

## Intelligence artificielle – révolution dans l’agriculture?

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20.031

**Journée annuelle de la communauté de la charte de  
digitalisation**

Online zoom

22 octobre 2020



**agridea**

ENTWICKLUNG DER LANDWIRTSCHAFT UND DES LÄNDLICHEN RAUMS  
DÉVELOPPEMENT DE L'AGRICULTURE ET DE L'ESPACE RURAL  
SVILUPPO DELL'AGRICOLTURA E DELLE AREE RURALI  
DEVELOPING AGRICULTURE AND RURAL AREAS





# Intelligence artificielle Révolution dans l'agriculture ?

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Story Inspired by David Fankhauser, Syntech GmbH

Big Players in AI

facebook



Microsoft

amazon

Google

Baidu 百度

IBM



NVIDIA



KÜNSTLICHE INTELLIGENZ

Wie Googles Mutterkonzern Alphabet mit Robotern die Landwirtschaft verändern will



Die Prototypen sollen bei ihren Streifzügen durch die Felder Daten von jeder Pflanze sammeln.  
© Mineral / Hersteller

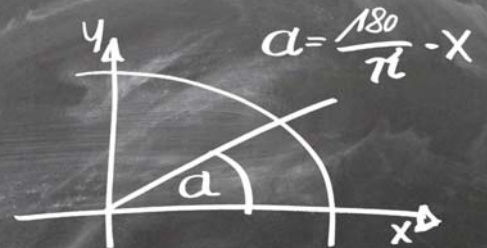
15.10.2020, 18:17 Uhr

Google hat Robotern die Landwirtschaft verändern könnte



Aujourd'hui – des ordinateurs intelligents ?

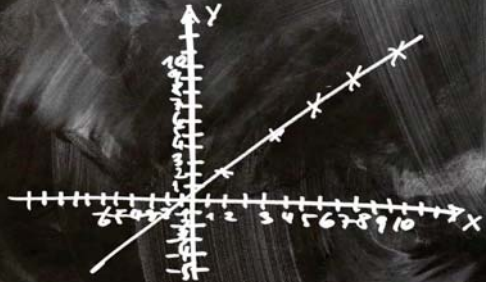
$$X_{1/2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



$$X^2 + px + q = 0$$

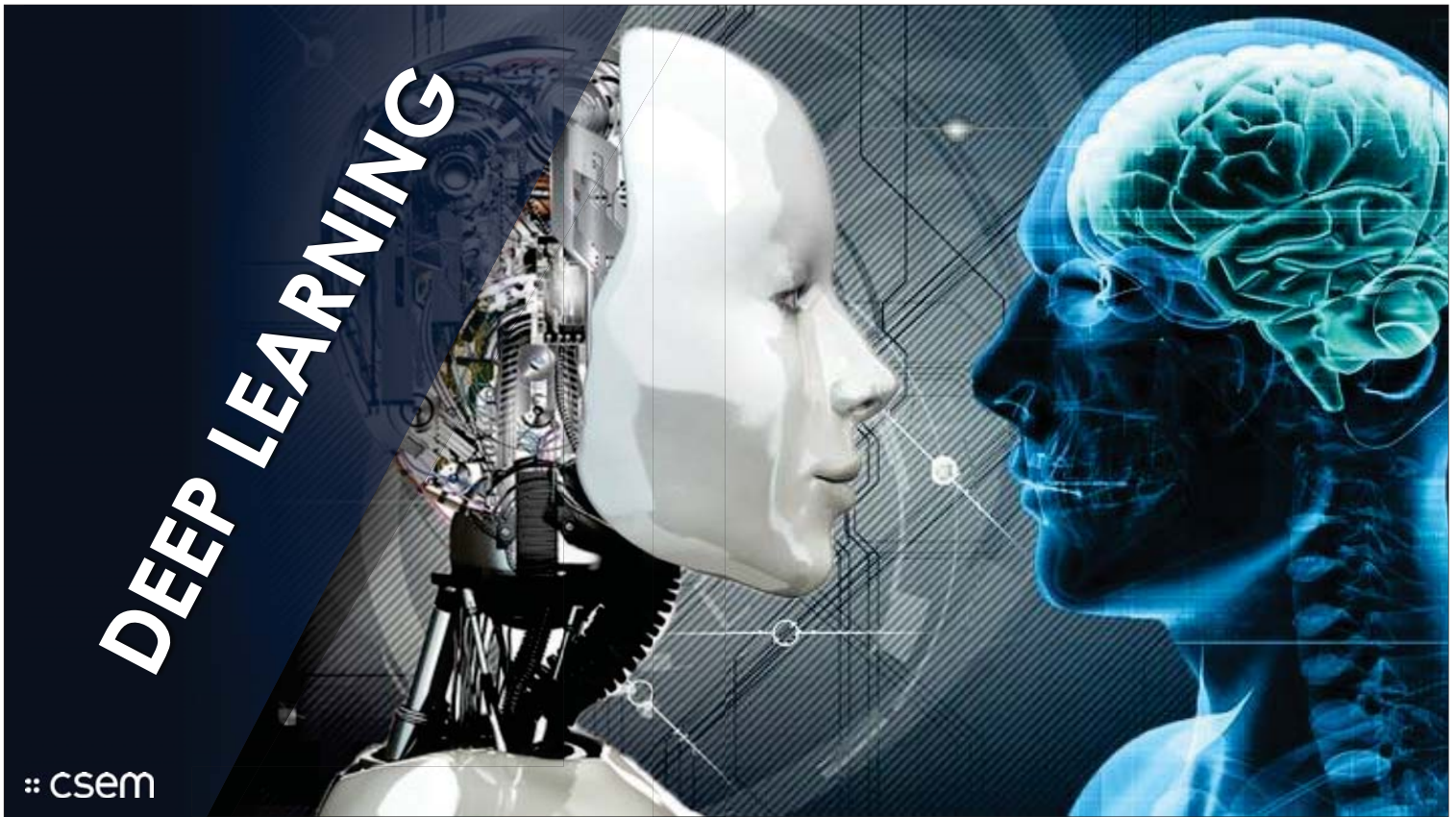


$$X_{1/2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$



$x = 6 - 2y$   
 $x + a = b$   
 $f(x) = \tan x$

$$f(x) = \sin x$$



Deep what...?

ARTIFICIAL INTELLIGENCE

MACHINE LEARNING

DEEP LEARNING



Moore's law



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## How Long Until Computers Have the Same Power As the Human Brain?

