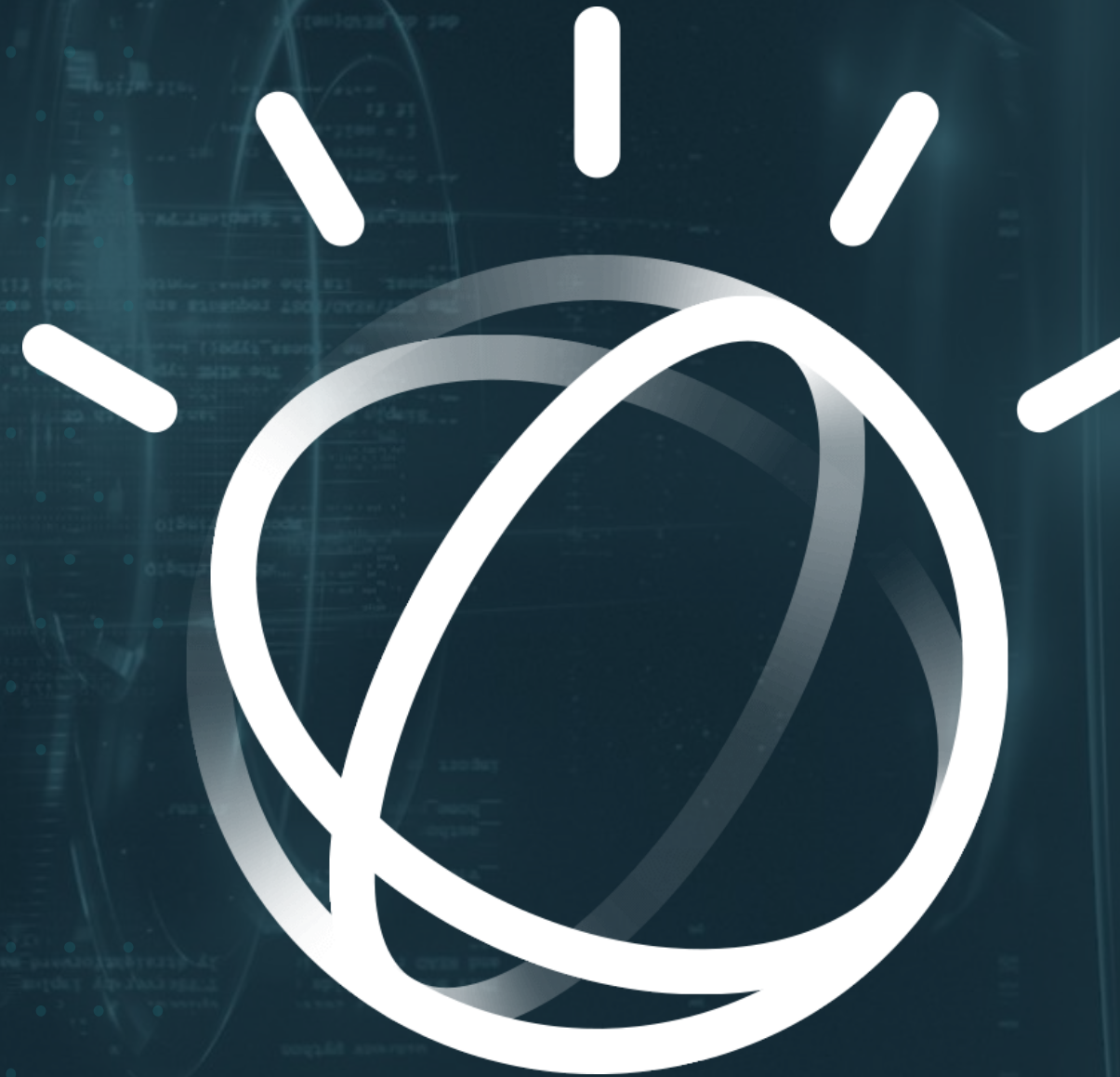


# Maximo Visual Inspection

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IBM Technology, Sustainability Software team  
MACS klantendag, 6 Oktober 2022*



# Maximo Visual Inspection (MVI), overzicht

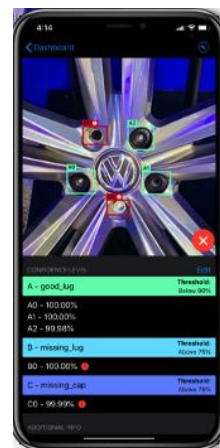
Doel: Analyseren van plaatjes en herkennen van specifieke kenmerken op dat plaatje, te configureren door een gebruiker zonder data-science achtergrond

Toepassingsgebieden:

