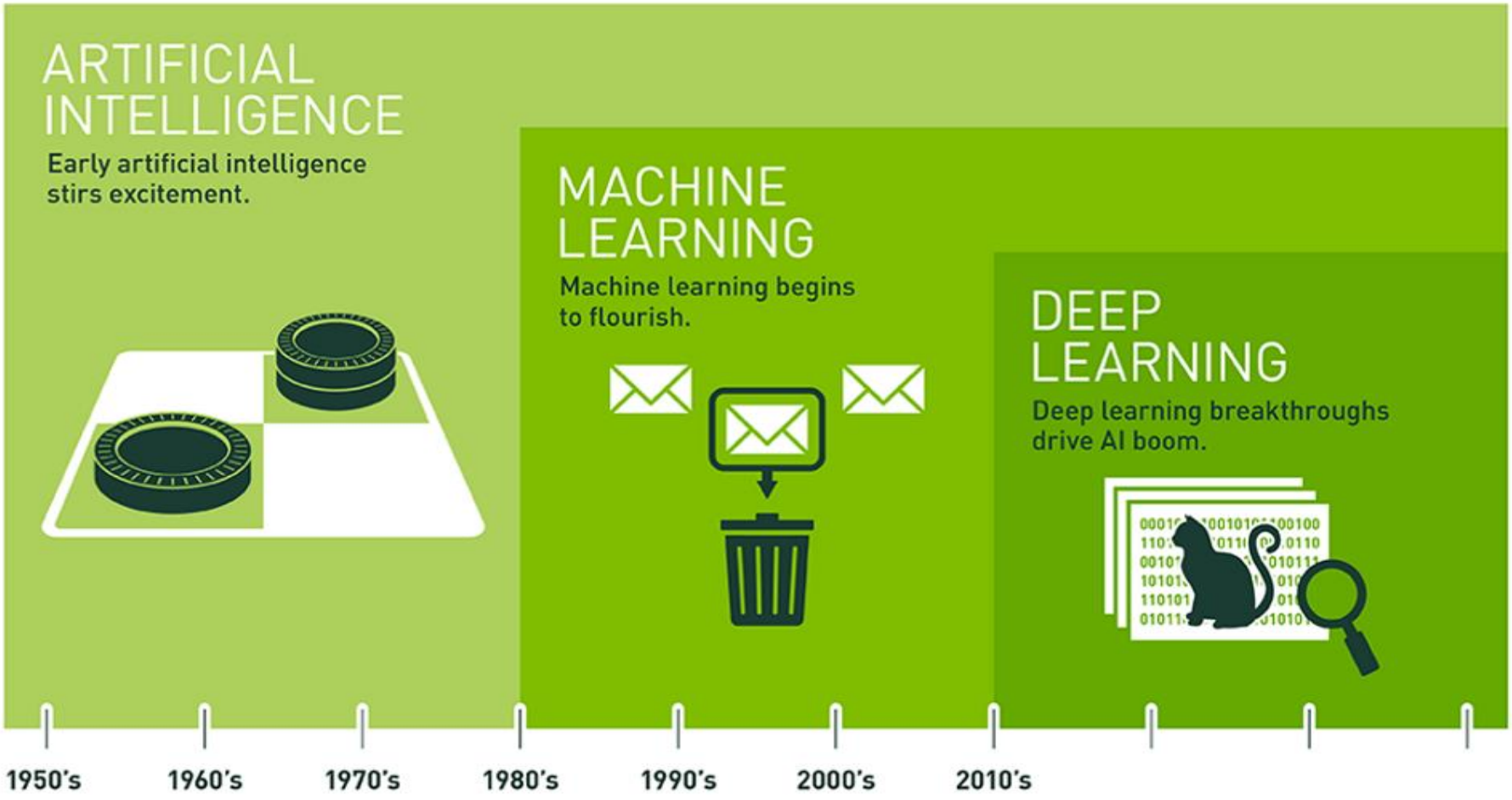
MIGROS BIO

Robotik in der Landwirtschaft

Wie funktioniert klassische Bildverarbeitung?



