Suomen Automaatioseura Webinar: AI – käytännön sovelluksia, **AI konenäkösovellukset teollisuuden tehokkuuden lisäämiseksi**

Timo Heikkinen, 15.6.2020

About Top Data Science

- Business : "AI as a Service"

- Located in Helsinki, Finland

- 20 people, Data scientists with MScs and PhDs, Software Engineer, Business development team

- Excellent customer track record
  - Finland, Germany, Denmark, Japan, Vietnam, Israel, USA

- 60+ machine learning solutions delivered, including several Azure and AWS based solutions.

- Part of Morpho Inc. (https://www.morphoinc.com/en) since 2018 TDS + Morpho = 80 computer vision engineers

Customers & Partners

About Morpho – Top Data Science parent company

- Business : "Image Processing Software R&D and Licensing"

- HQ in Tokyo, Japan

- More than 3 billion computer vision licenses sold worldwide

- Listed in Tokyo Stock Exchange (TYO: 3653)

- 30+ image processing products & technologies

- 70+ computer vision and image processing engineers

- Experts in on-device/edge computation

Customers

Products

Co-creation

Top Data Science co-creation model brings together **customers' domain knowledge and our AI know-how** to build up innovative, robust and scalable solutions.

The industries that we have co-created and deployed AI solutions include:

- Pulp & paper and packaging
- Wide range of process industries
- Engineered product and component industries
- Health care & health tech
- Traffic management and transportation
- Biotechnology and pharmaceuticals
- Public sector

Scientific Approach

- **The scientific mindset** is key part of Top Data Science company culture and genetics.

- Active participation in AI-based innovation contests and ecosystems with constant curiosity in thinking novel ways to solve customer problems with state-of-the-art machine learning solutions.

- Providing excellent learning environment for team members through challenging customer projects

- **Continuous follow-up of AI tech scene** and related **knowledge-sharing** is a natural team behaviour and critical part of our success.

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From Proof-of-Concept to Production

Proof of Concept

- Scoping and understanding the problem

- Define clear KPIs for PoC

- Select the most suitable AI approach and test the solution with available data set

- Create a clear plan how to pilot and scale

Pilot

- Develop the end user application and deploy the solution in run-time environment (cloud or on-premise)

- Improve the performance of algorithms

- Collect feedback from users and develop accordingly. End user acceptance is crucial!

Production

- Scaling the solution to new production lines / sites

- Improvement of algorithms and applications based on customer feedback

- Continuous performance monitoring

Kuvaileva -> Ennustava -> Ohjaileva Analytiikka

Prescriptive analytics is the third and final phase of business analytics, which also includes descriptive and predictive analytics.

Descriptive analytics looks at past performance and understands that performance by mining historical data to look for the reasons behind past success or failure.

Predictive analytics answers the question what is likely to happen

Prescriptive analytics goes beyond predicting future outcomes by also suggesting actions to benefit from the predictions and showing the implications of each decision option
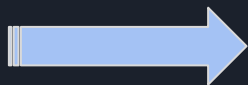

https://en.wikipedia.org/wiki/Prescriptive_analytics
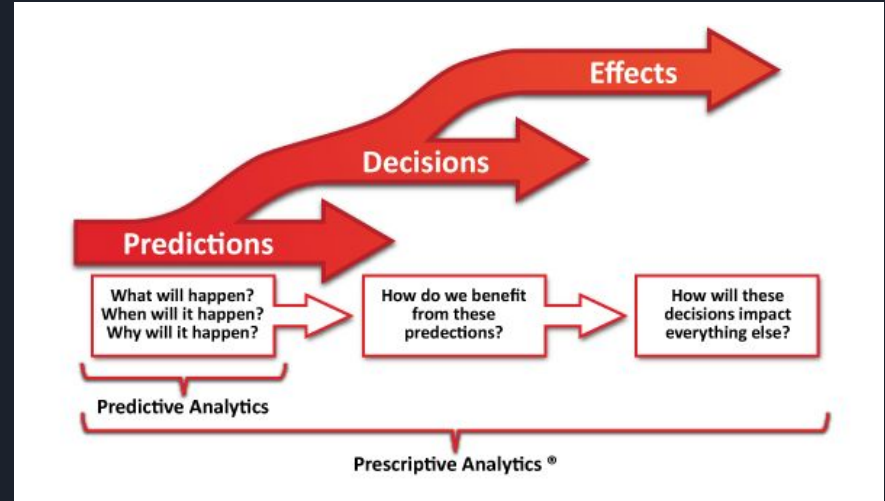
Background and vision for our Computer Vision Solutions

