seeing what matters

20:15:44 05/06/2015 UTC

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forState:UIControlStateNormal
forState:UIControlStateHighlighted
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nav-button-highlighted"] stretchable
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http: /finance.yahoo.com/news/america-10-fastest-shrinking-companies-145745947.html

Our goal

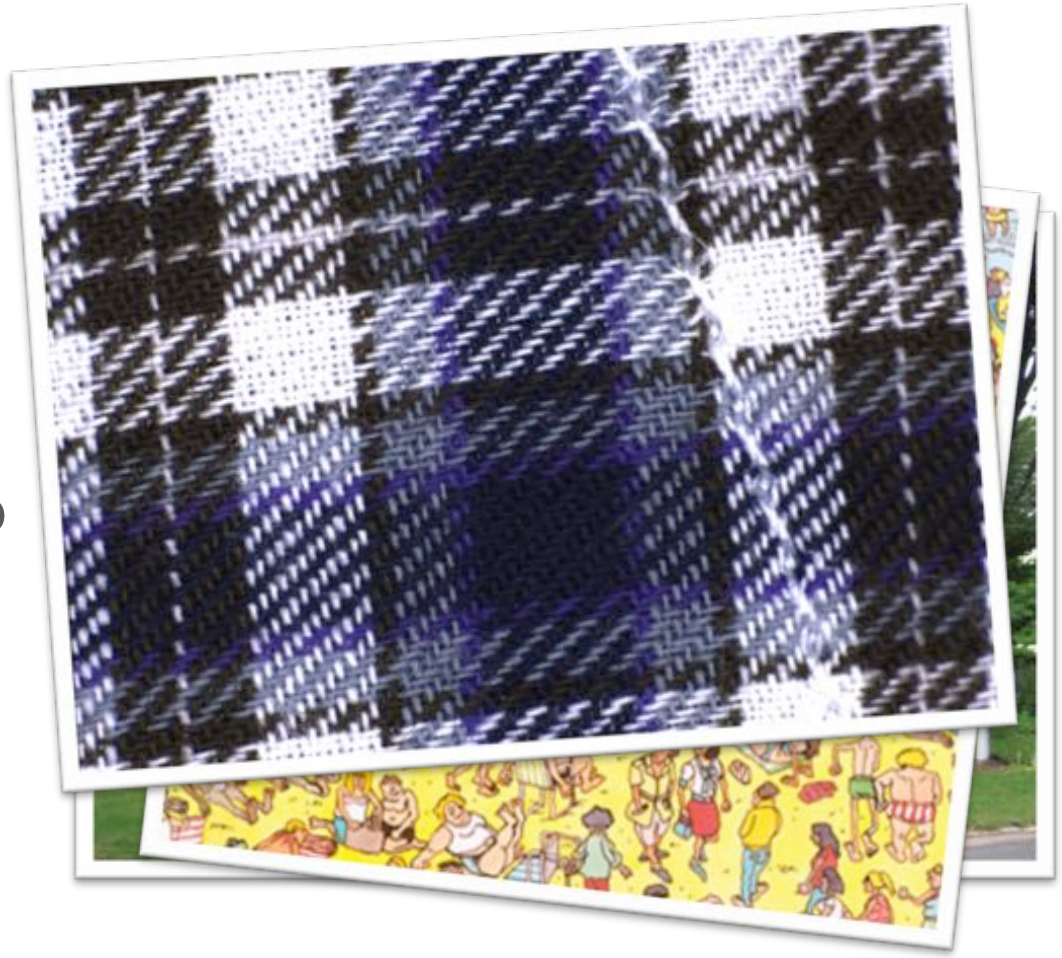
*Enable computers, machines and robots to **understand images** such that they can meaningfully interact with the real world.*

VIDI

What is this?

Where is Waldo?

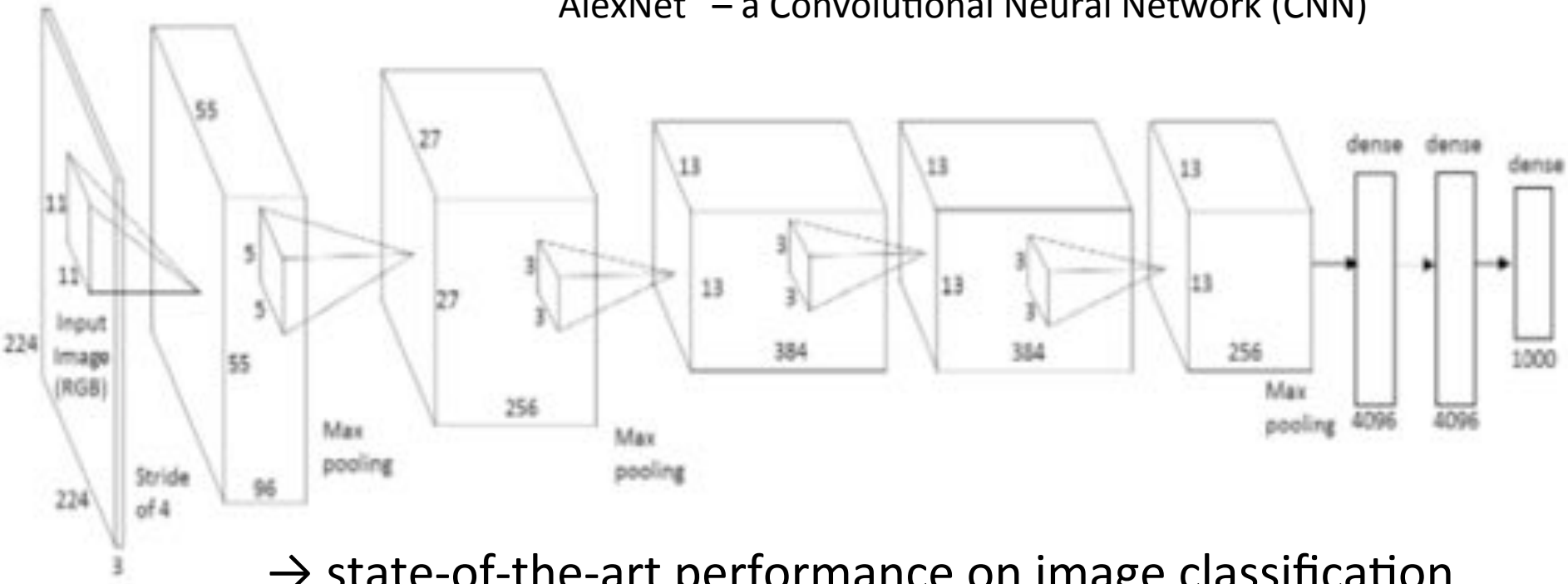
What‘s wrong?