Begriffswirrwarr…



Machine Learning – Lernkategorien

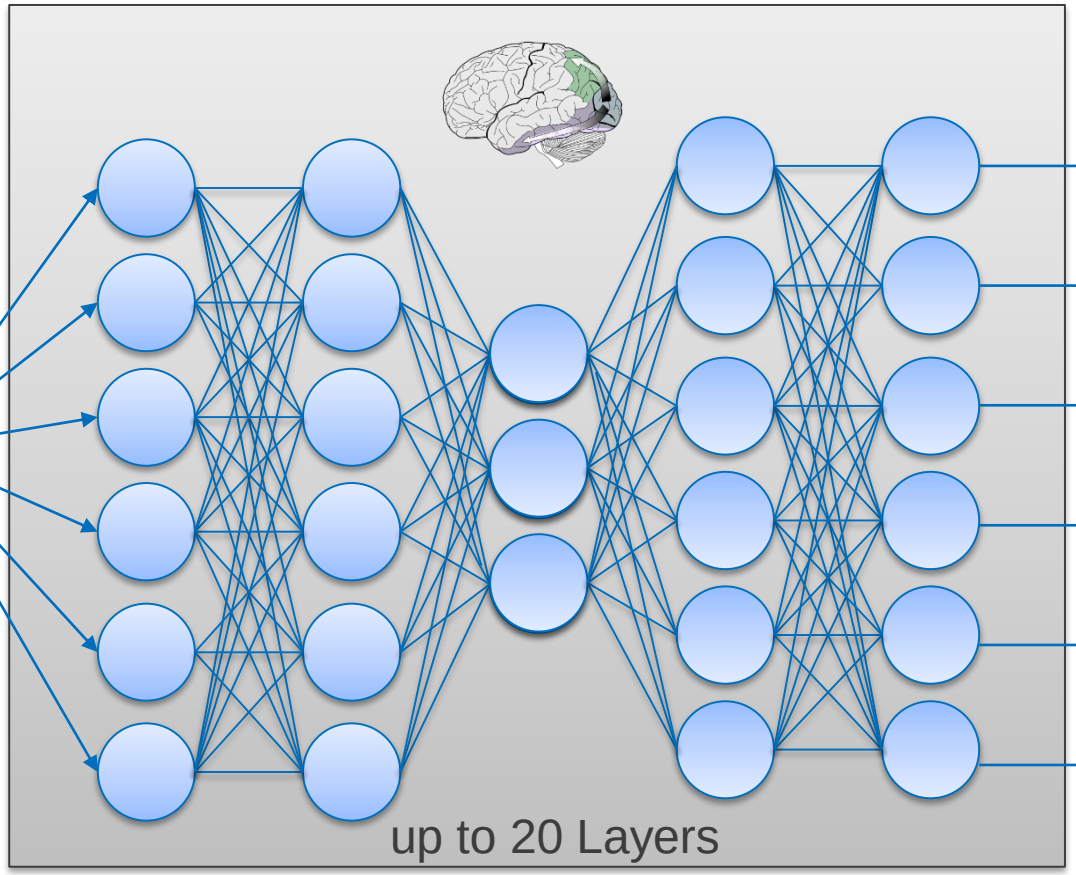
Supervised Learning

Reinforcement Learning

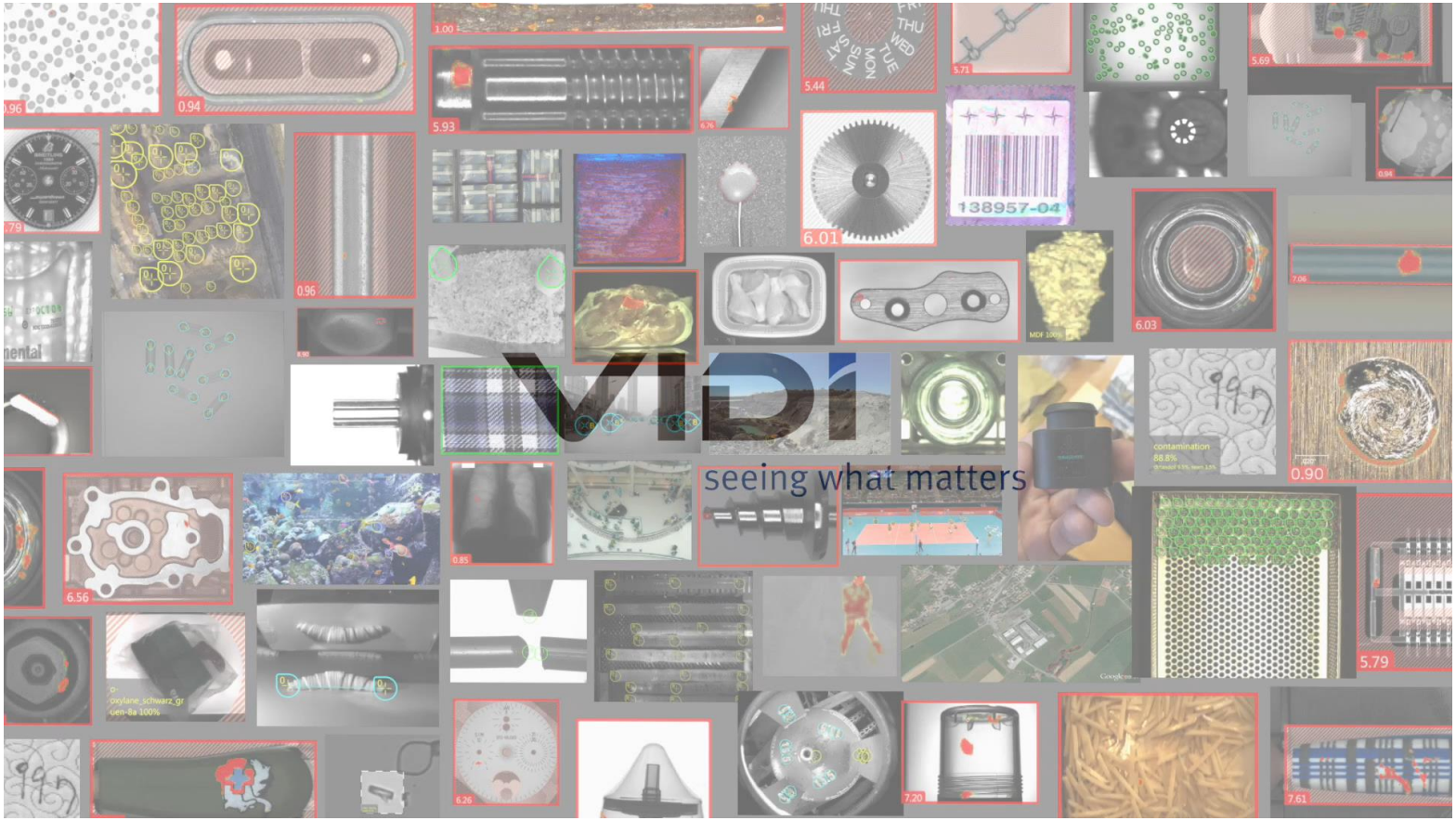
Unsupervised Learning

Wie funktioniert unser Hirn?