- Kwaliteitscontrole in een productie proces (bv. voedingsindustrie, kleding, elektronica)
- Proces controle, status (bv. waterzuiveringsinstallaties)
- Verzekeringen (bv. kwalificeren van schades)
- Automatische inspecties (bv. bruggen, viaducten, elektriciteitsleidingen)

Uitvoering:

- Vaste camera
- Drones
- Robots



# Voorbeeld van toepassing bij Sund & Bælt voor het onderhoud van de Great Belt brug.

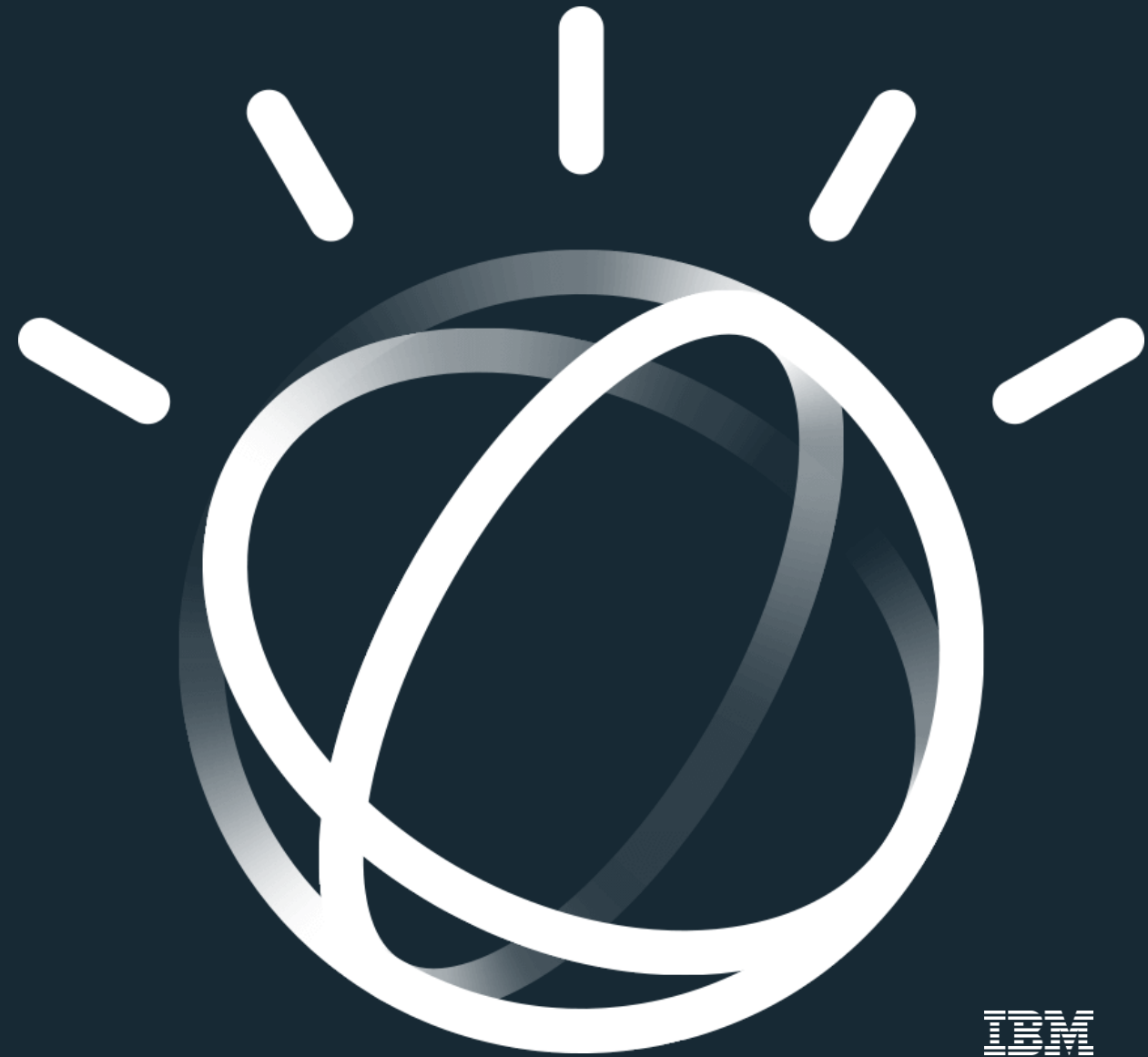
Video MVI use case at Sund&Bælt: <https://www.youtube.com/watch?v=b42pclnHJjs&t=57s>

# MVI, de stappen om tot automatische inspectie te komen.

1. Verzamelen van plaatjes van de te detecteren kenmerken
2. Labelen van de specifieke kenmerken
3. Trainen van het model
4. Analyseren van nieuwe foto's door getraind model
  - a. Handmatig via de UI op de MVI server
  - b. Via de API op MVI server
  - c. Op een Edge device of iPhone waarop het getrainde model is geïnstalleerd

# DEMO

Thank You




# MAS overzicht pagina


IBM Maximo Application Suite Take a tour ? 👤 ☰


## Suite navigator


**Applications** | Industry solutions | Add-ons | Tools


### Your applications


 **Digital Twin Exchange** ⋮


Browse, purchase, download, and manage digital twin resources that are provided by a growing ecosystem of manufacturers, OEMs, and third-parties. 