**1940**

1

calc/second

Mother Jones

**Computing power doubles every 18 months.**

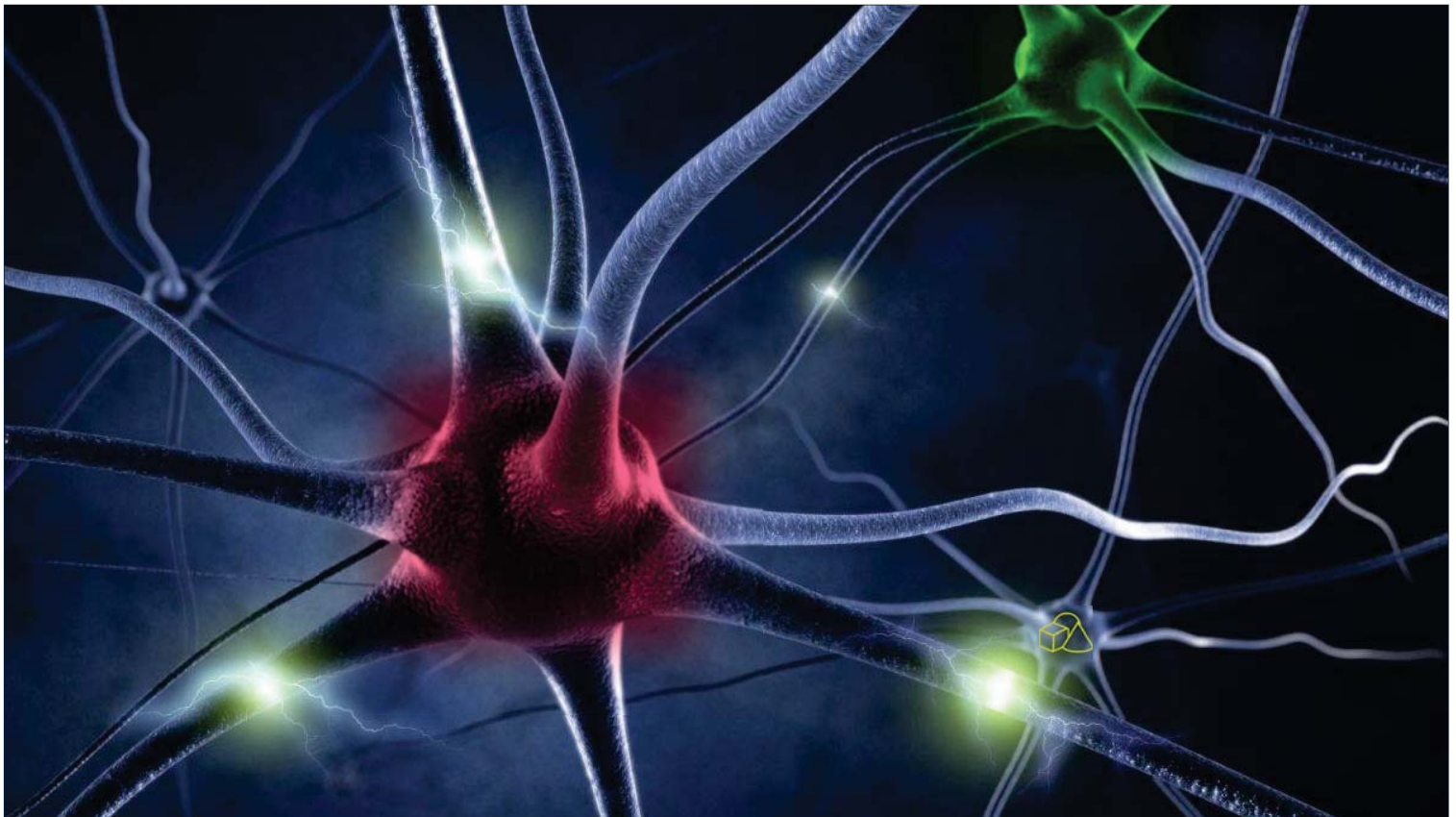
Mother Jones



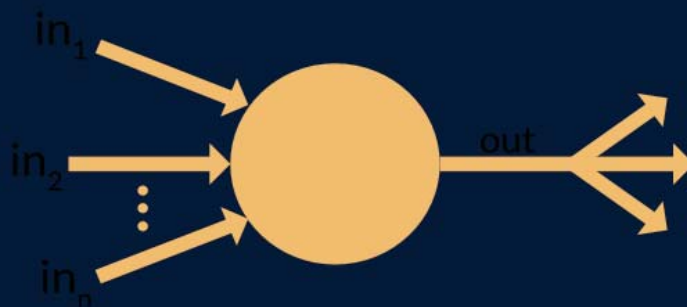
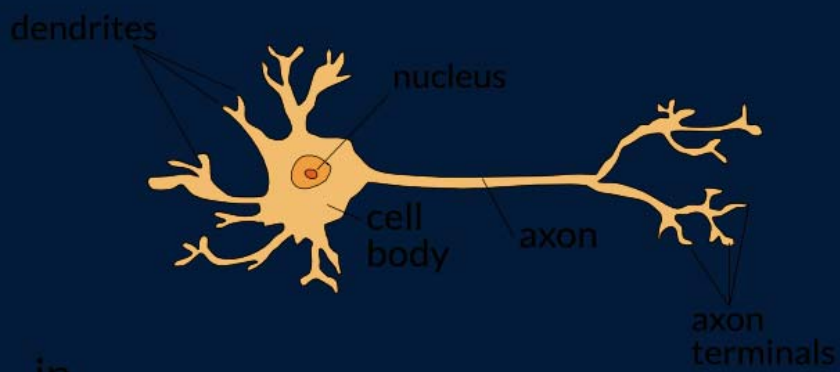




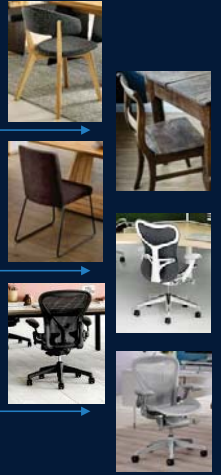
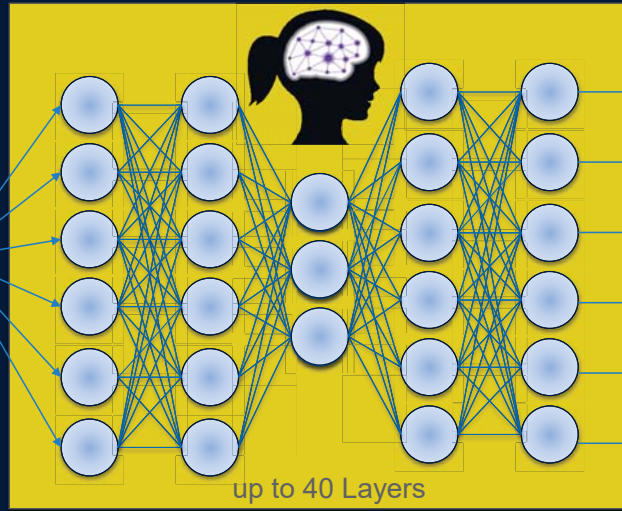
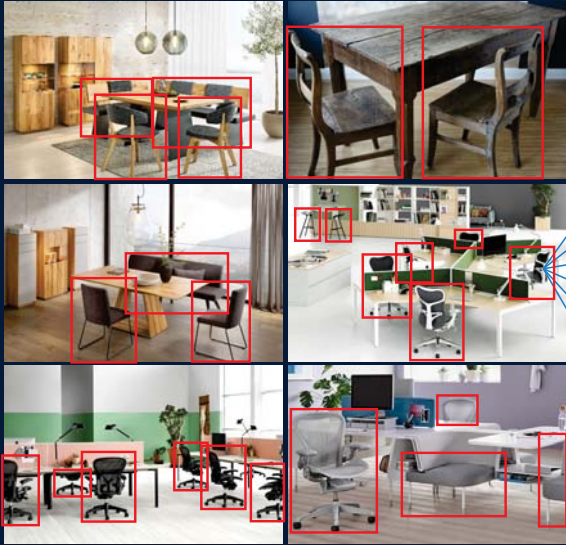




Inspiré de la nature



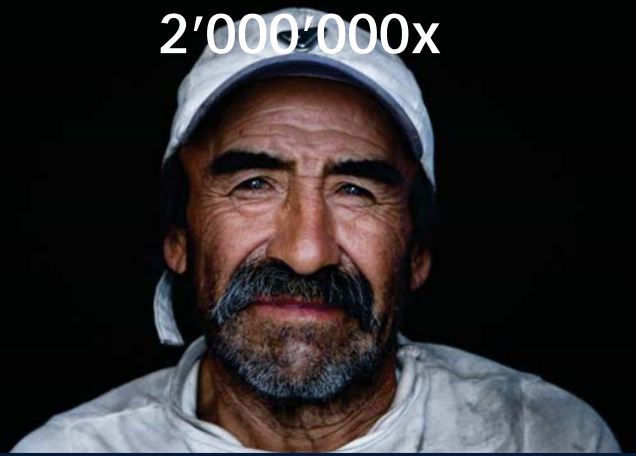
# Cerveau artificiel



# Deep Learning

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# Nature



# Embedded AI computer



- ✓ Nvidia AGX Xavier
- ✓ 32 TFLOPs ( $10^{12}$ )
- ✓ 10W



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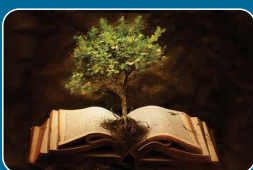
## Comment apprend un humain ?