VIDI

Deep Learning

"AlexNet" – a Convolutional Neural Network (CNN)



→ state-of-the-art performance on image classification

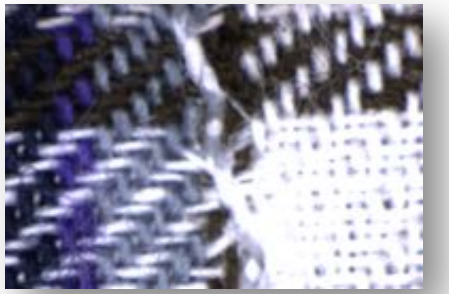
for **thousands** of classes

trained with **millions** of images

Challenges in Industrial Applications

1

2



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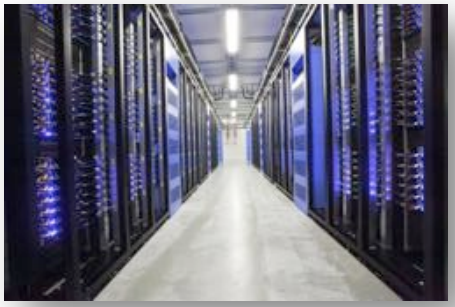
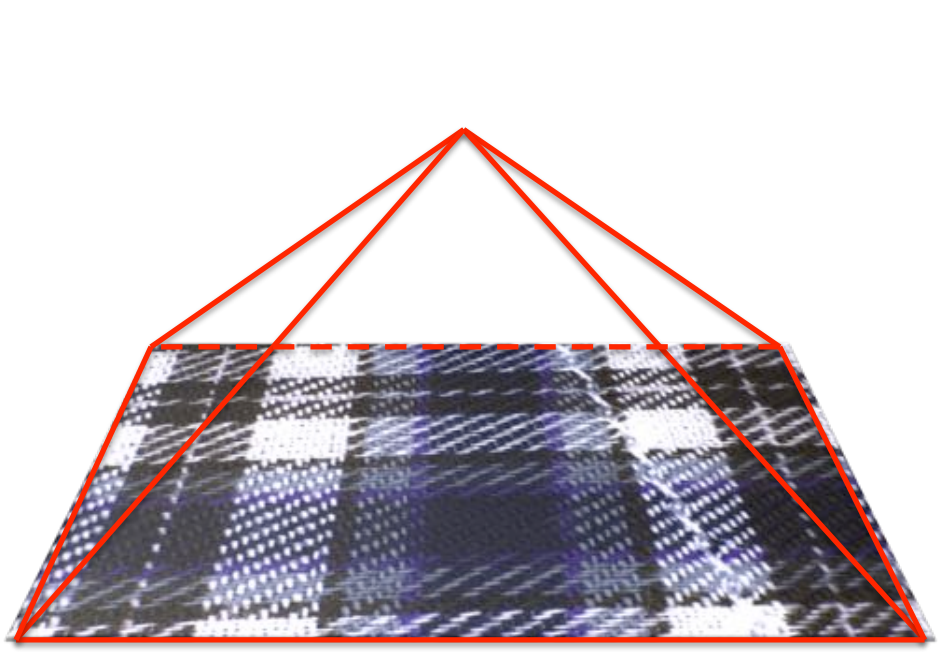
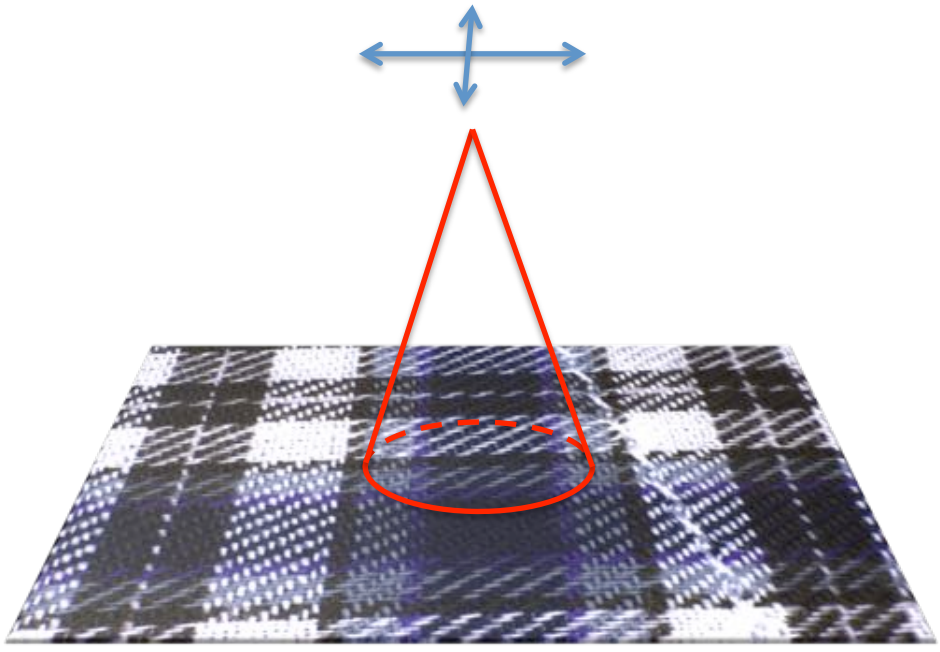