Künstliches Hirn



Deep Learning seit 2008

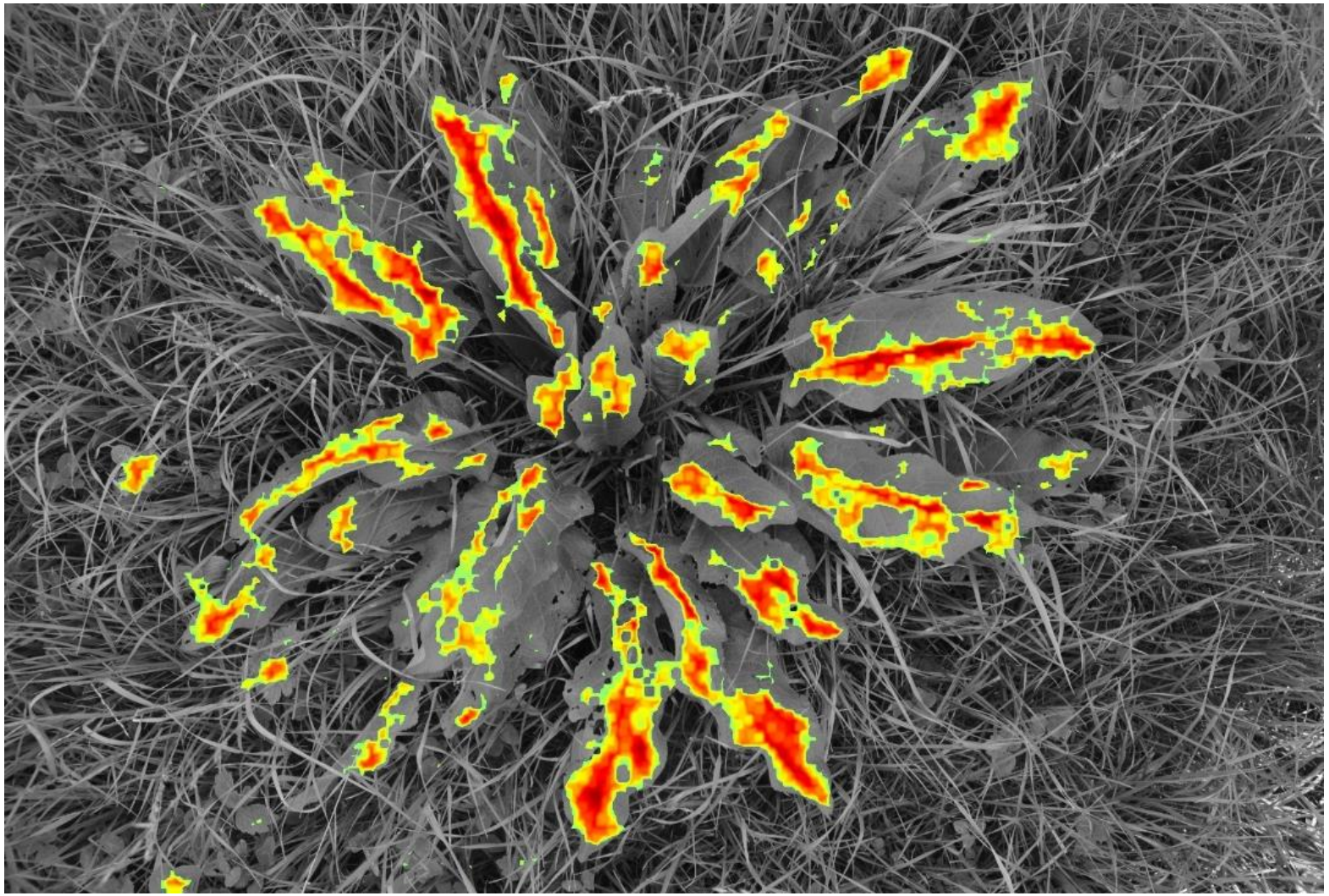


VIDI
seeing what matters

COGNEX

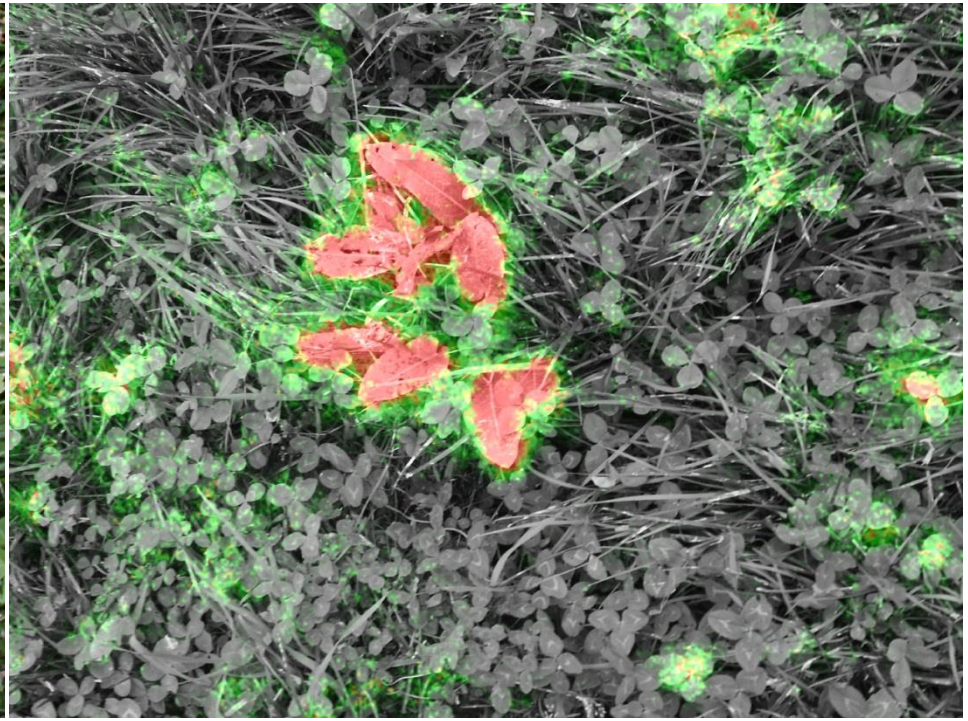
Ampfer, Blacke – Rumex

Ampfer, Blacke – Rumex

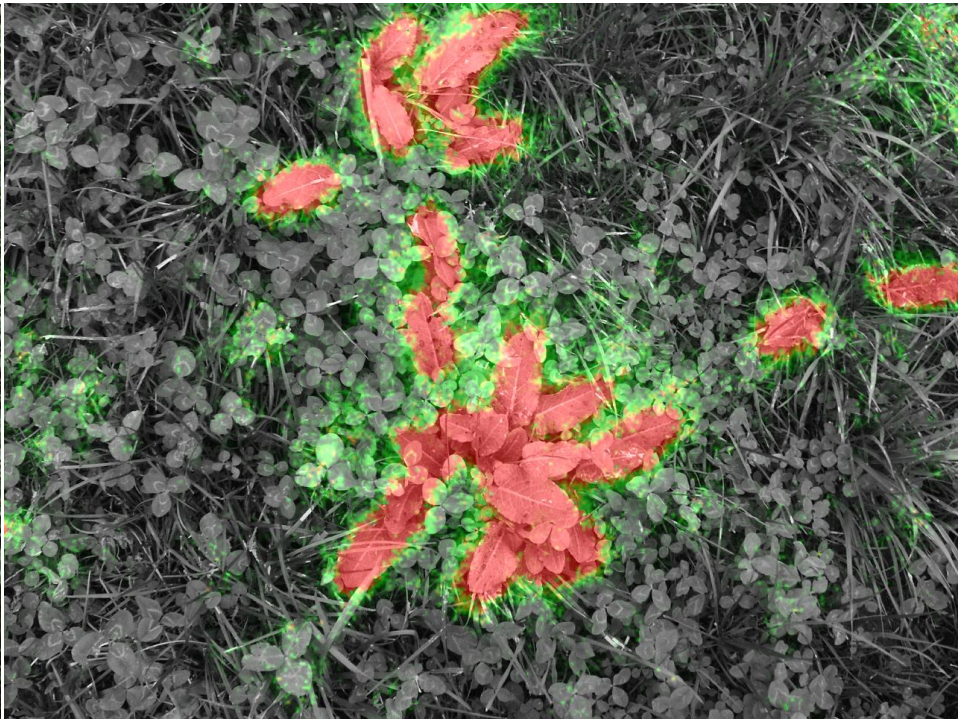


Ampfer, Blacke – Rumex

Ampfer, Blacke – Rumex