★ Customers are targeting for **_more autonomous operations_** by using AI video analysis and computer vision technologies.

TODESVS. FUTURE VISION

TODAY VS. FUTURE VISION

Video cameras and screens are widely used in factories, but still today they are observed manually & passively tieing operators to the control rooms.

Adding AI driven computer vision to the video platforms can lead to a significant cost savings and benefits including:

- **Automatic alarms and early-warnings**
- **Instructions and information to new operators and personnel**
- **Autonomous reactions on process changes & malfunctions**
- **More reliable operations and less downtime**
- **Free operator personnel from control rooms**

# Case 1: Automatic weld seam detection and measurement

AI for Quality Measurement

## Computer vision for weld quality inspection.

Client is a Global company developing and producing mechatronic components and systems for automotive industry with operations in + 20 countries and + 6 billion € revenue

Deep Learning
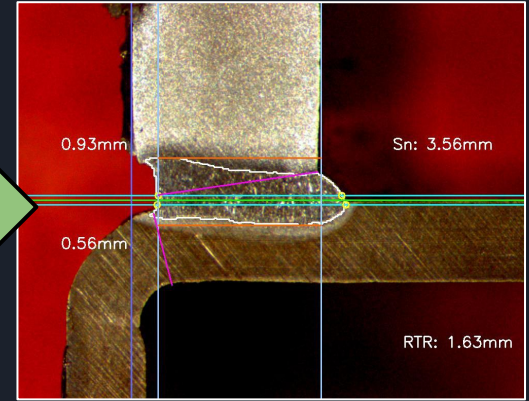
0.93mm

Sn: 3.56mm

0.56mm

RTR: 1.63mm
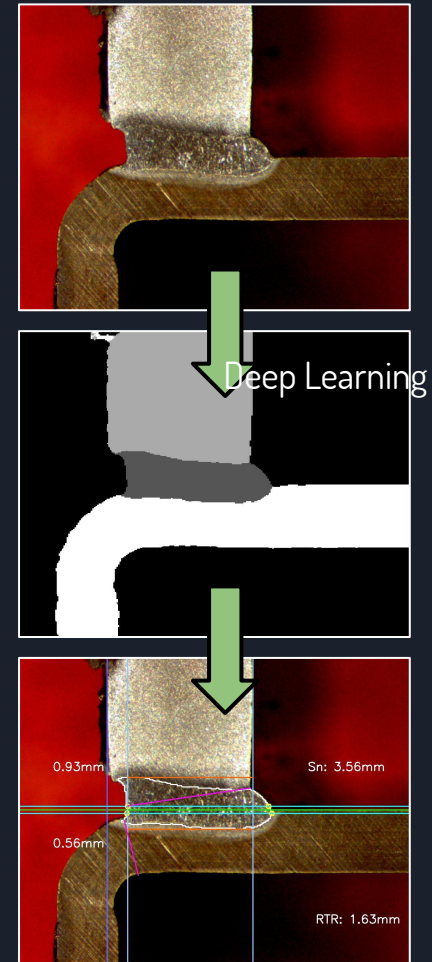
Workflow in the inspection process
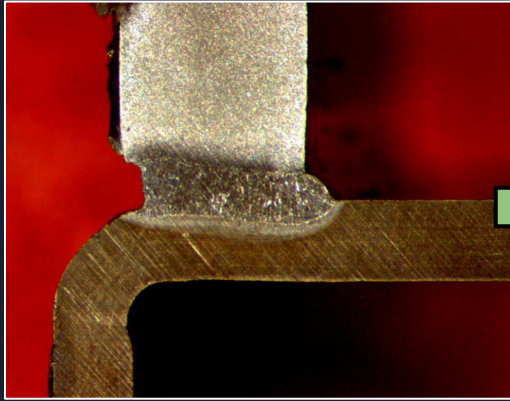
Quality Operator takes the microscope images from weld cross sections and sends them to AI Application
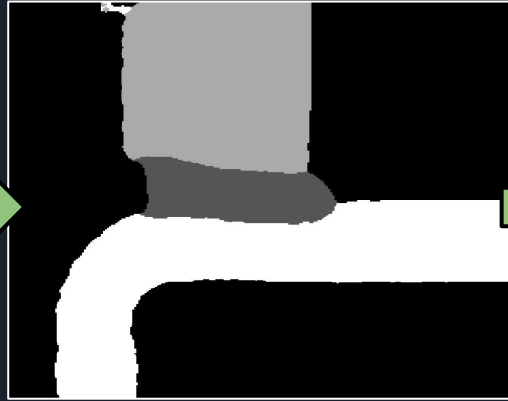
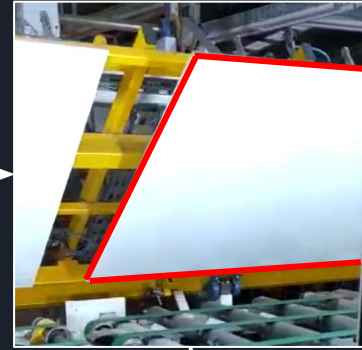AI Application detects the area of welding seam from upper and lower part