VIDI

Brute Force *vs* Focus & Attention





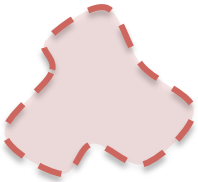
CNN

VIDI

Anatomy of a unique approach

Core

Focus



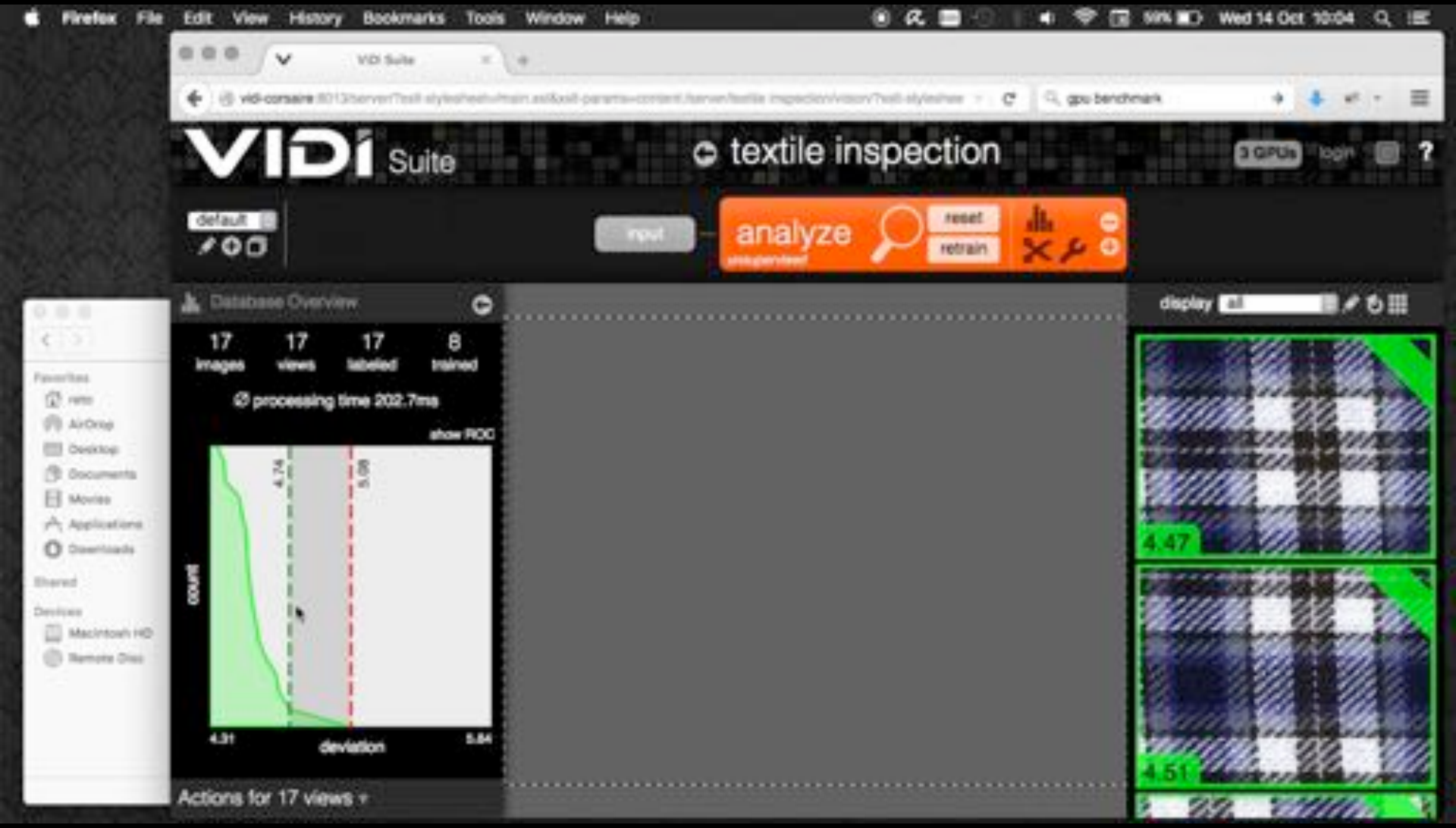
Tools

1 **Collect** images of good samples

3 **Validate** model on images with defects

2 **Train** images with ViDi red unsupervised

ViDi red


Firefox File Edit View History Bookmarks Tools Window Help