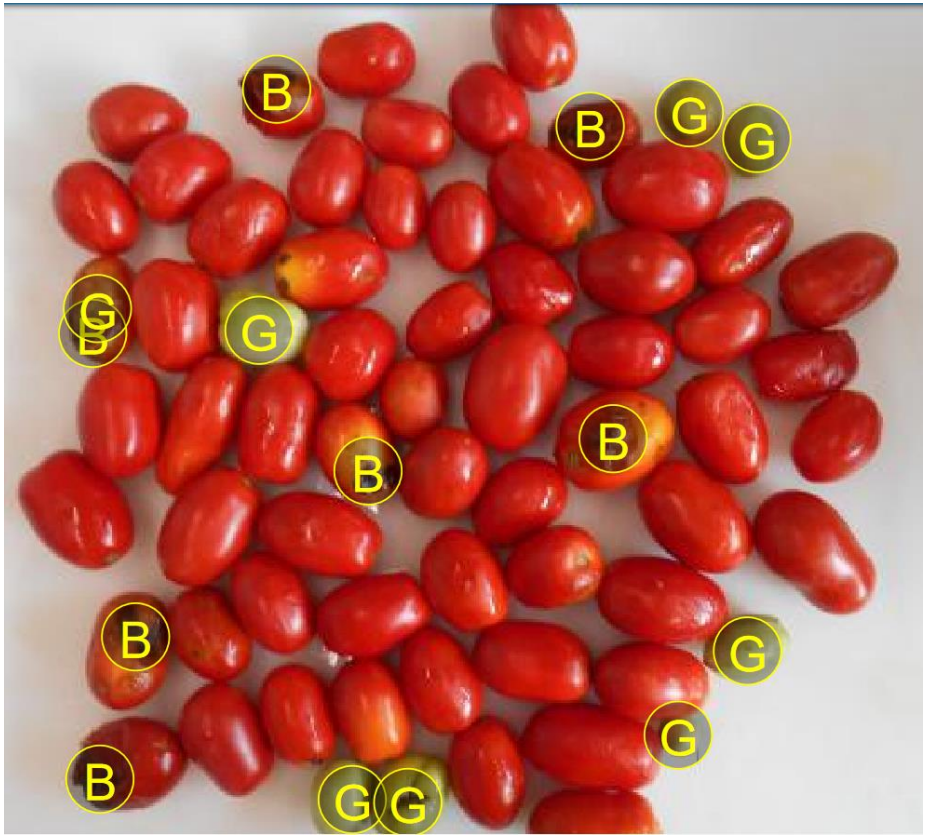
Ampfer, Blacke – Rumex



Tomaten

Sortiermaschine

Tomaten



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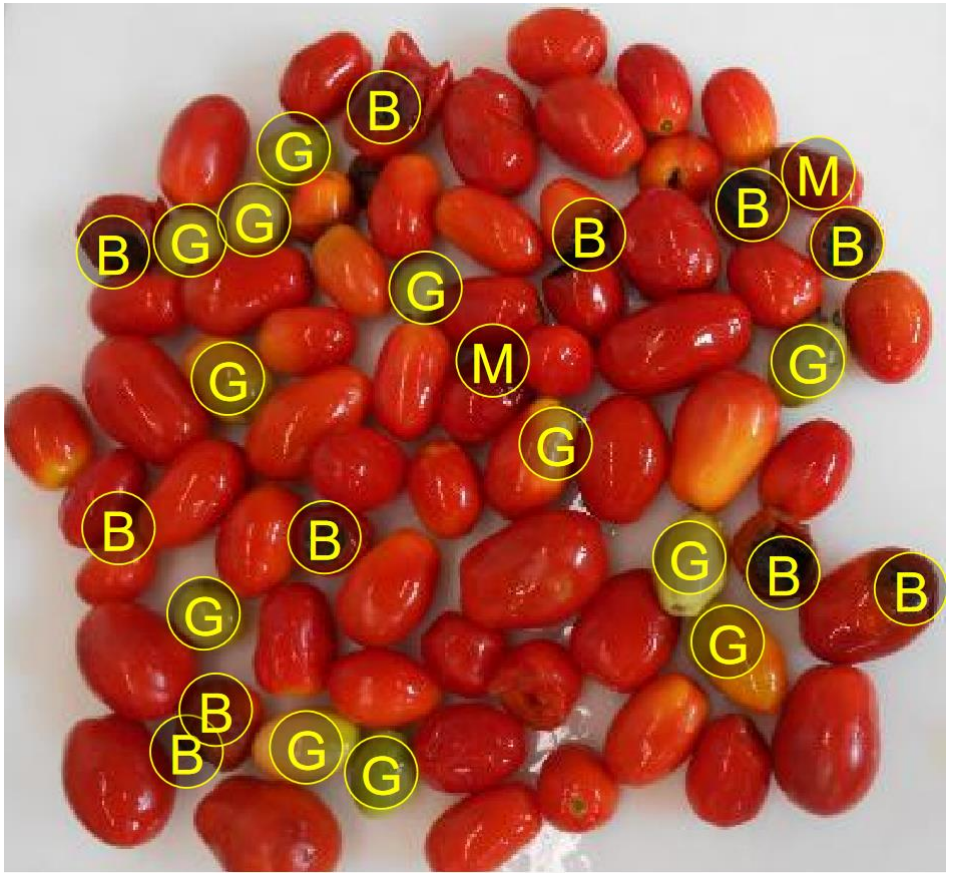
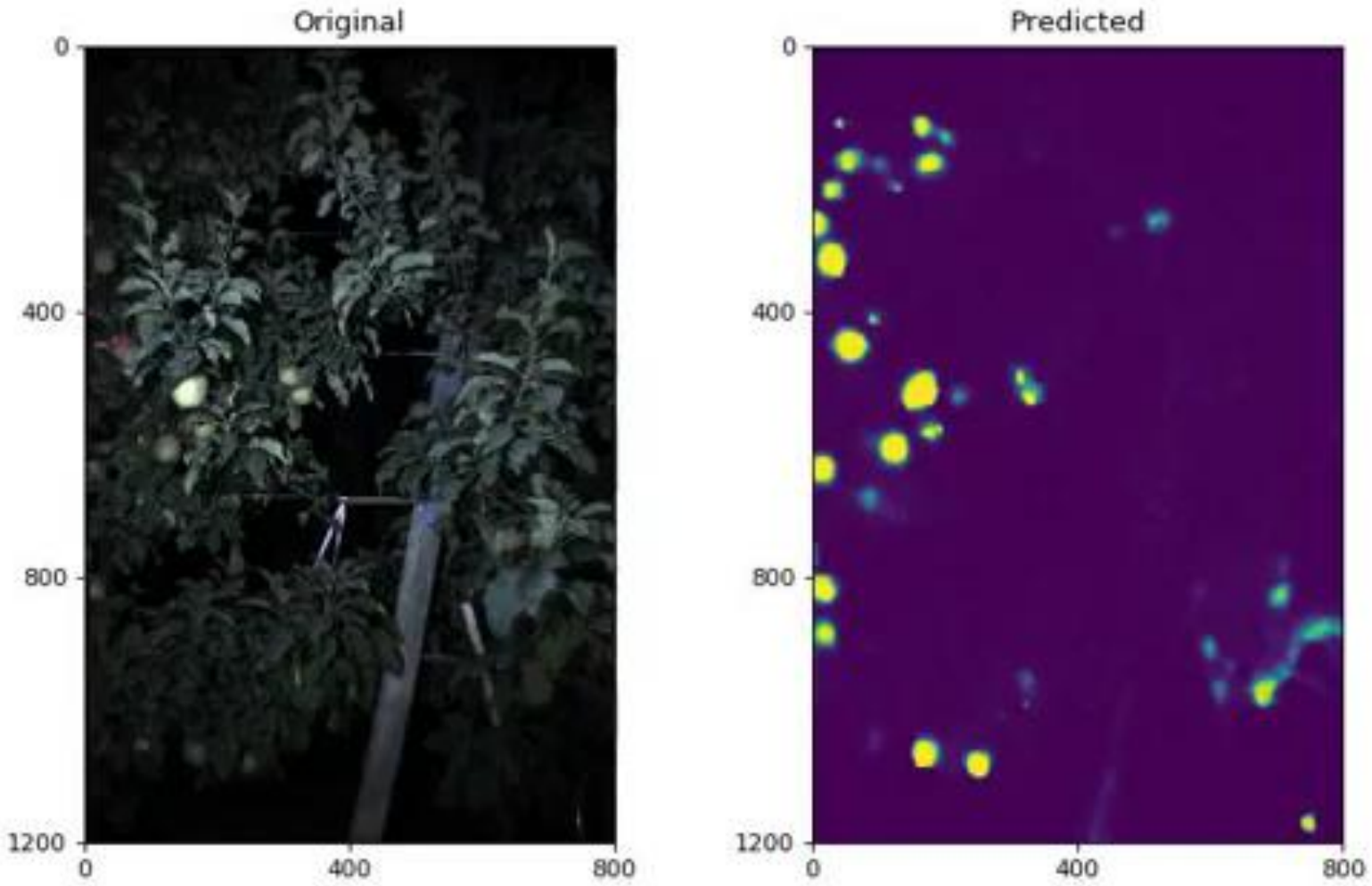
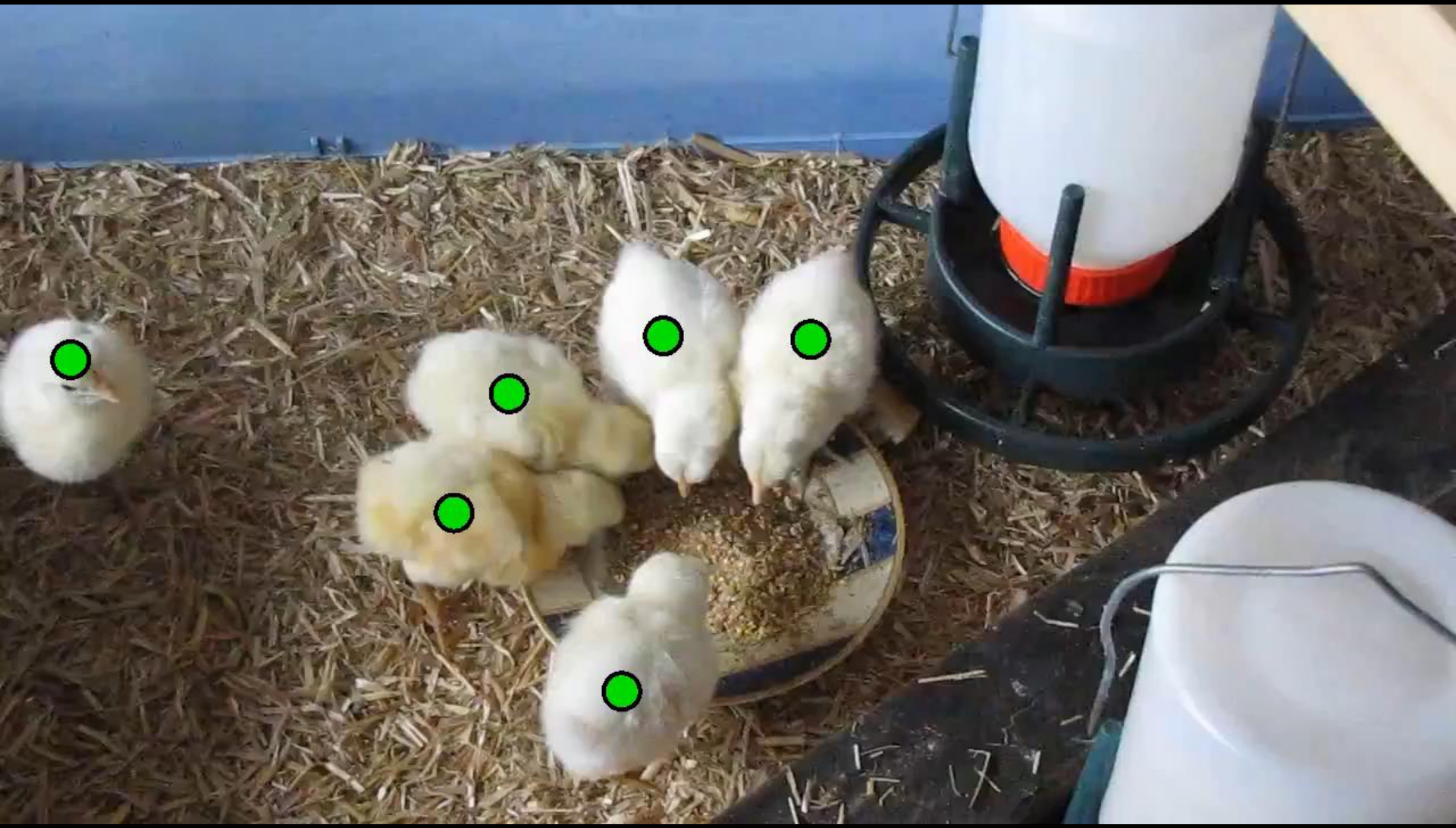