Supervised Learning



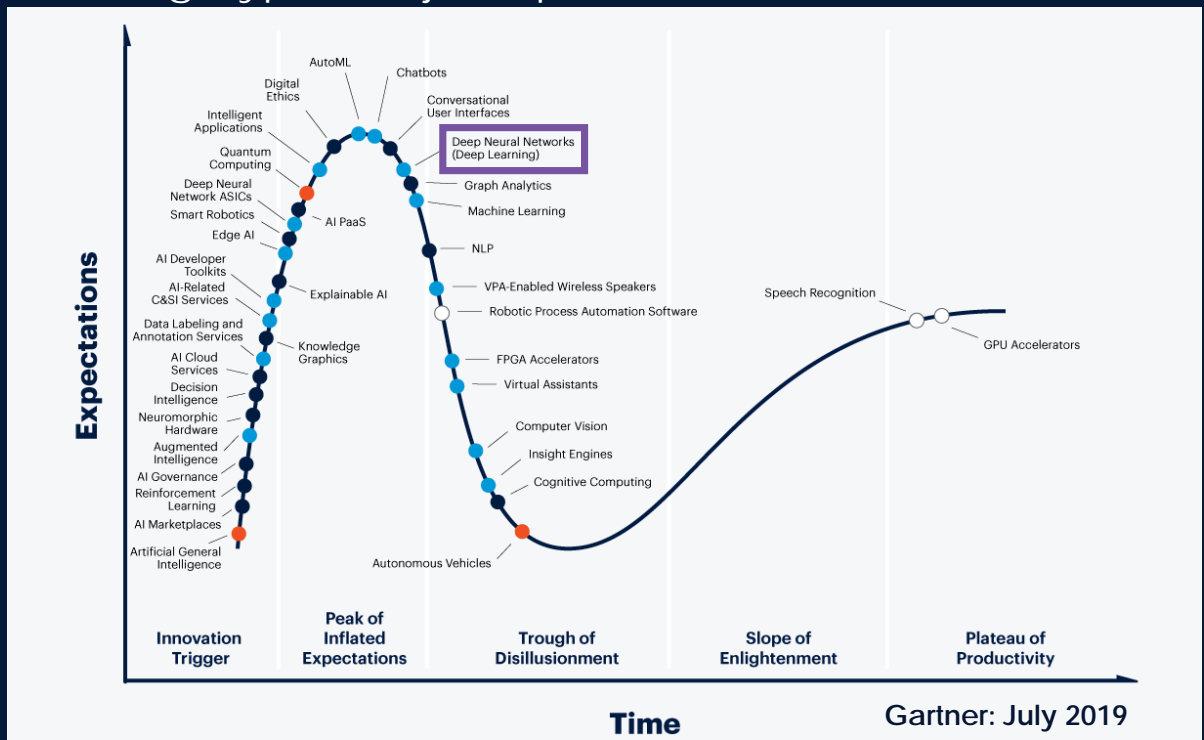
Reinforcement Learning



Unsupervised Learning

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# Deep Learning Hype – déjà dépassé...



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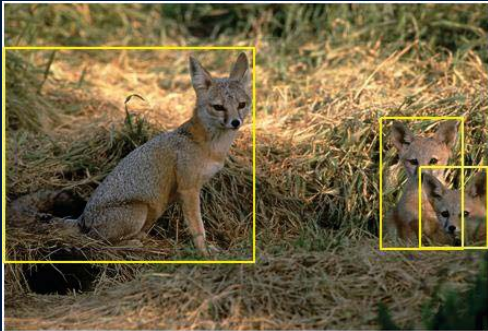
Human-Parity

2018 – compréhension  
du texte

2017 – reconnaissance  
linguistique

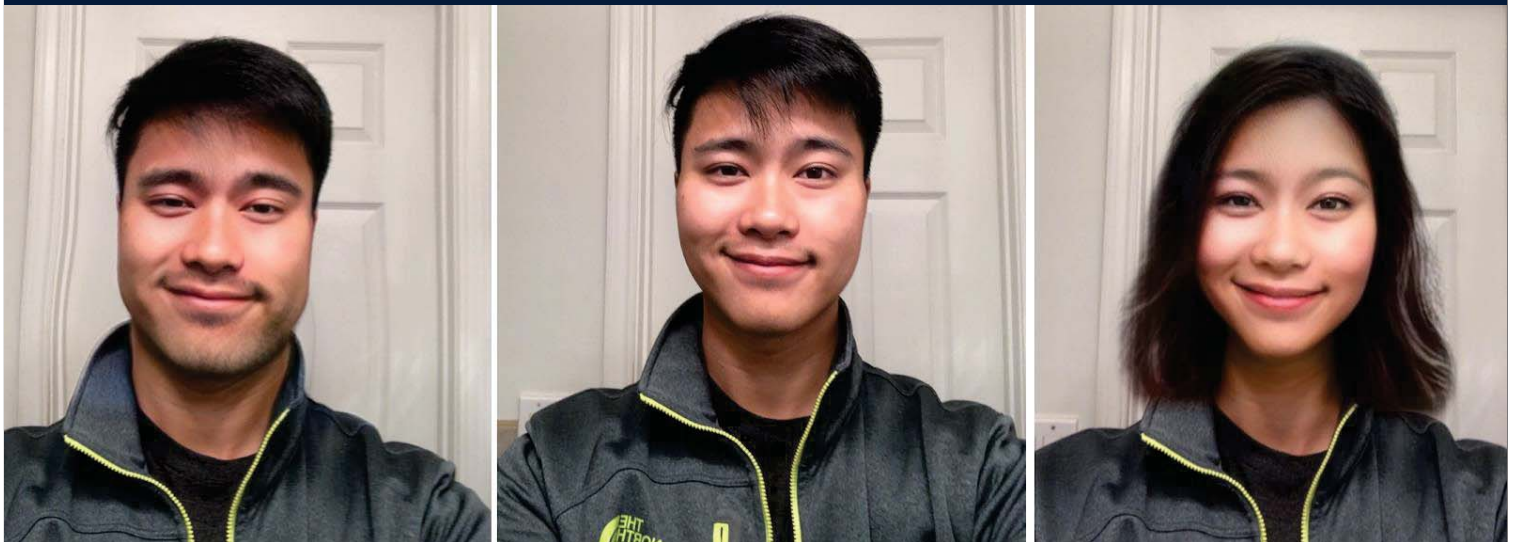
SQuAD2.0  
The Stanford Question Answering Dataset

2016 – reconnaissance  
d'images



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Snapchat – changement de sexe