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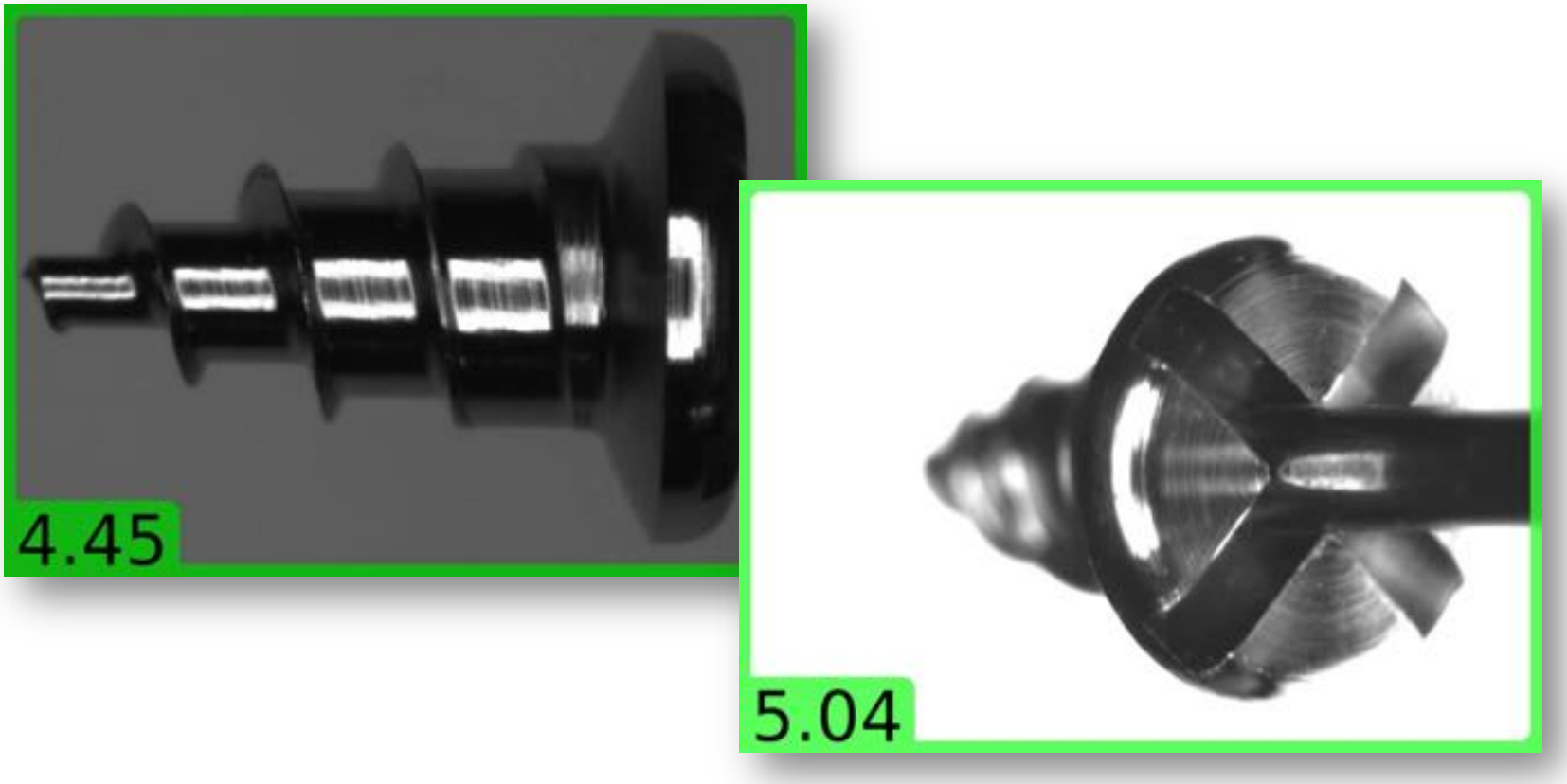
VIDI Suite
textile inspection
3 GPUs
login
default
input
analyze
reset
retrain
Database Overview
17 images
17 views
17 labeled
8 trained
processing time 202.7ms
show ROC
4.74
5.68
count
4.31
deviation
5.84
Actions for 17 views
display
4.47
4.51