AI Application automatically takes key measurements of particular welding seam type and stores the result to the database

Case 2: Automated Quality Inspection

Automated Quality Inspection for MDF production

Object Detection / Segmentation

Quality Classification

OK   Defect   Thrash

Melamine Faced MDF (MDFLAM) is a specialized product manufactured by pressing decorative paper impregnated with melamine resin on MDF plates under specific heat and pressure conditions.

Quality of MDFLAM products may vary due to various factors and a manual check by human operators is required. This task is tedious, repetitive and resource-consuming.
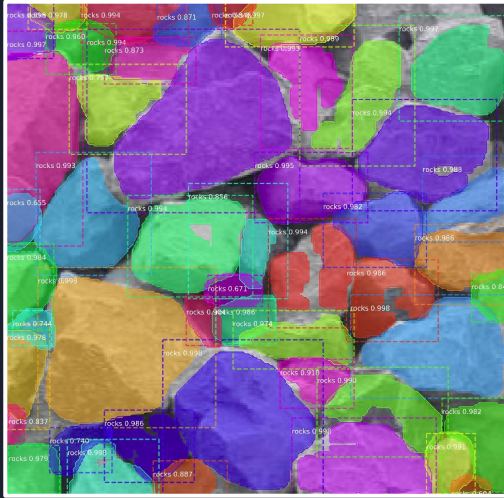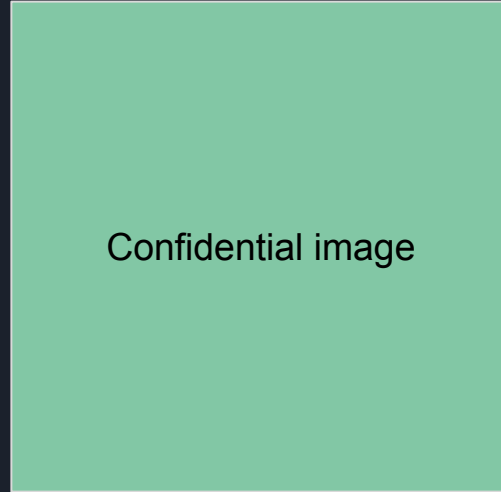
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Case 3: Process optimization, assembly process, on-board/on-device computer vision...

Computer Vision for Industrial Applications

Deep learning based instance segmentation for a global machinery company

Confidential image

Object detection in assembly process

Real-time, image-based detection, classification and tracking algorithms for maritime industry

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