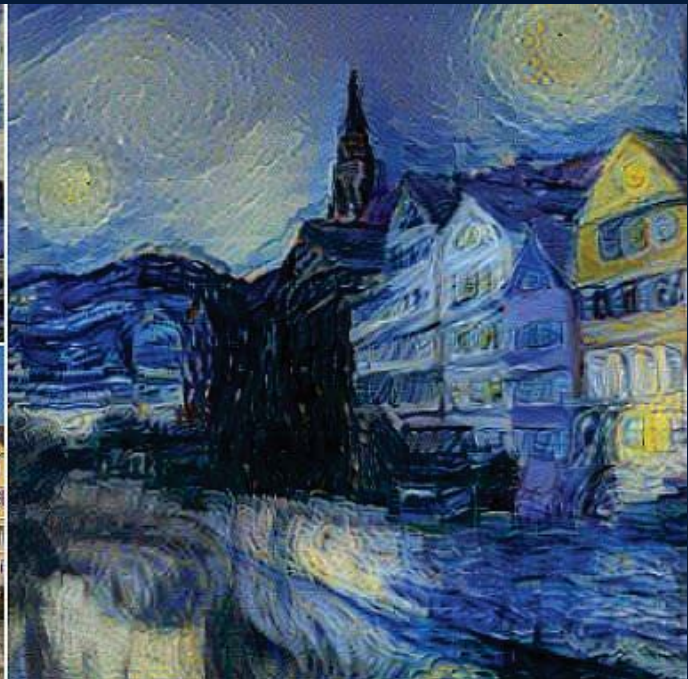
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## Imagination visuelle – éléphant



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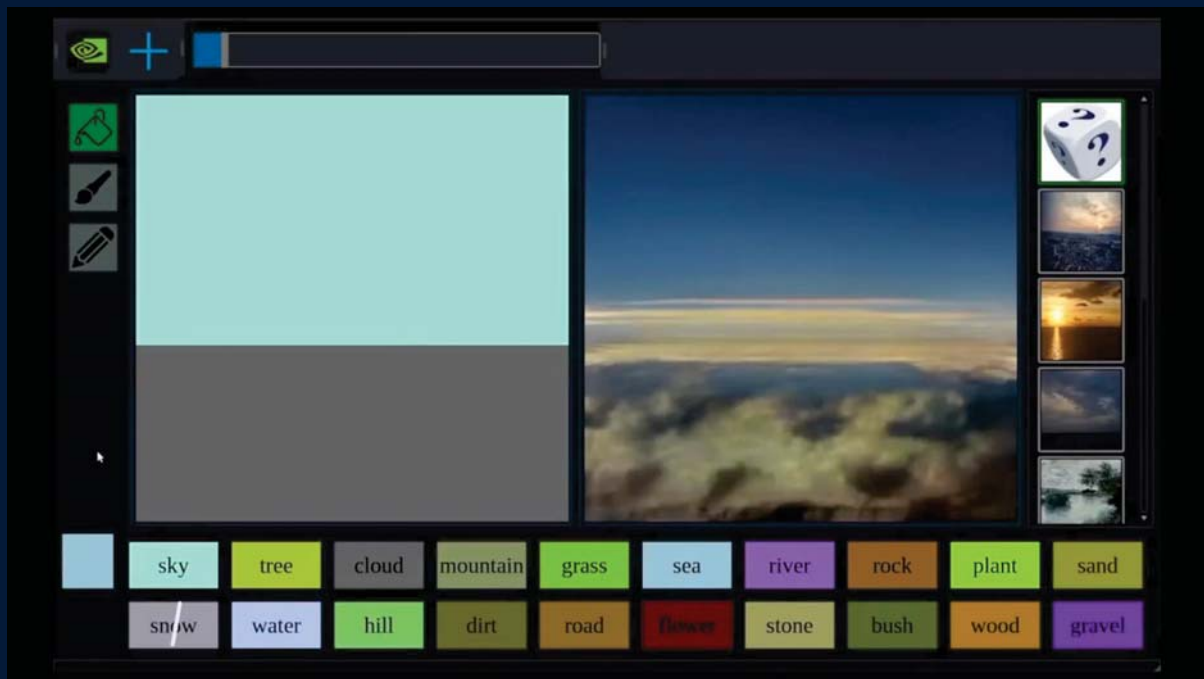
## Vincent van Gogh?



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## Les rêves appliqués



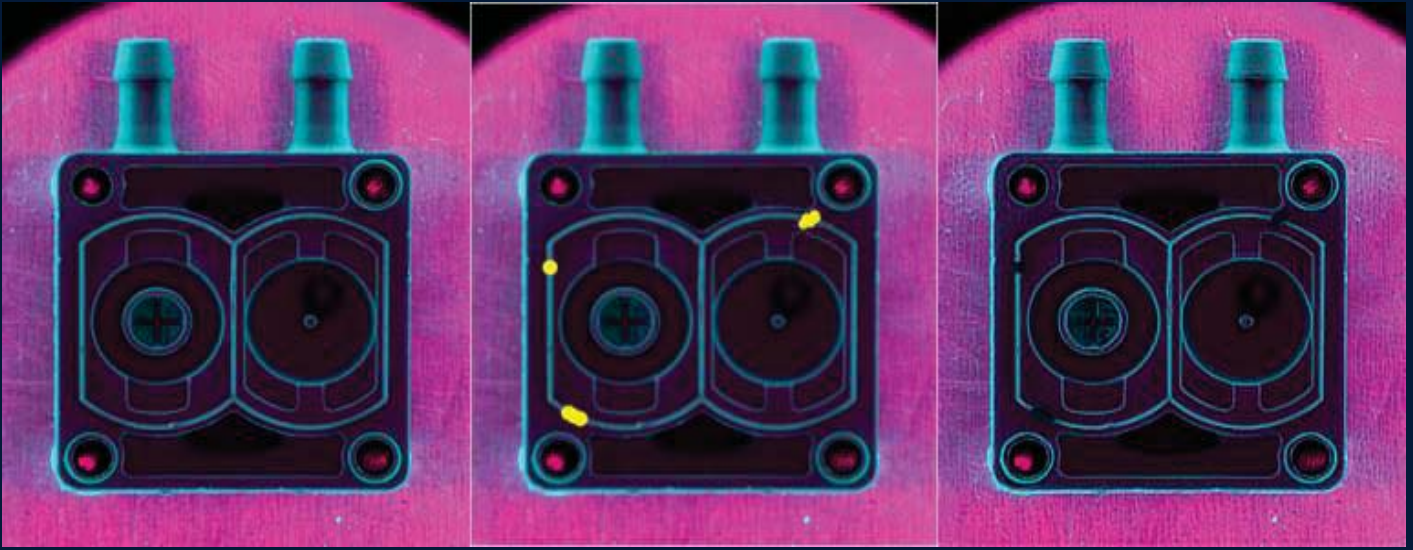
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CSEM - TECHNOLOGY  
ORGANIZATION IN  
SWITZERLAND

Technology Transfer to Industry

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## Les rêves appliqués(GAN)



Original Image

:: csem 

## Industry 4.0 & Machine Learning

Quality and  
Process Control



Predictive  
Maintenance



Digital  
Manufacturing



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# DEEP LEARNING FOR INDUSTRY