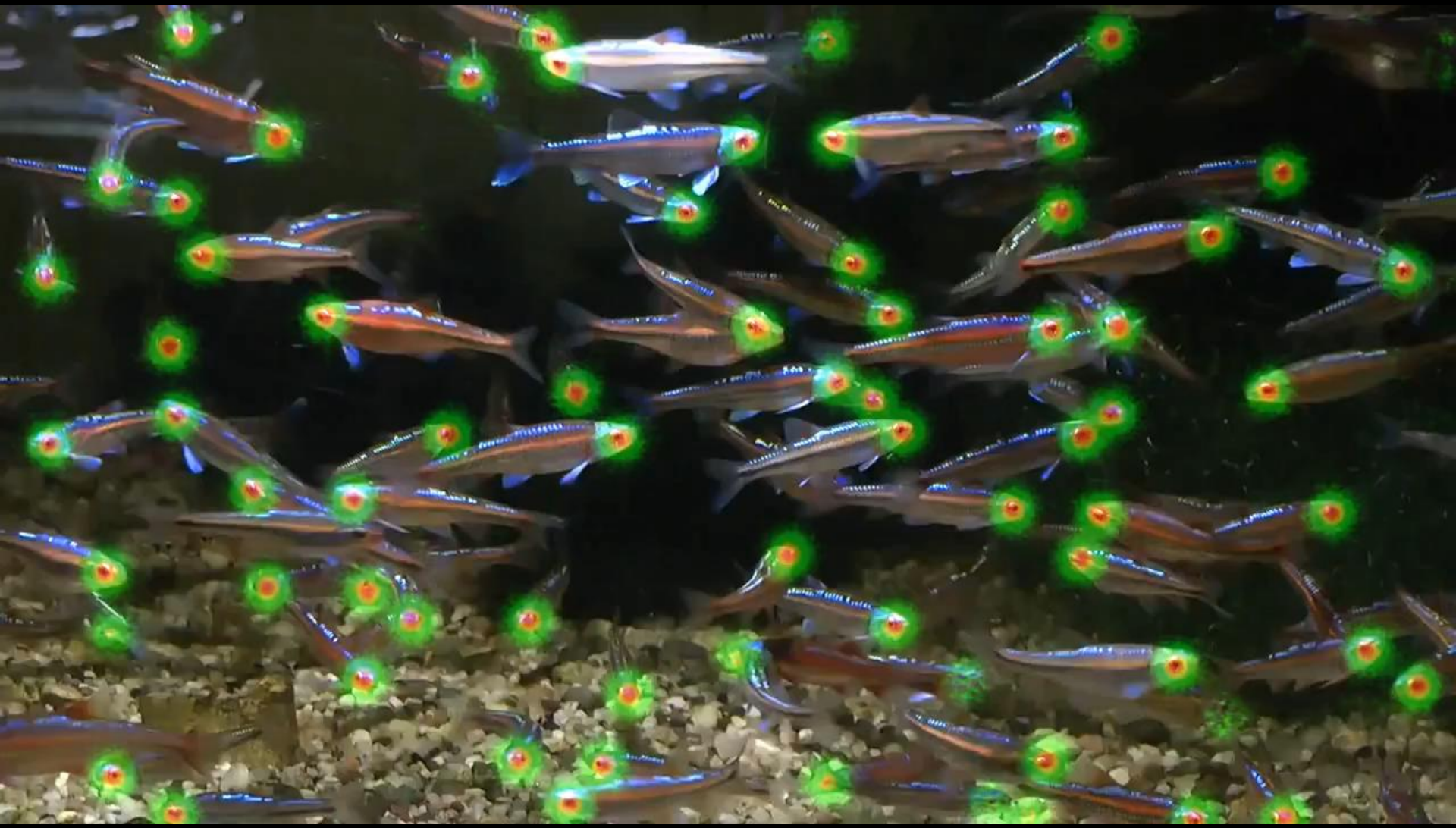
Apfelernte

Deep Learning für Apfelerkennung



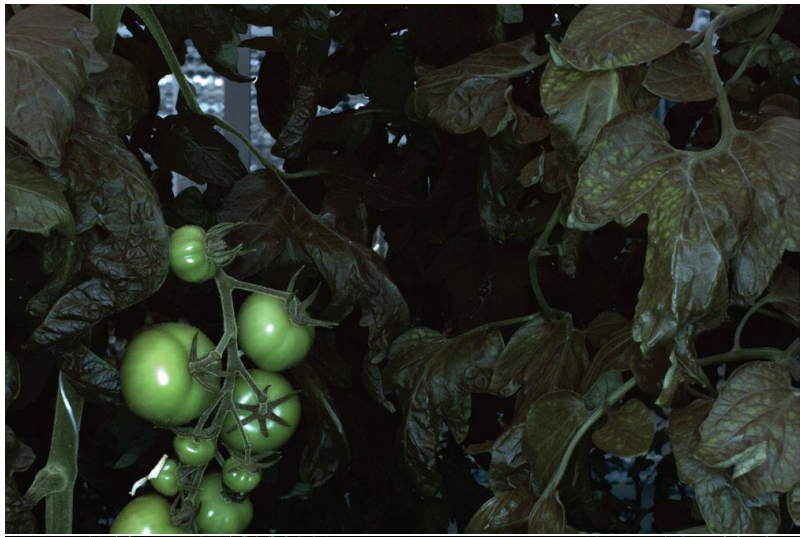


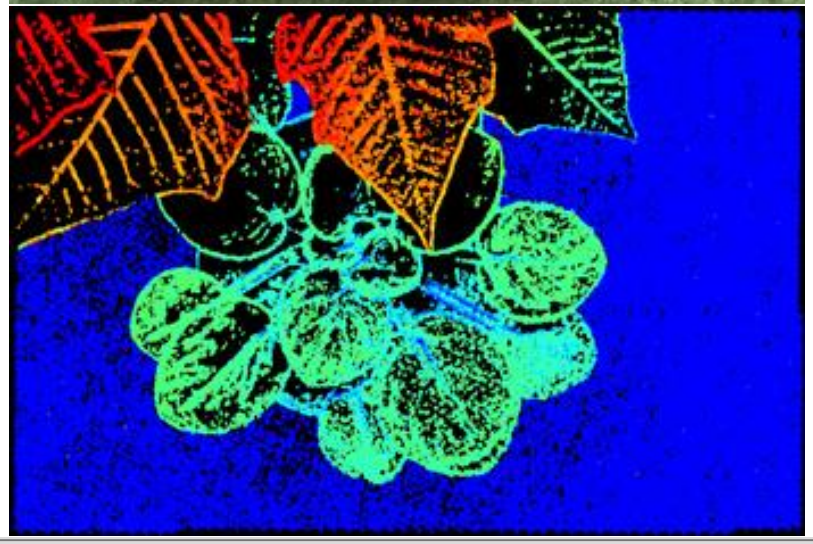
«Bio Tracker – Hühner»



«Bio Tracker – Fisch»