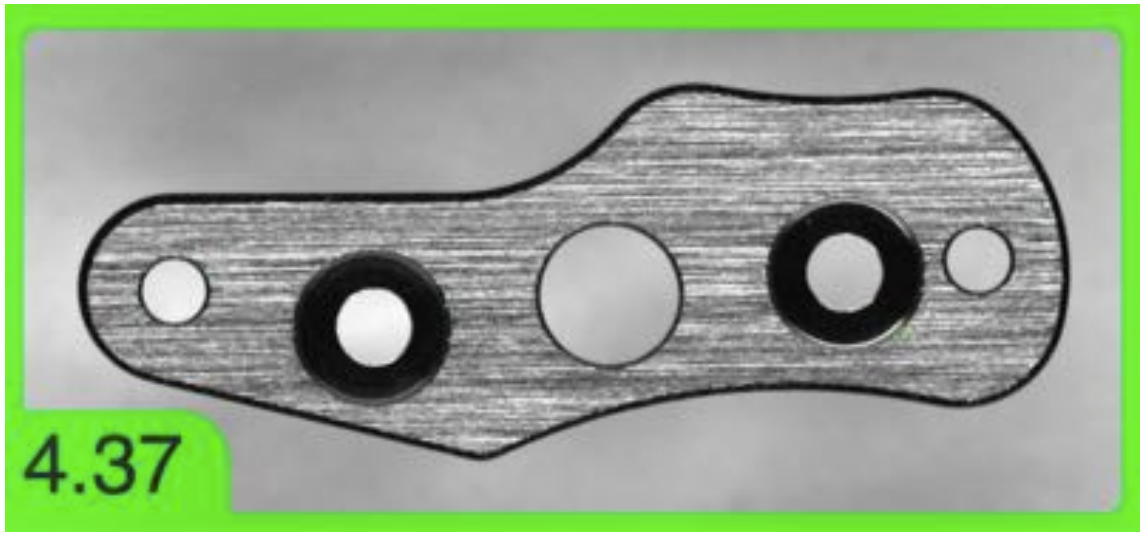
Medical Screw

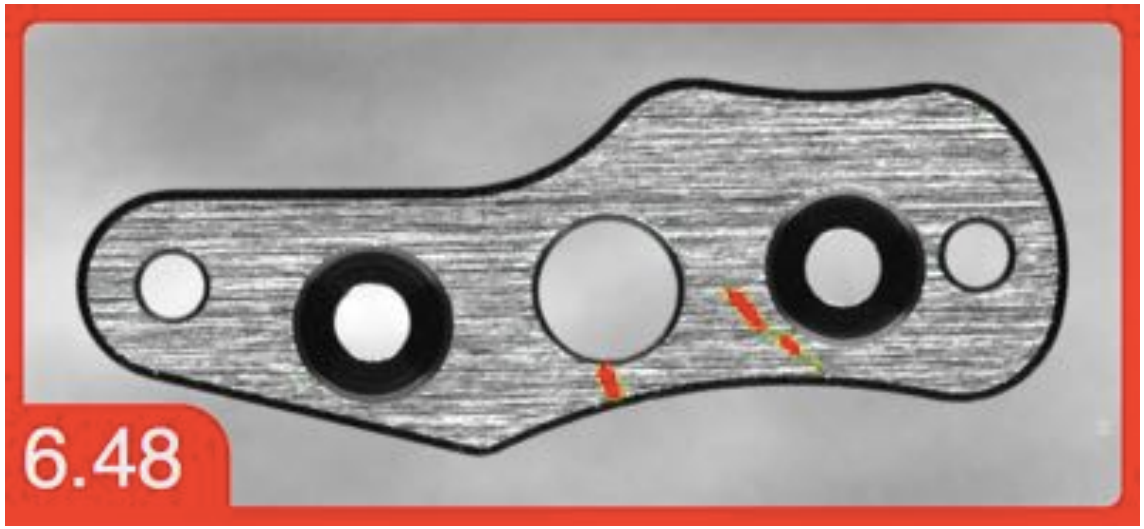
thread and head inspection



Watch Bridge

brushed metal surface



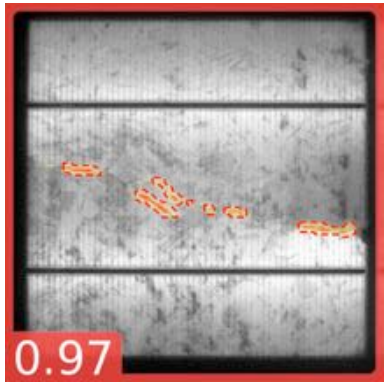


1 **Collect** images of good & bad samples

2 **Mark** defects on bad images

3 **Train** model with ViDi red supervsied

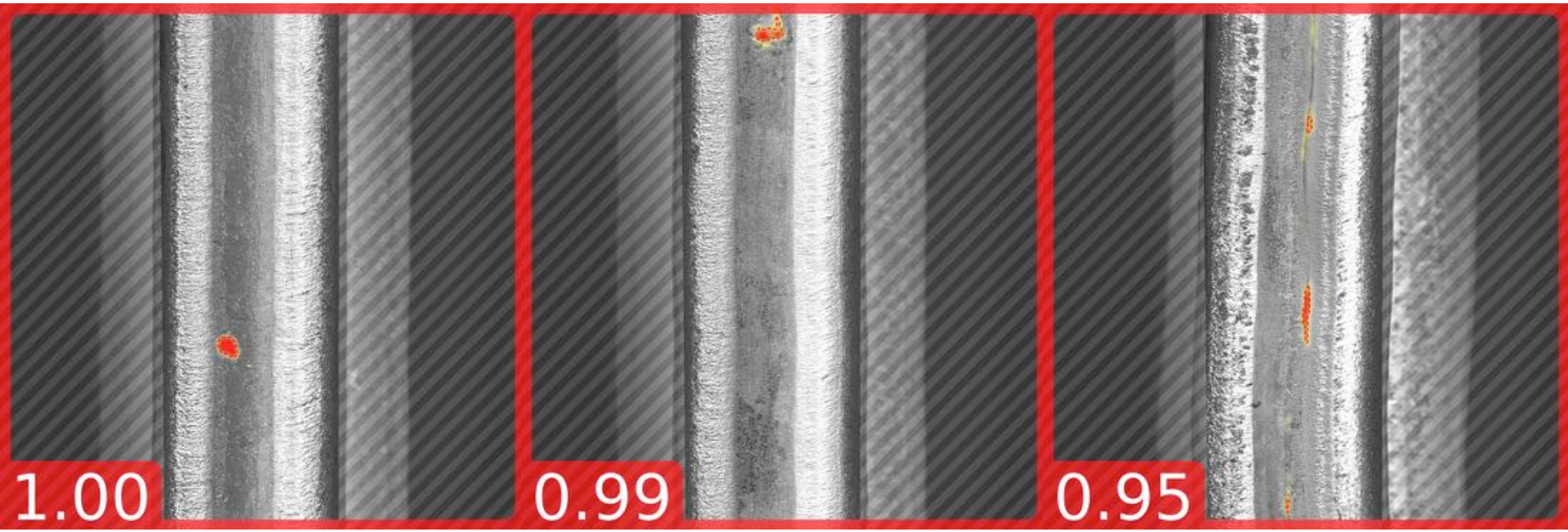
4 **Validate** model on untrained images