# ViDi

:: CSEM 2008

:: ViDi 2012

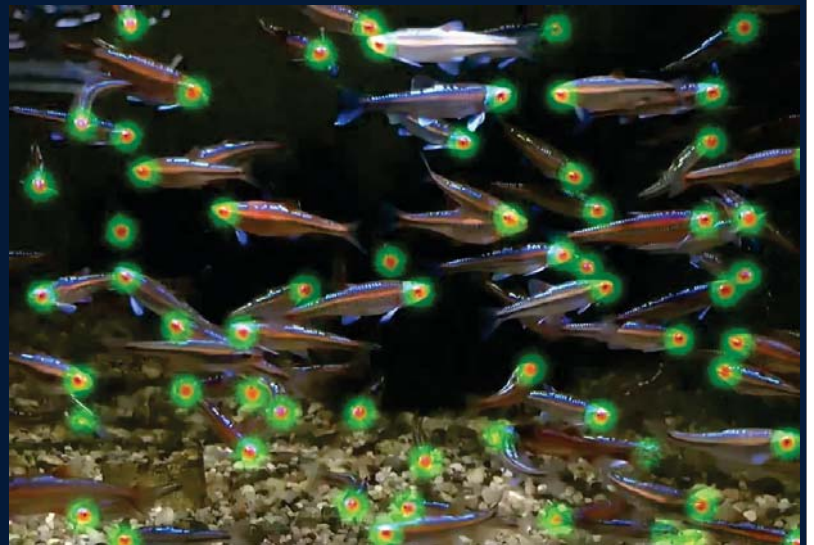
:: Cognex 2017

:: csem

COGNEX



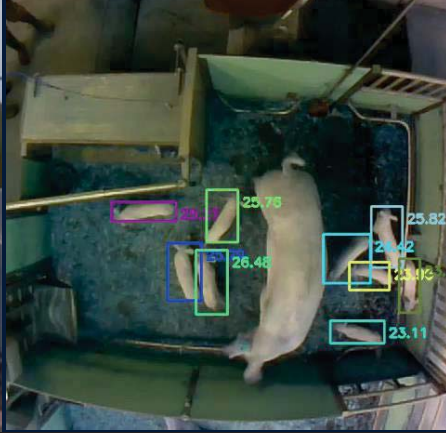
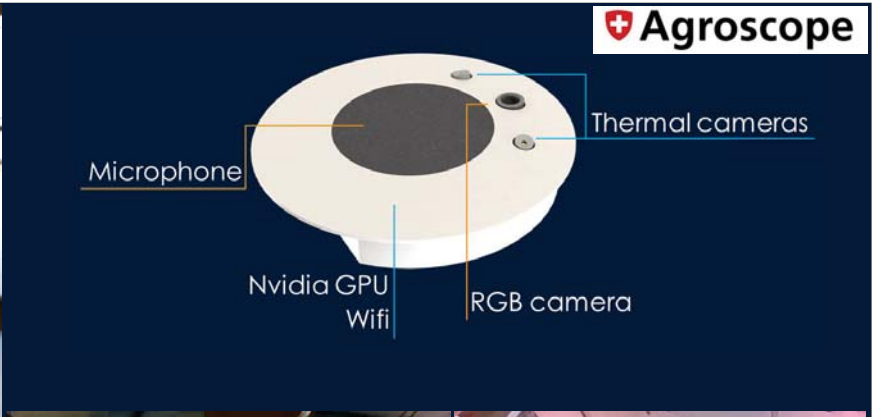
## Utilisations dans la nature



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 Agroscope





Machines de tri



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# Tomates



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 Agroscope

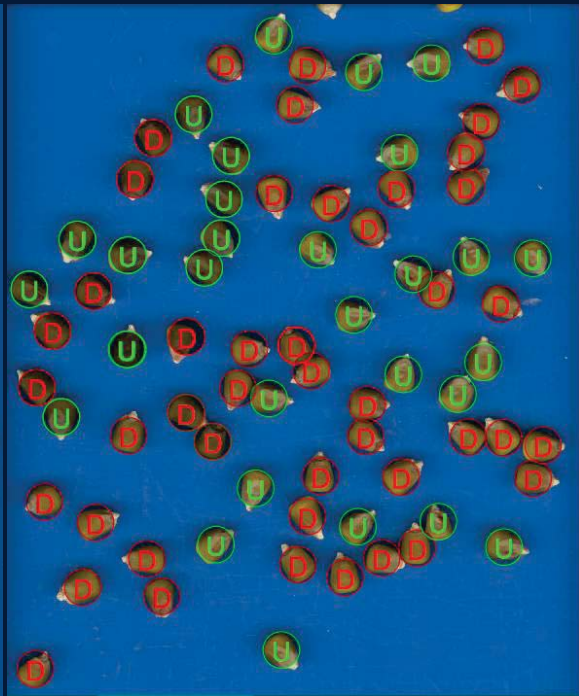
Patience sauvage, oseille à feuilles obtuses, rhubarbe sauvage – (lat. Rumex)



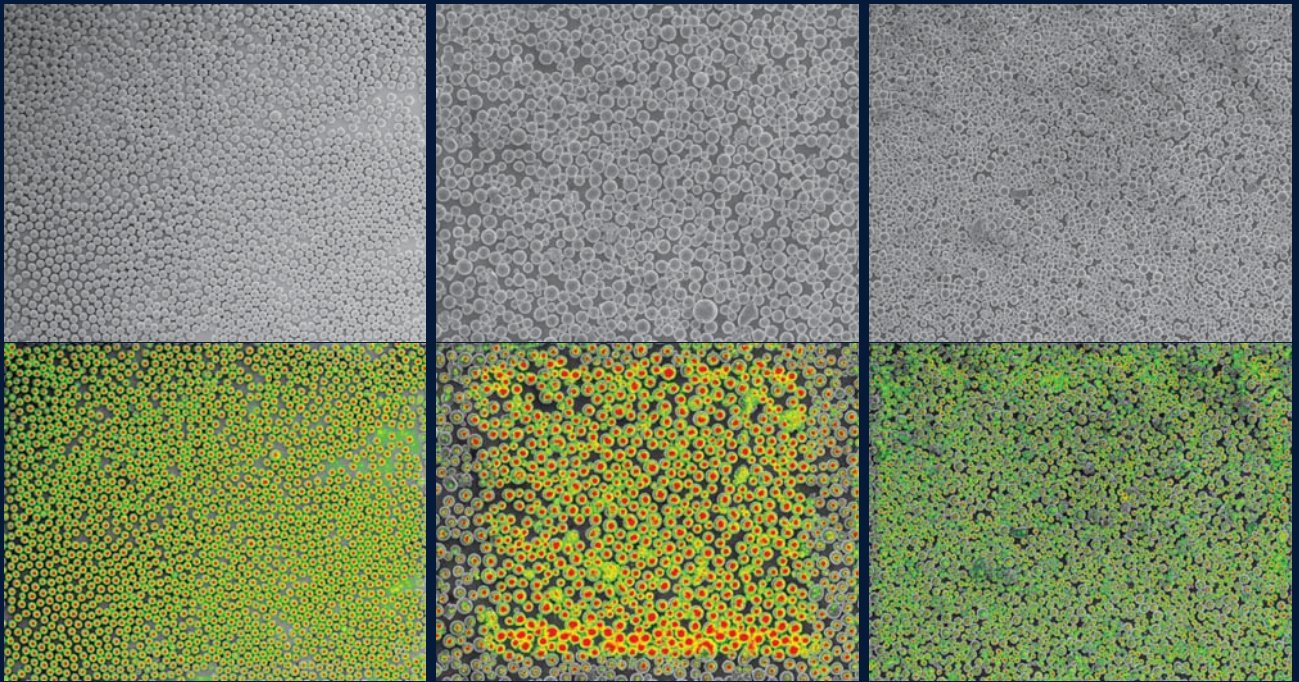
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## Corn Embryo