3D Lichtfeldtechnologie

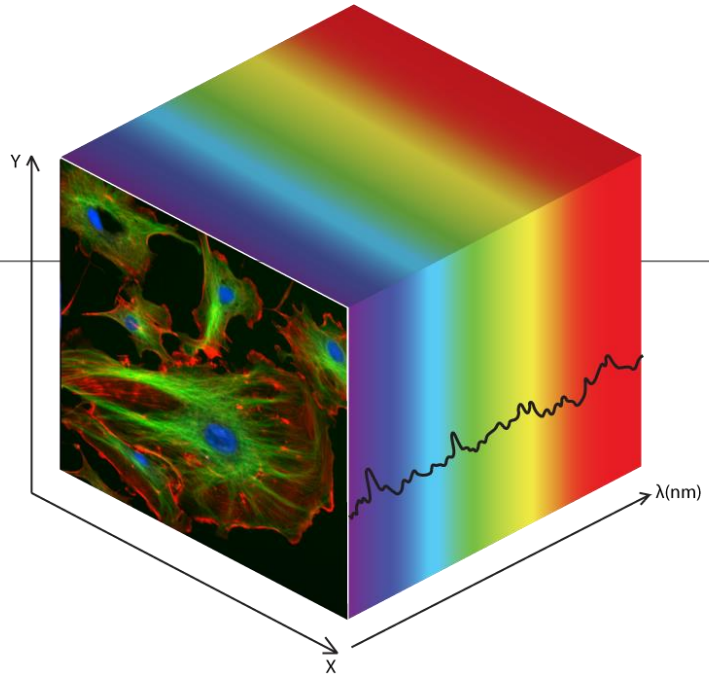


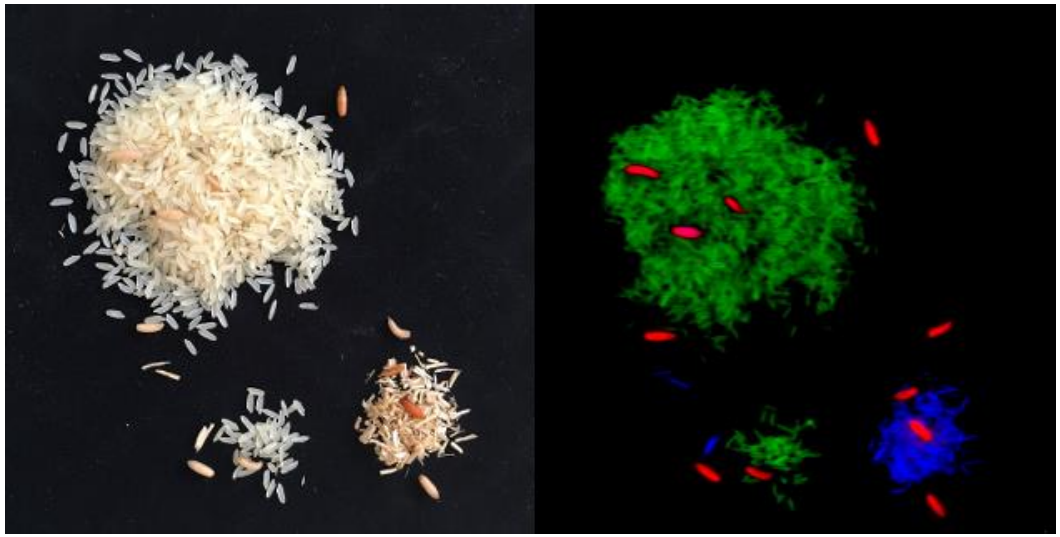


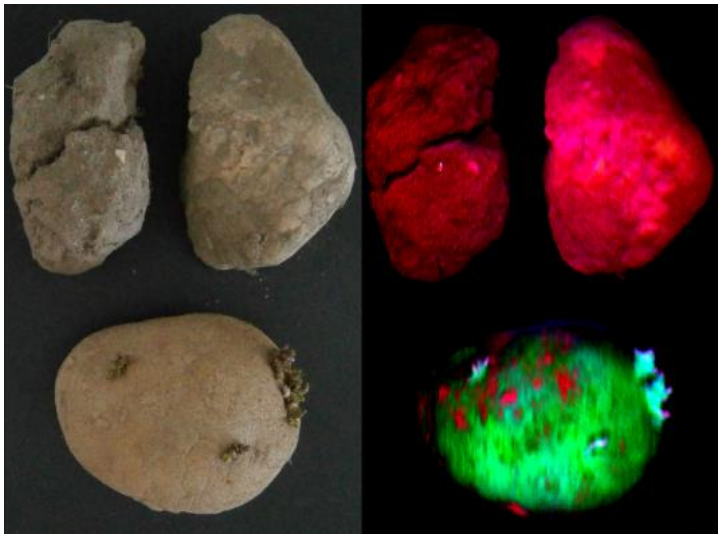
3D Lichtfeld Vision

Hyperspectral

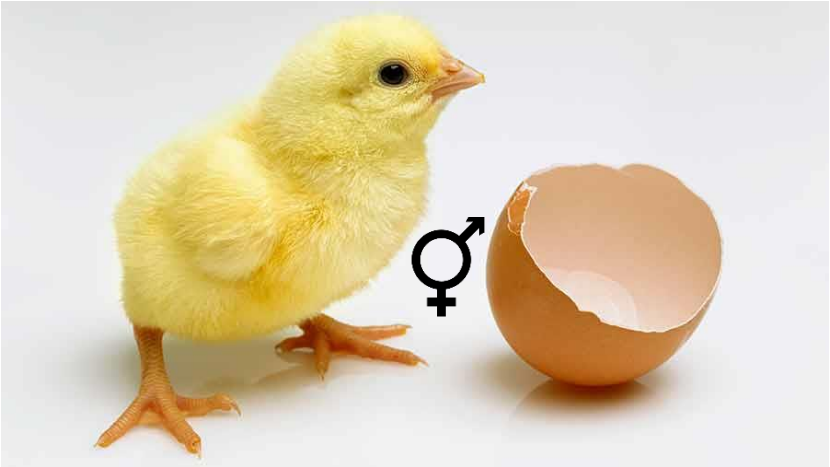
150 Bänder im Bereich
470 – 900nm (VNIR)
3650 x 2048px