VIDI red

supervised

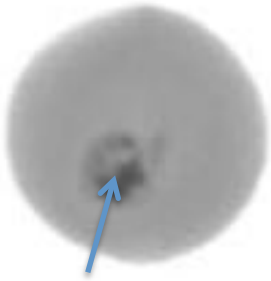
Rail Inspection



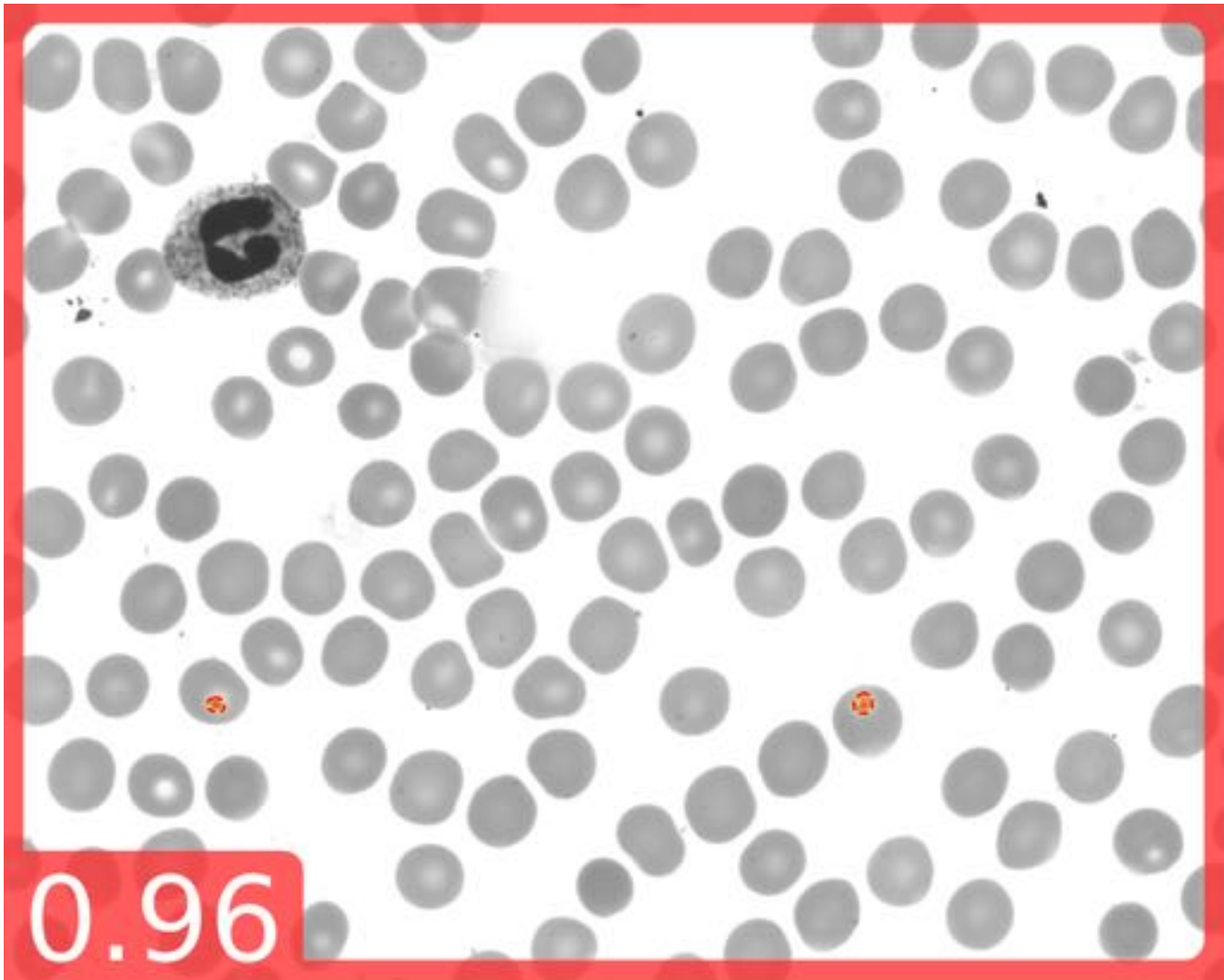
Medical Diagnosis

Malaria parasite detection in blood smears

red
blood cell



Malaria parasite



images courtesy by
Dr. J. Lundin, FIMM, Finland

1 **Collect** images of objects

2 **Identify** features on images

3 **Train** model with ViDi blue

4 **Validate** detection on untrained images

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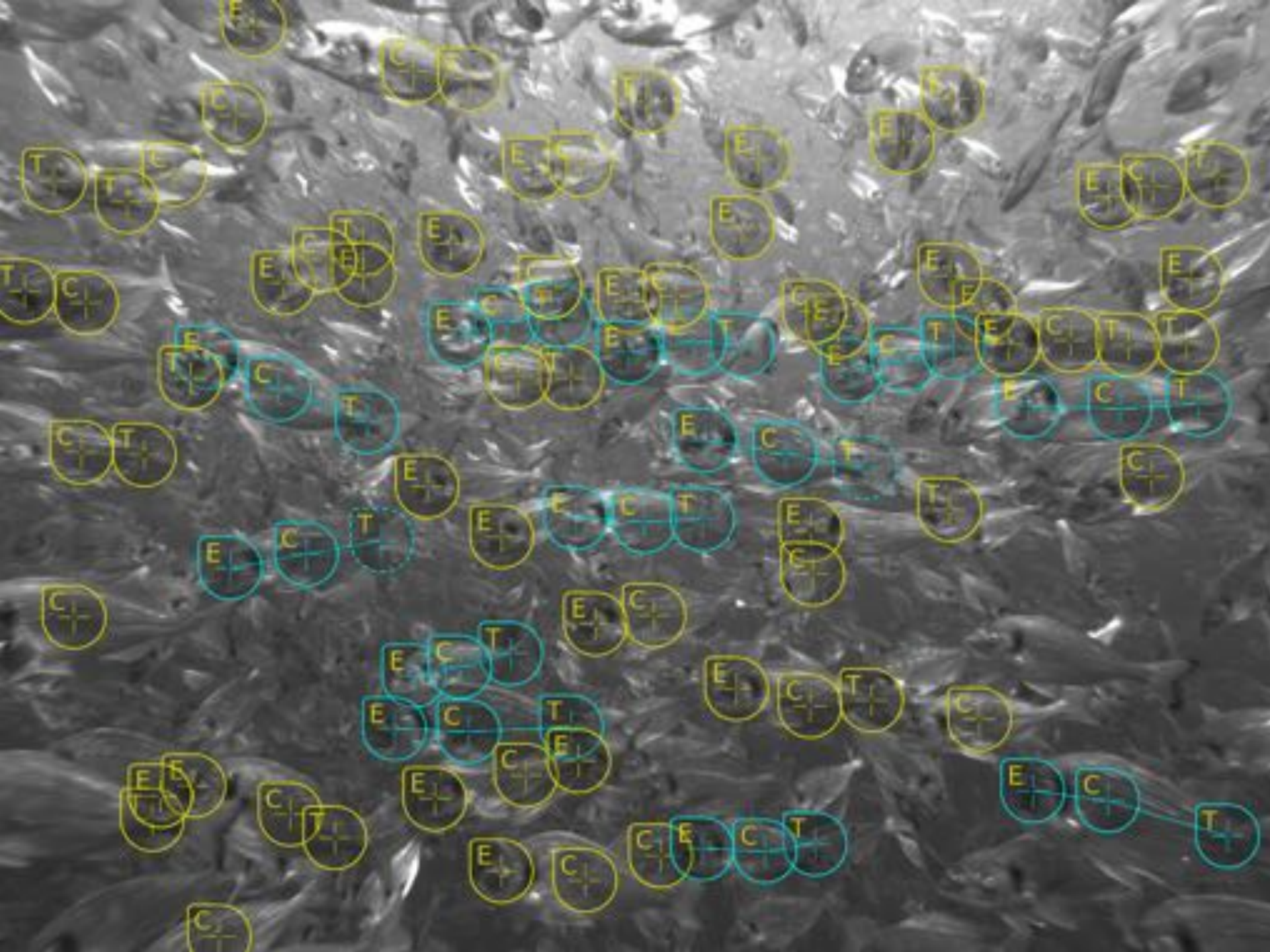
08:57 2 WY