# Cellules/céréales/fourrage



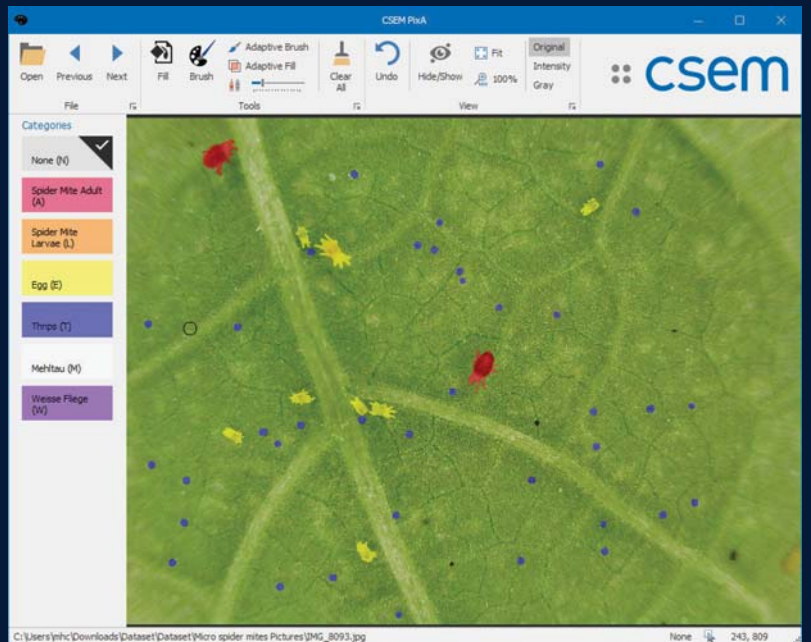
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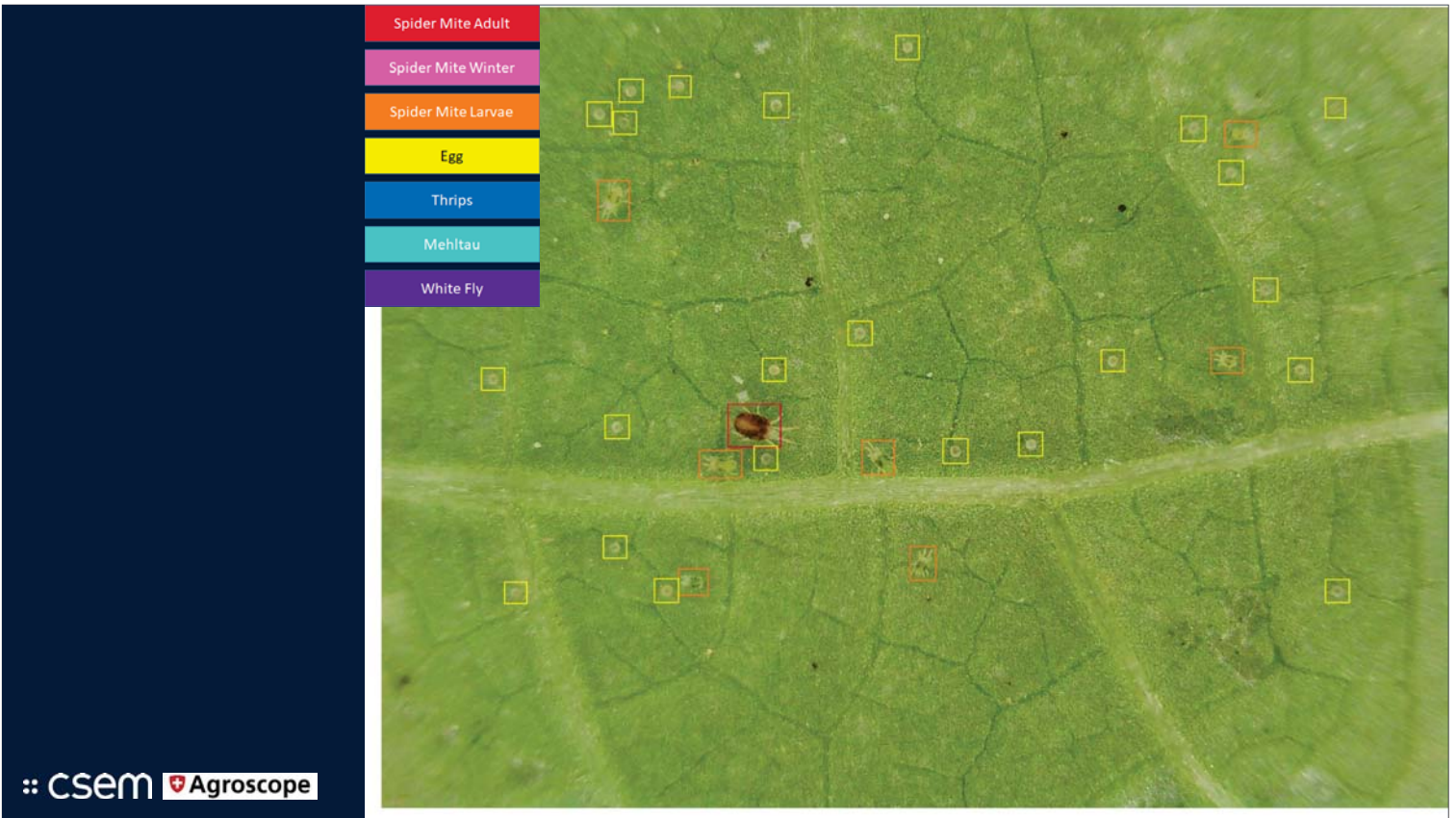


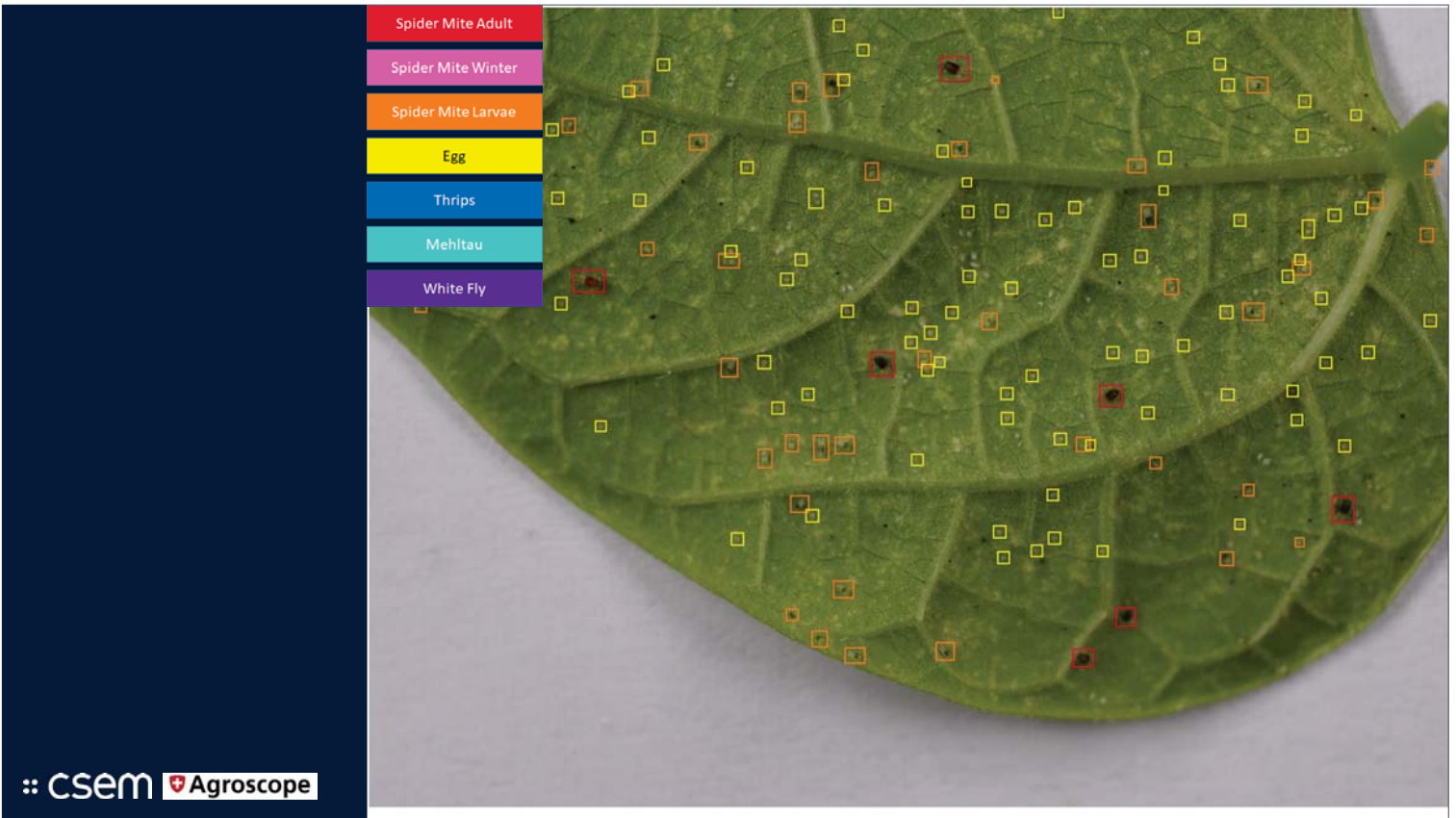




# Greenhouse







## Crop classification

**DATA Bio**  
 Data-driven Bioeconomy

### Deep Learning for Agriculture and Forestry

- Hyperspectral images from Sentinel satellites
- Remote sensing
- Continuous monitoring of health status