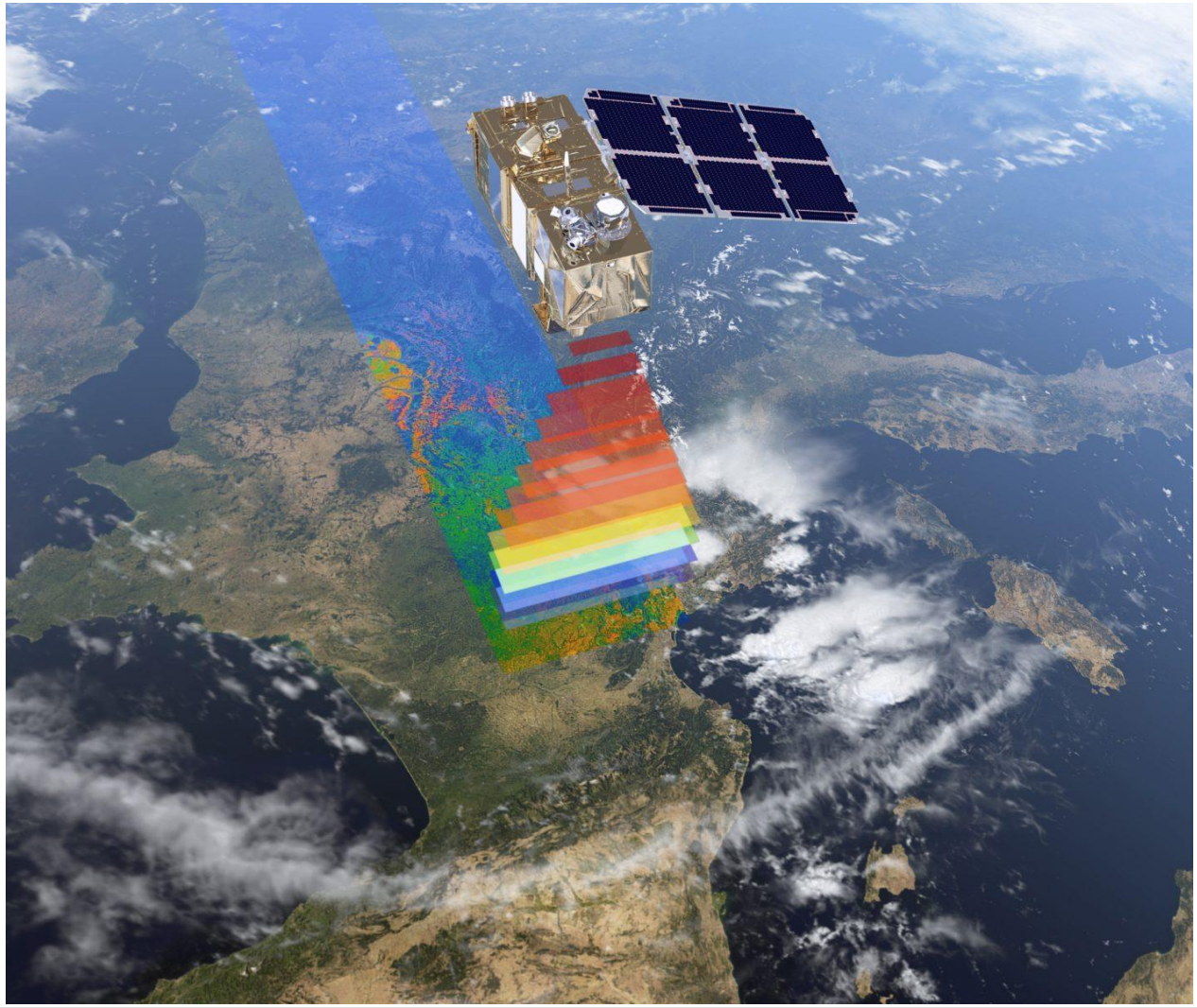




In-Ovo Sexing von Hühner



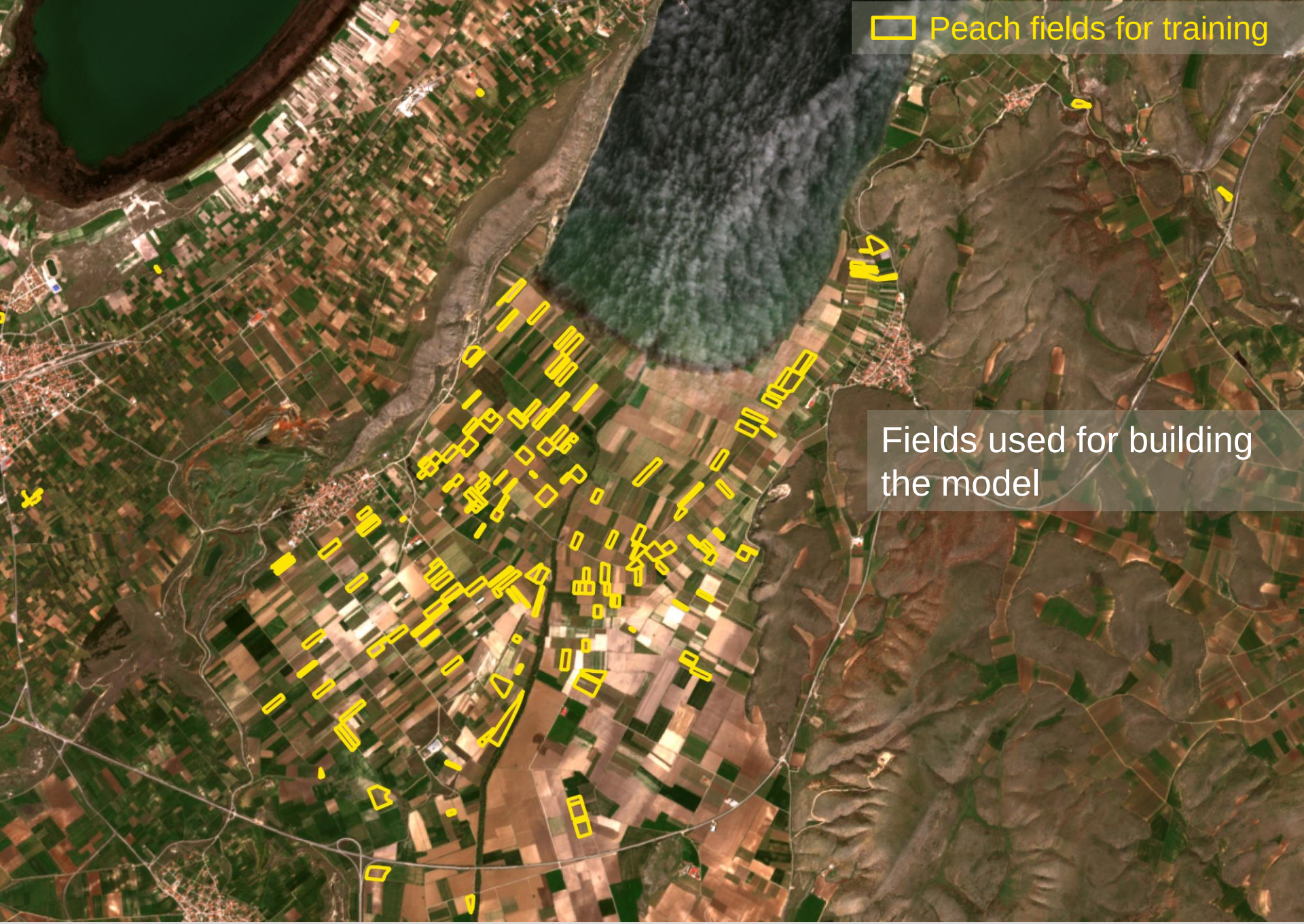
Erdbeobachtungssatelliten – Copernicus

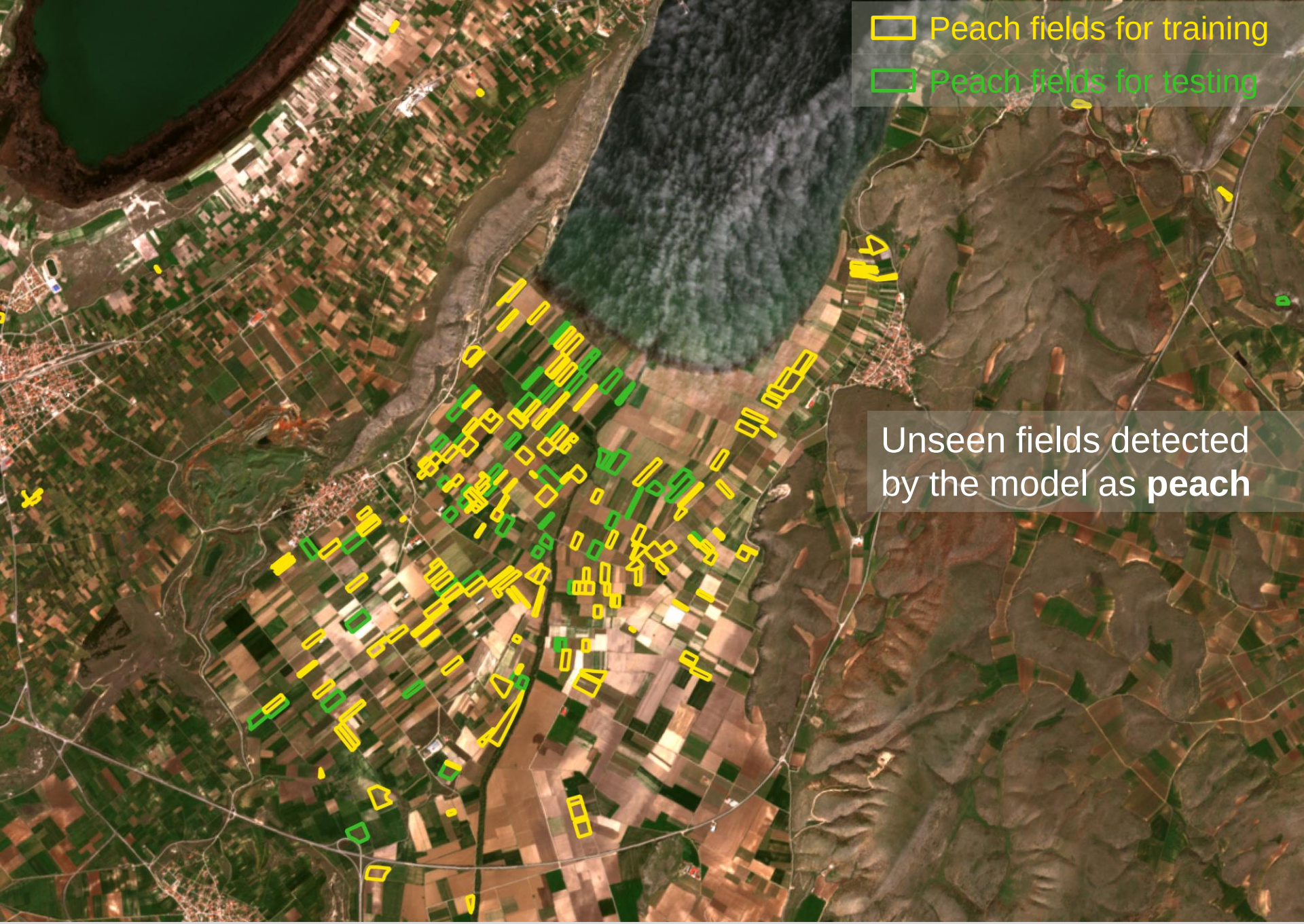


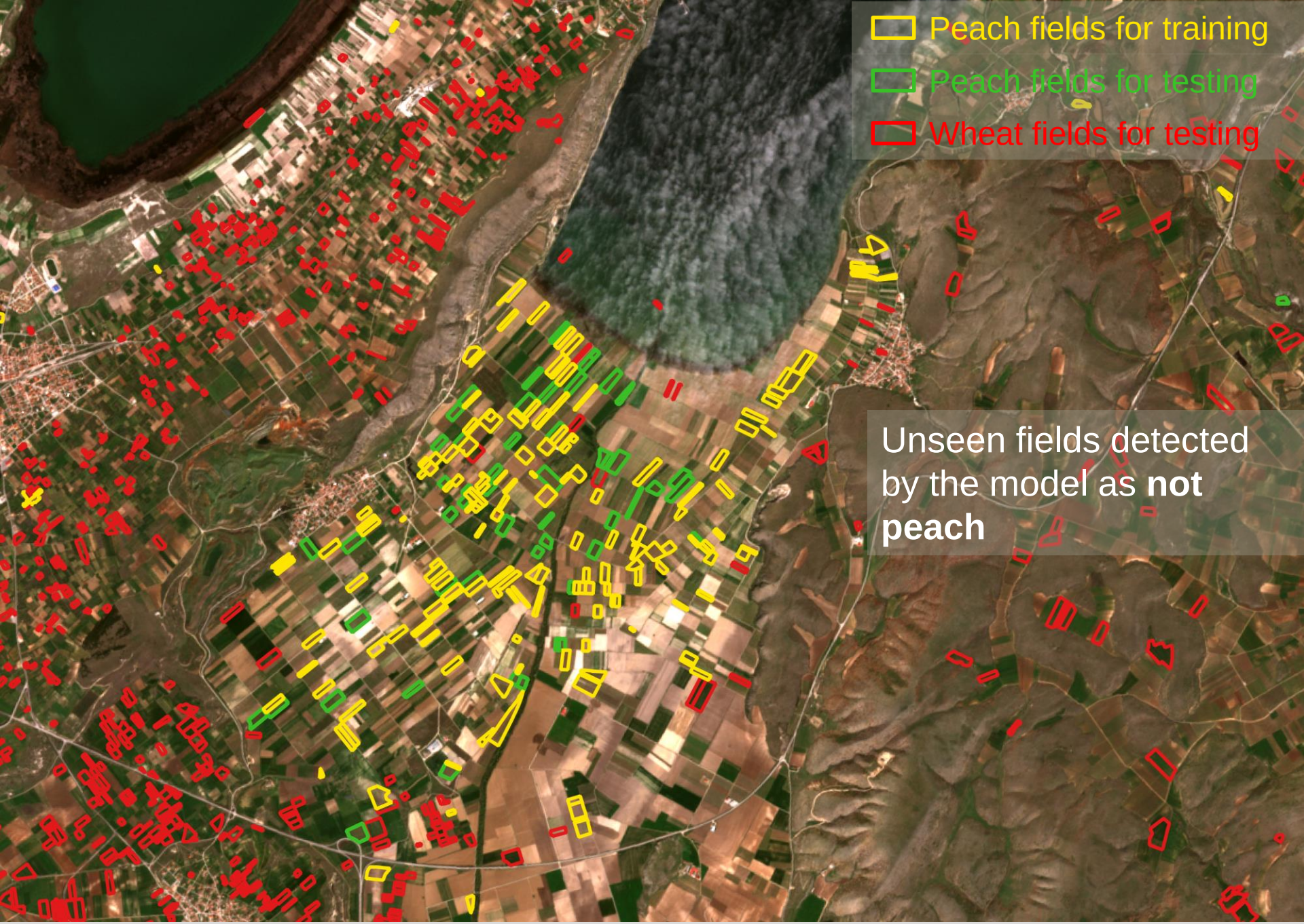
- 6 Satelliten operationell
- Sentinel-2 Auflösung: 10m
- Total 12 Spektralbänder
- Abdeckung alle 5 Tage

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732064


Image from Sentinel-2


Peach fields for training
Fields used for building the model


Peach fields for training
Peach fields for testing
Unseen fields detected by the model as **peach**


Peach fields for training
Peach fields for testing
Wheat fields for testing
Unseen fields detected by the model as **not peach**

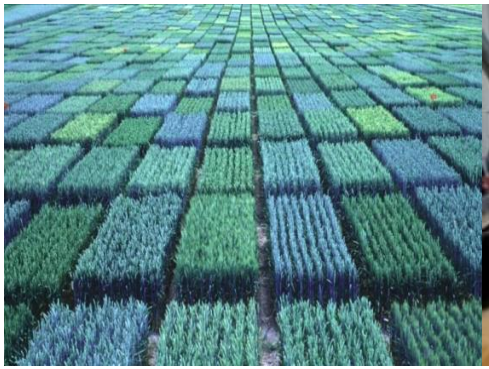
CTI-project (2016-2019) – IoT tool for precision farming

- Manage crops -> showcases: apple & cocoa