ViDi blue



VIDI

Surveillance

count trucks and verify load

1 **Collect** images of products

2 **Tag** images with their label

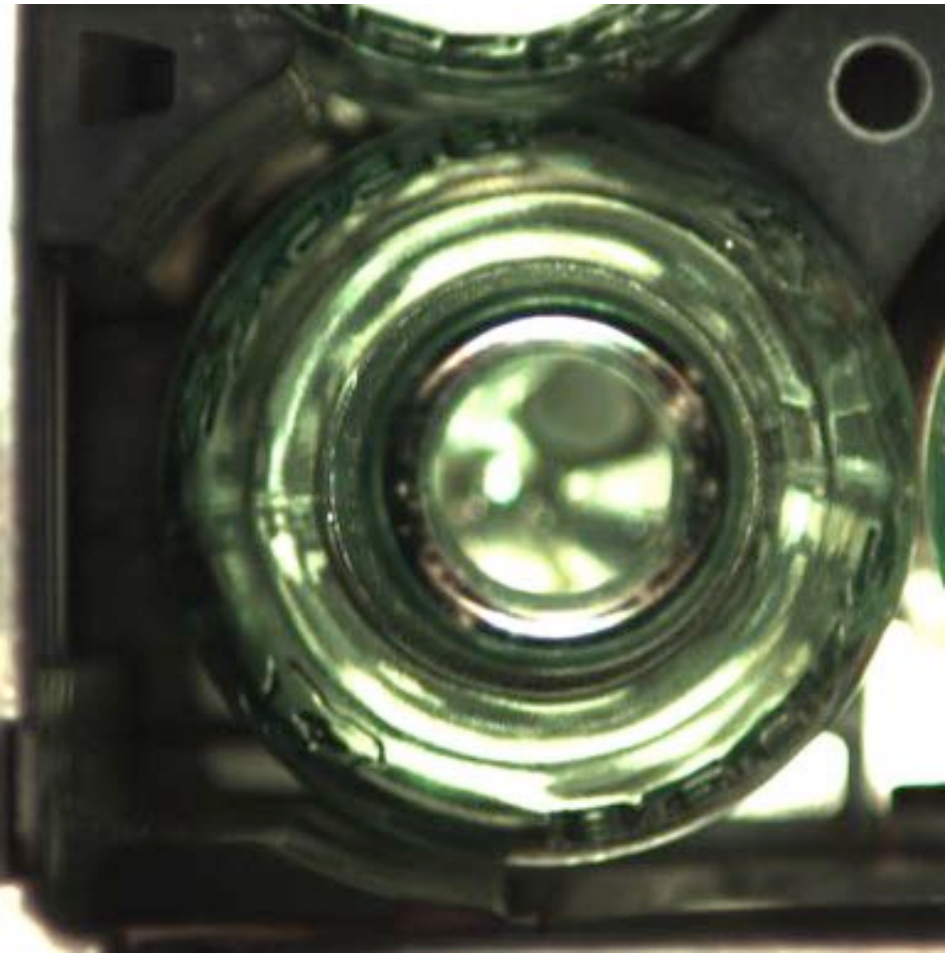
3 **Train** model with ViDi green

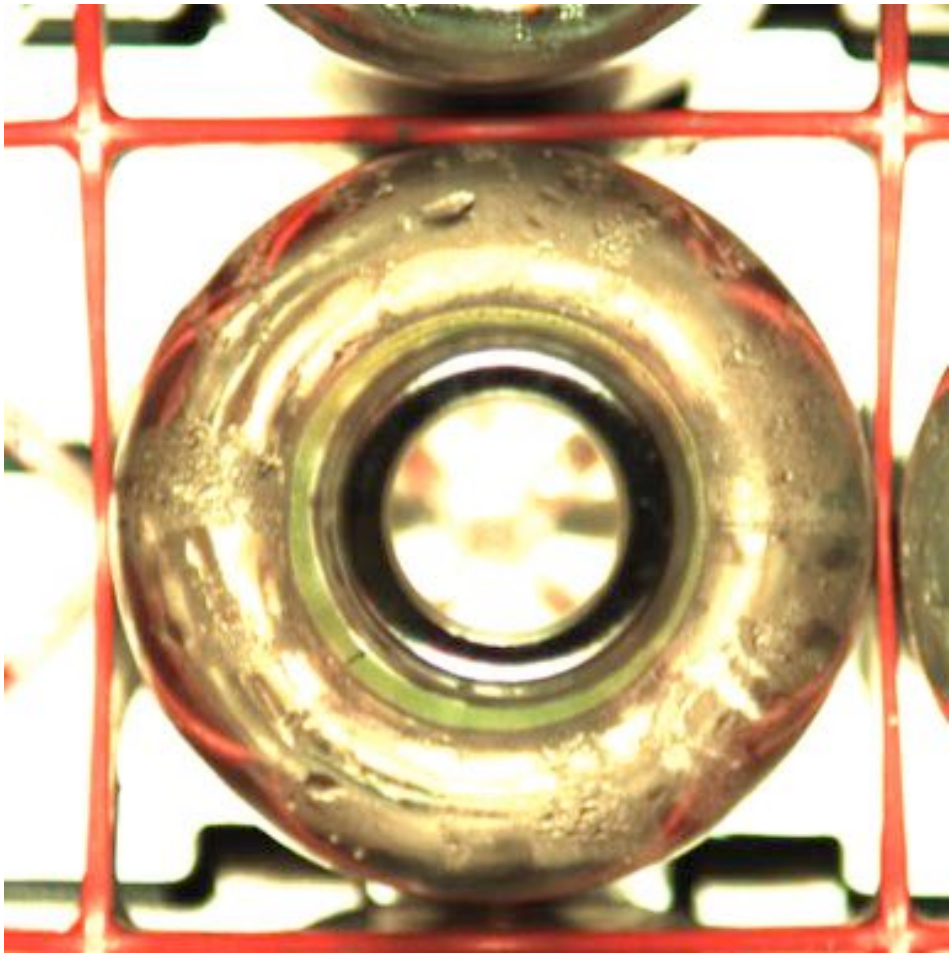
4 **Validate** model on untrained images