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Received funding from European Union's Horizon 2020 research and innovation programme grant agreement No 732064

## The 10k pixel issue



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## Big data

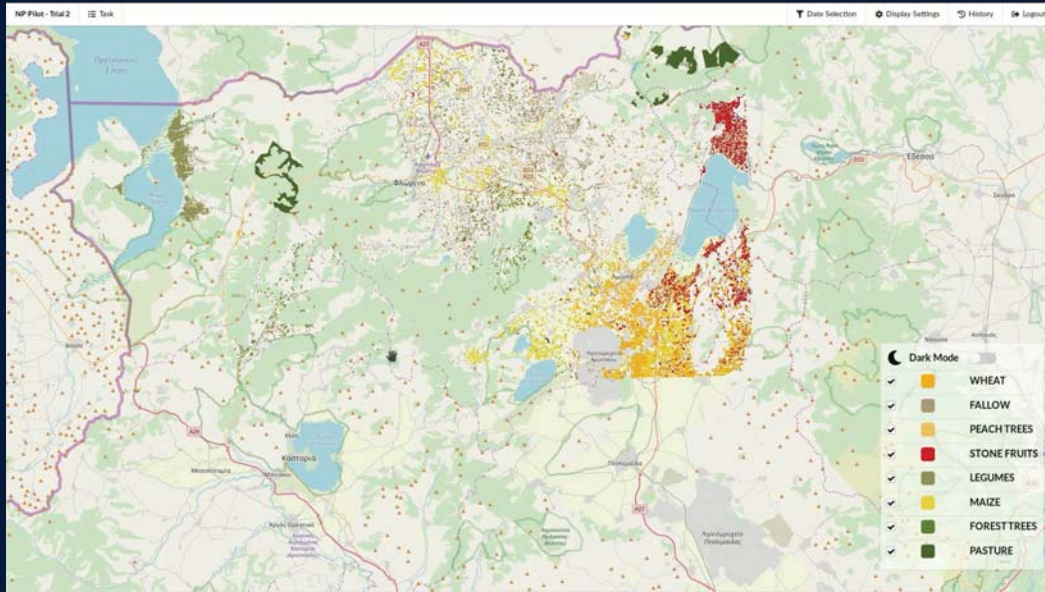


- *Multi-Spectral data*
- *Labelled at parcel level*
- *27k parcels for 1 tile*

- Wheat
- Maize
- Legumes
- Fruits

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# Scenario 2: In-Depth Parcel Assessment



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## Time Series Data



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# Prévisions du chiffre d'affaire

- Prévisions de données temporelles sur le commerce d'animaux.
- Les réseaux neuronaux apprennent les caractéristiques des produits et des partenaires commerciaux dans les données.
- Prédiction automatique avec plusieurs modèles spécifiques.