- Wireless sensors
- Cloud connection
- Machine Learning algorithms

-> Based on Swiss agronomic excellence

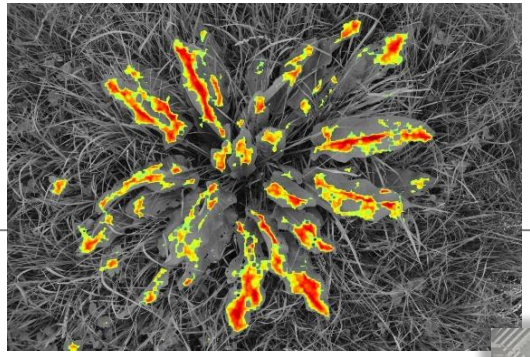
agrisensbox ENVEVE Agroscope csem Nestlé syngenta NETWORK inartis SWISSLIFESCIENCESCOMMUNITY

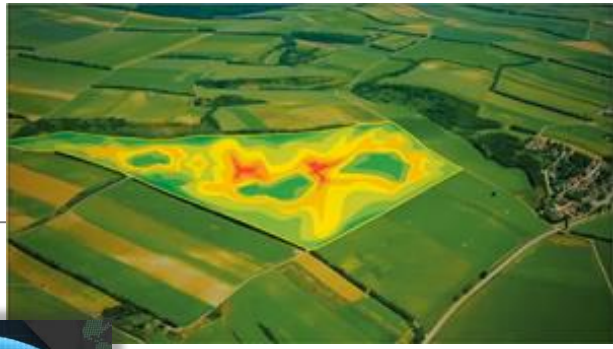
From Farm to Table value chain

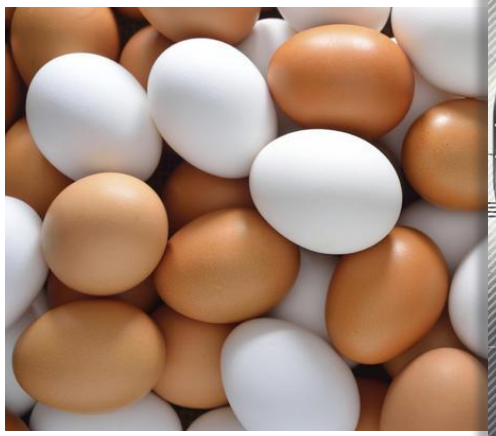


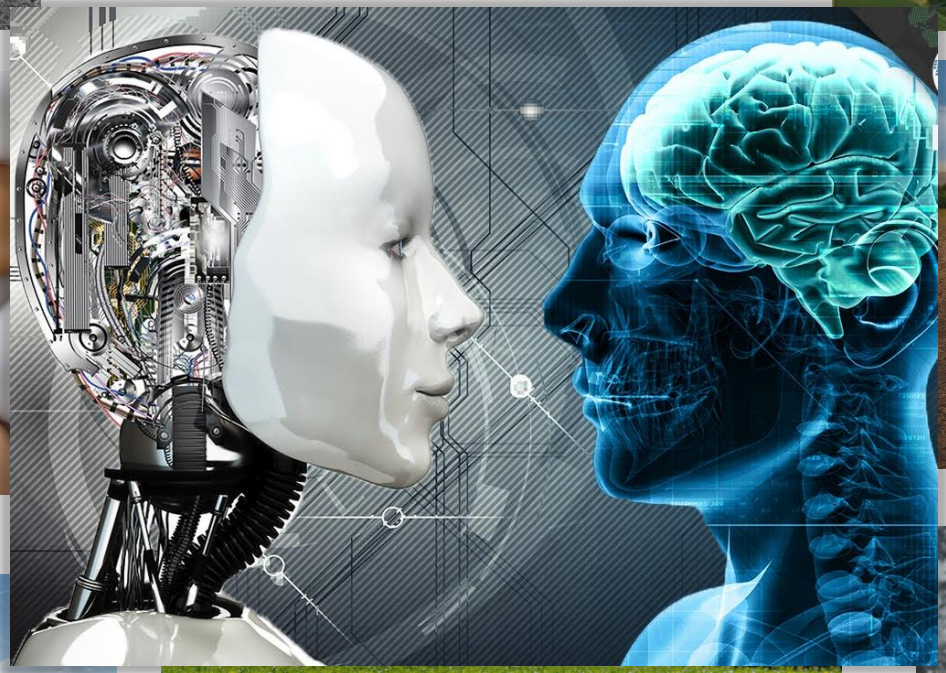

Inputs	Farmers - Production	Transport	Processing	Packaging	Distribution	Retail	Consumer
Seeds	Crops	Ship	Aggregators	Plastic	Distributors	Retailers	Metabolism
Pesticides	Meat	Air	Processors	Carton	Importers	Supermarkets	Personalized
AgBiotech	Dairy	Truck	Manufacturers	Glass	Exporters	Restaurant	Microbiota
Fertilizers	Fish		Beverages	Alu			
Water							

Machine Learning







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