ViDi green

VIDI

Bottle Sorting





vs

?

98.4%

correct classification

Pharma Packaging

orientation of IV bags

Up or Down?

VIDI green

99.98% correct

VIDI

Handwritten OCR

Classifier	Error rate
Linear classifier	7.6%
Non-linear classifier	3.3%
Boosted stumps	0.87%
Support vector machine	0.56%
K-nearest neighbors	0.52%
Large neural network	0.35%
Committee of 35 neural networks	0.23%

14 years

VIDI green **0.35%**

MNIST: a database containing 70’000 characters
a defacto standard in handwritten OCR benchmarking in academia

VIDI

Learning *vs* Teaching

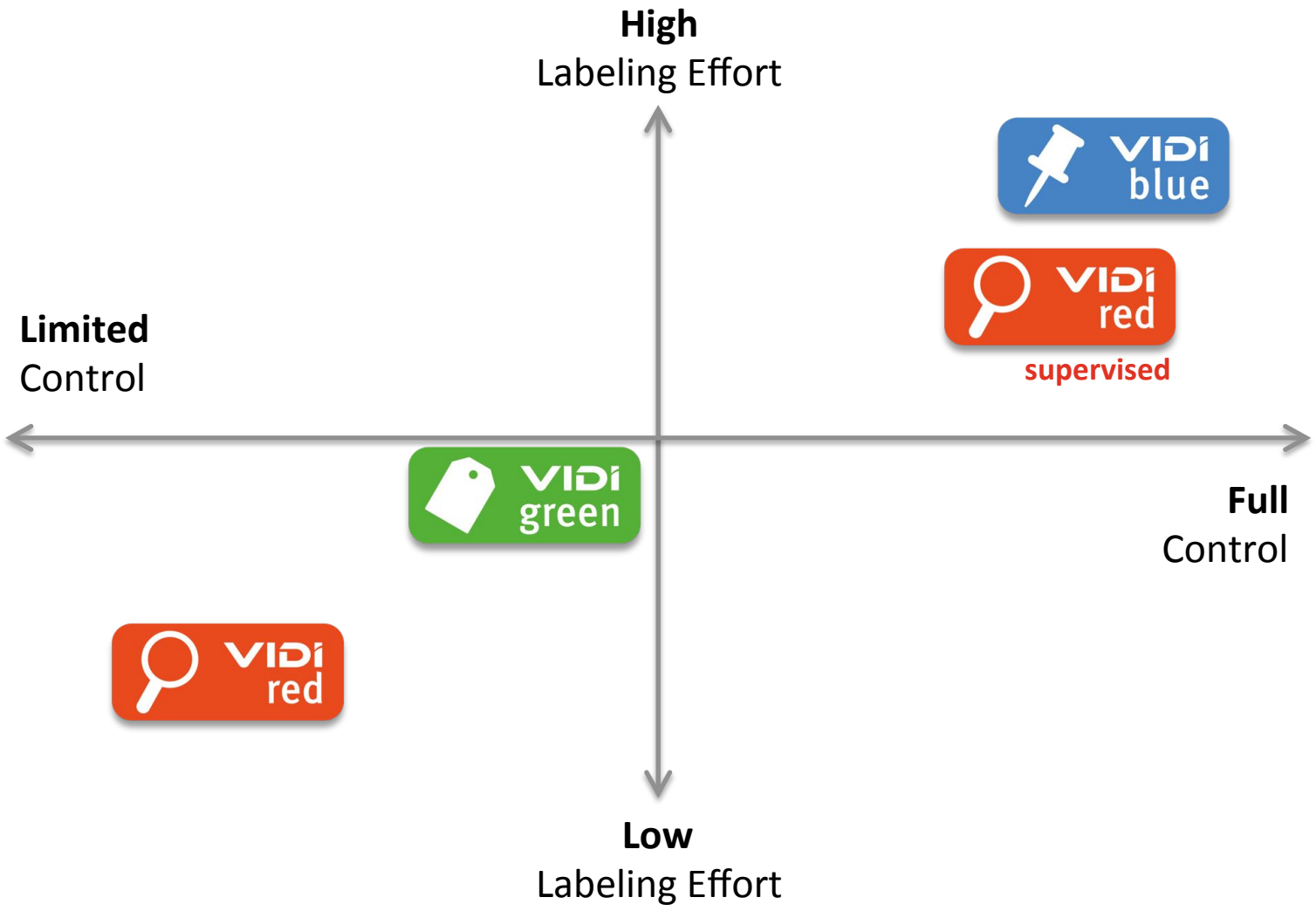
semi-supervised

unsupervised

weakly supervised

strongly supervised

You Get What You Give



ViDi Suite

Deep Learning based Image Analysis

Automated aesthetic inspection, classification and detection

- **Human-like**: Outperform the best quality inspectors
- **Self-learning**: No software development required
- **Powerful:** Tackle the impossible to program inspection challenges

Hunting defects

Human-like
Self-learning
Powerful

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