Mehrdimensionale Zeitreihen

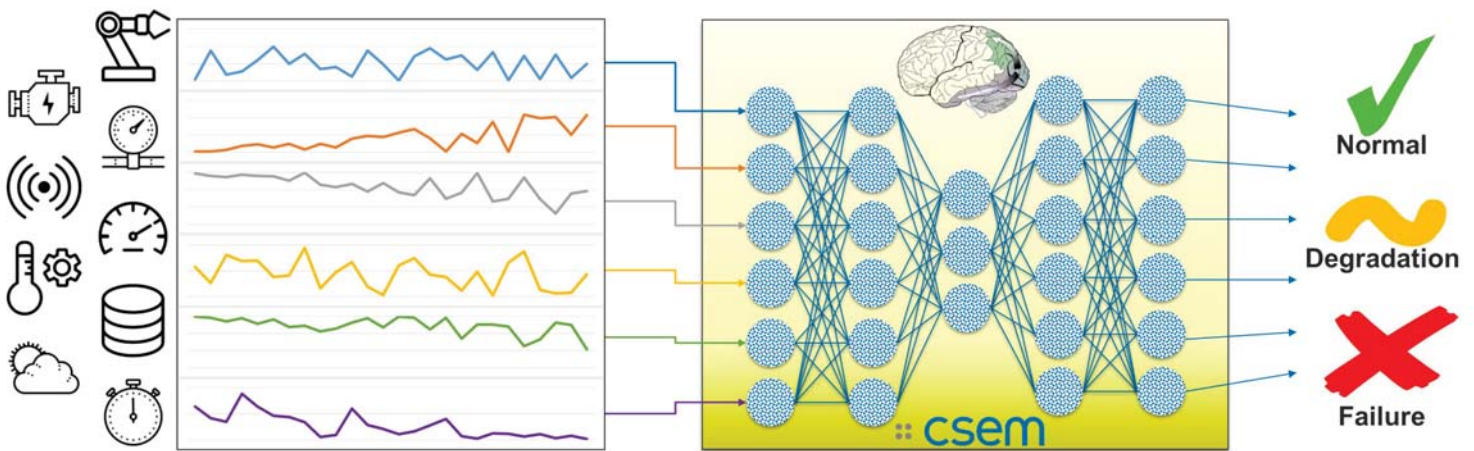


Deep Learning



Prognose

# Maintenance with Deep Learning



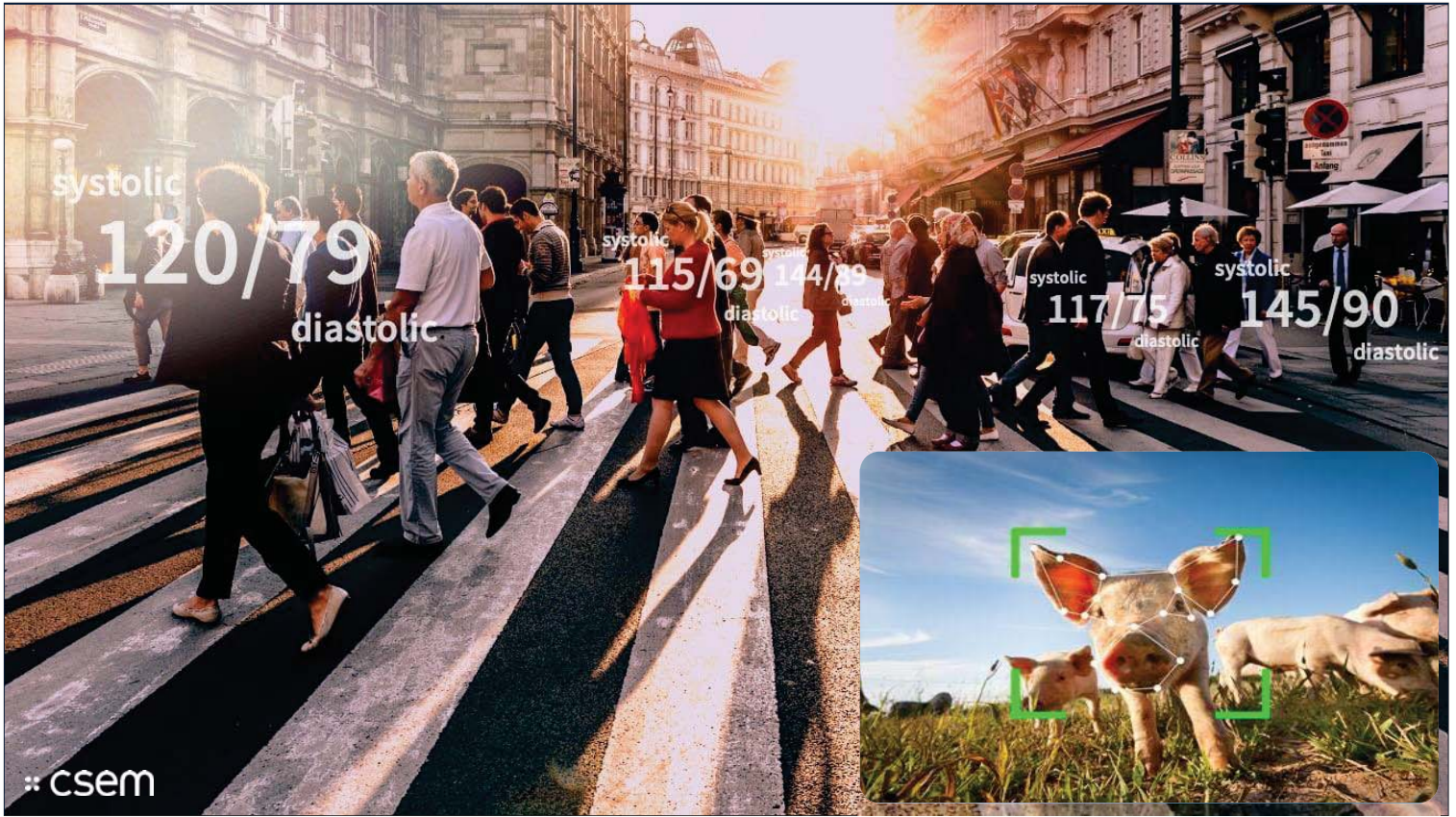
# Condition Based Monitoring for Trains



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## 3 milliards de visages (Clearview AI)



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## WER DARF DEINE PERSÖNLICHEN DATEN SAMMELN?

Facebook	✓
Google	✓
Twitter	✓
Instagram	✓
Microsoft	✓
Apple	✓
Der Staat	✓
Dein Netzanbieter	✓
Die Chinesen	✗

# L'avenir ?



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# L'IA n'est pas parfaite non plus...



Ara 97.3%

+



Noise

=



Bücherregal 99.1%

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L'IA n'est pas parfaite non plus...

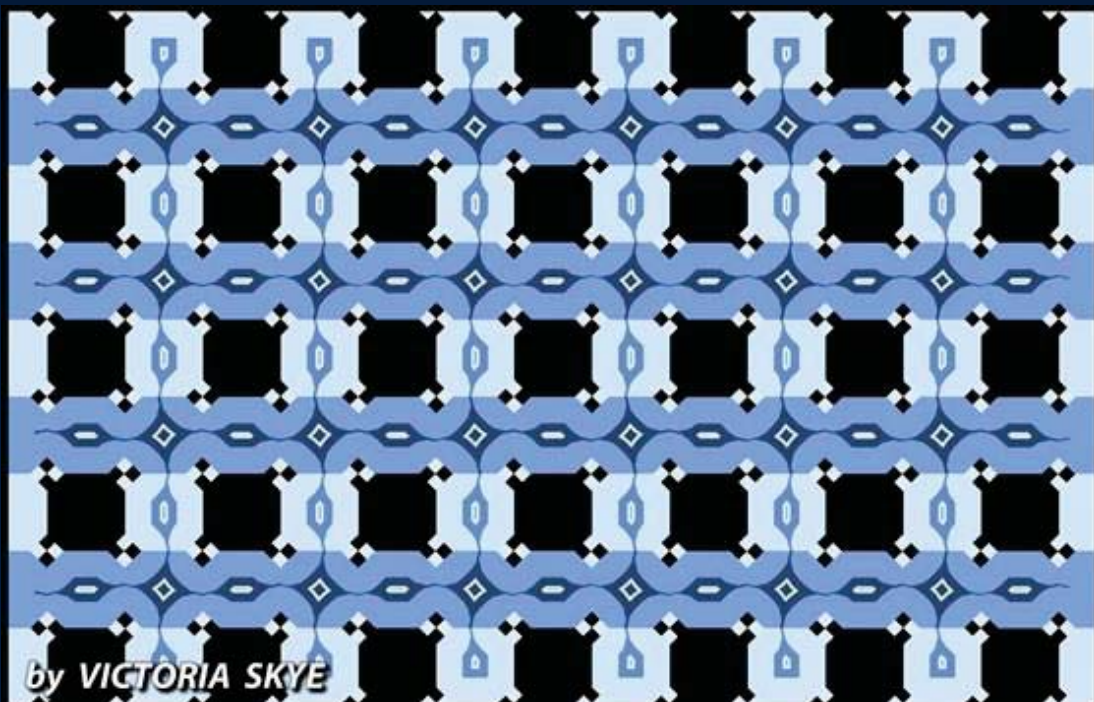


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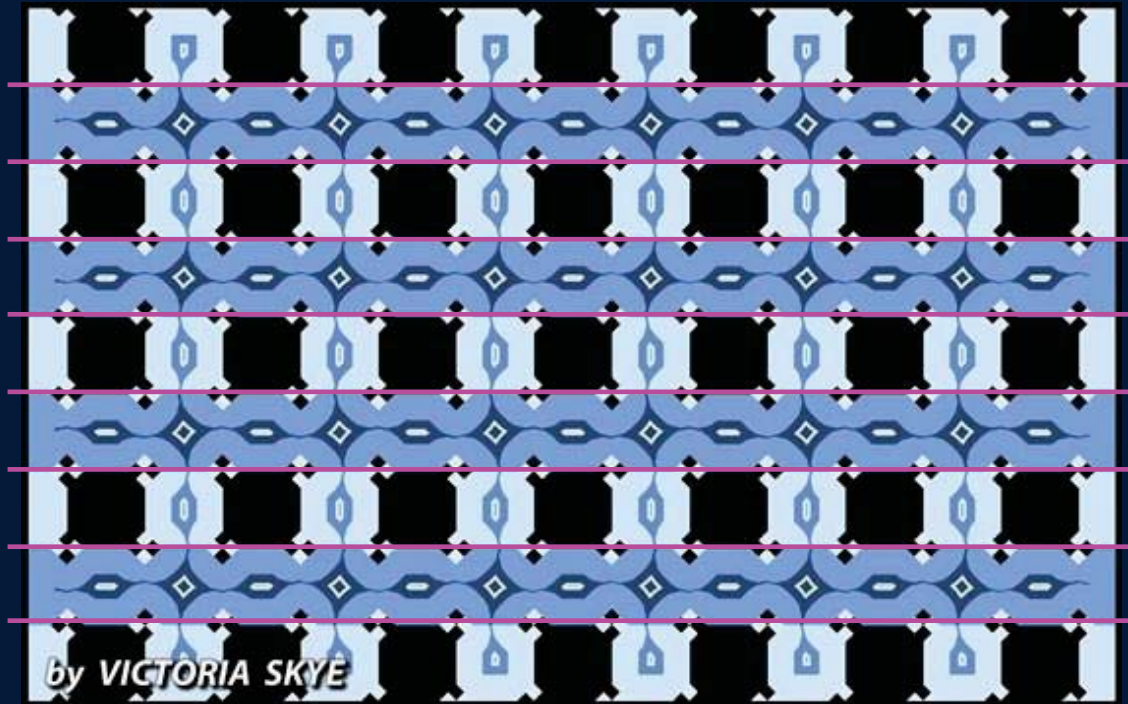
Les humains ?



by VICTORIA SKYÉ

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Les humains ?



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## Contact

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