 **Manage with Health** ⋮


**Manage**  
Manage your asset lifecycle, workflow, and business processes and integrate with other enterprise applications. 


**Health**  
Manage the health of your assets to increase asset availability and improve replacement planning. 


 **Monitor** ⋮


Optimize operating performance by using AI-powered remote asset monitoring to obtain insights into failures. 


 **Predict** ⋮


Predict and manage the likelihood of future failures by applying machine learning and data analytics. 


 **Visual Inspection** ⋮

Unleash the power of deep-learning AI to quickly identify production defects and monitor assets for potential disruptions. 


 **Assist** ⋮


Use artificial intelligence and augmented reality to enable technicians to troubleshoot and repair equipment problems more efficiently. 

 **Safety** ⋮

Get proactive protection with personalized risk assessment to minimize workplace hazards and establish safer working environments. 

### More applications


 **MRO Inventory Optimization**

Use analytics and optimization algorithms to improve margins, increase service levels, and minimize unplanned downtime. 

# MAS overzicht pagina


IBM Maximo Application Suite | Visual Inspection

Welcome to IBM Maximo Visual Inspection




**Create data set**

Start by adding images and video files to a data set.




**Prepare data**

Label objects in images and video frames, then use auto labeling to finish adding labels to the whole data set; assign categories to images or videos, or label actions in videos.



**Train model**

Select a few custom options to create your model.



**Deploy model**

Deploy the trained model and receive an API link for an inference device.

[Get started](#)



# Data Sets

IBM Maximo Application Suite | Visual Inspection

Data sets

Selected: 0/120

View:

Select

Sort by: Select

<input type="checkbox"/> Create data set + Import .zip file	<input type="checkbox"/> HvG-Paperclips-prod... 10 items 5:32 PM, Sep 30, 2022 	<input type="checkbox"/> HvG-Paperclips 17 items 5:18 PM, Sep 30, 2022 	<input type="checkbox"/> Paper 11 items 7:54 AM, Oct 3, 2022 	<input type="checkbox"/> Sedimentation Tanks 0 items 8:10 AM, Oct 3, 2022 	<input type="checkbox"/> Paper 198 items 8:03 AM, Oct 3, 2022 	<input type="checkbox"/> orange_apple 10 items 2:25 PM, Oct 1, 2022 	<input type="checkbox"/> Plant Leaf Analysis 90 items 7:59 PM, Sep 29, 2022 
<input type="checkbox"/> HvG-Paperclips-augm... 306 items 5:21 PM, Sep 30, 2022 	<input type="checkbox"/> Transmission Lines 4,882 items 11:08 PM, Aug 8, 2022 	<input type="checkbox"/> Augmented Sediment... 234 items 1:54 PM, Sep 30, 2022 	<input type="checkbox"/> Sedimentation Tanks ... 13 items 12:48 PM, Sep 30, 2022 	<input type="checkbox"/> Plants 2,571 items 4:26 PM, Sep 26, 2022 	<input type="checkbox"/> wwbl Tank Inspection... 6 items 8:26 AM, Sep 29, 2022 	<input type="checkbox"/> MissingDataset_office... 1 items 8:16 AM, Sep 29, 2022 	<input type="checkbox"/> Augmented Sediment... 322 items 3:45 PM, Sep 28, 2022 
<input type="checkbox"/> Sedimentation Tanks ... 14 items 3:17 PM, Sep 28, 2022 	<input type="checkbox"/> MissingDataset_office... 9 items 5:21 PM, Sep 27, 2022 	<input type="checkbox"/> fabric-full 5,700 items 7:12 AM, Sep 27, 2022 	<input type="checkbox"/> Sample fabric 150 items 7:07 AM, Sep 27, 2022 	<input type="checkbox"/> aircraft dataset 13 items 2:12 AM, Sep 21, 2022 			

Items per page: 20 1-20 of 120 items

1 of 6 pages

# Data Set content

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## Data set / Transmission Lines

Total files: 4,882   Matching files: 4,882   Selected files: 0

[Train model](#)   [Augment data](#)   [Auto label](#)   [Export data set](#)

View:

Assign category   Label objects   Label actions    Select      

Sort by: Select

Drop files here

Import files

<input type="checkbox"/> Uncategorized insulator	<input type="checkbox"/> Uncategorized markerball	<input type="checkbox"/> Uncategorized hardware	<input type="checkbox"/> Uncategorized insulator	<input type="checkbox"/> Uncategorized markerball	<input type="checkbox"/> Uncategorized insulator
<input type="checkbox"/> Uncategorized hardware rustybolts insulator	<input type="checkbox"/> Uncategorized hardware	<input type="checkbox"/> Uncategorized insulator	<input type="checkbox"/> Uncategorized hardware	<input type="checkbox"/> Uncategorized markerball	<input type="checkbox"/> Uncategorized hardware
<input type="checkbox"/> Uncategorized insulator	<input type="checkbox"/> Uncategorized damper	<input type="checkbox"/> Uncategorized insulator	<input type="checkbox"/> Uncategorized damper	<input type="checkbox"/> Uncategorized damper	<input type="checkbox"/> Uncategorized insulator
<input type="checkbox"/> Uncategorized hardware					

Items per page: 20   1-20 of 4882 items   1 of 245 pages

# Labelling

IBM Maximo Application Suite | Visual Inspection

Label objects / HvG-Paperclips

Keyboard shortcuts | How to label

**Objects** + Add label

<b>A</b>	Red (3)
A1	Red
A2	Red
A3	Red
<b>B</b>	Green (1)
B1	Green

Filter objects

**Zoom**

Release mouse to finish drawing.

Zoom

# Labelling

The screenshot displays the IBM Maximo Application Suite Visual Inspection interface. The main window shows a data set named 'HvG-Paperclips' with 17 total files, 17 matching files, and 0 selected files. A modal dialog titled 'Augment data' is open, allowing users to select filters for data augmentation. The dialog includes a 'Sample' image of a house and a grid of filter options with preview images. The background interface shows a sidebar with filters for Images, Videos, Auto labeled, and Confidence, and a main area with a 'Drop files here' section and a grid of image thumbnails.

**IBM Maximo Application Suite** Visual Inspection

**Data set / HvG-Paperclips**  
Total files: 17    Matching files: 17    Selected files: 0

**Augment data**

Select the filters to use to augment your data. A new data set will be created that contains the original data as well as additional images created by using these filters. Visit the [IBM Documentation](#) for more information about data augmentation.

Currently selected: 17    New creations: 0    New total: 17

Blur     Color     Sharpen     Rotate     Crop     Noise     Vertical flip     Horizontal flip

Cancel    Continue

# Train model

IBM Maximo Application Suite | Visual Inspection

Train model / HvG-Paperclips

GPU usage ① 0 1 available 2

Advanced settings Off

Train model

Model name  
HvG-Paperclips\_model

Select type of training ①

**Image classification**  
Classify an entire image according to its visual content based on the relationship of nearby pixels.

**Object detection** ✓  
Detect instances of particular classes within images or videos using rectangular or polygonal bounding boxes.

**Action detection**  
Classify brief, temporal actions in video. Actions of interest will be located in both space and time.

Optimize model using ①

**Faster R-CNN** ✓  
Highly accurate for locating object bounding boxes in both images and videos. Generates a model in a TensorRT format by default.

**Tiny YOLO v3** Updated  
Optimized for speed but can be less accurate. Generates very small models that work well for embedded devices. Generates a model in CoreML and TensorFlow Lite format by default.

**YOLO v3** Updated  
Optimized for speed. Generates small models that work well for embedded devices. Detects small objects more accurately than Tiny YOLO v3. Generates a model in CoreML and TensorFlow Lite format by default.

**Detron**  
Best for object detection and segmentation of small objects. Generates accurate but large models.  
 Enable segmentation

**Single shot detector (SSD)**  
Suitable for real-time inference. Works well for embedded devices. Almost as fast as YOLO but not as accurate as Faster R-CNN. Generates a model in a TensorRT format by default.

**High resolution**  
Supports model training and inference on high-resolution images. Precisely detects the unique features of smaller objects. Generates accurate but large models.  
 Enable segmentation

**Anomaly optimized** Tech preview  
Optimized to detect anomalous objects. Highlights anomalies, such as scratches, chips, and dents, in detected objects. Provides confidence scores for both detected objects and detected anomalies.

**Custom packaged model**  
Provide source code and weight files. Perform training and inference within IBM Maximo Visual Inspection. Learn more here.

# Uitvoeren via de web UI

IBM Maximo Application Suite | Visual Inspection

api/dlapis/5a006c90-60c7-4720-b7af-e345493ad03e Copy GET POST

### Test Model

Results history

Drop image or video here

Confidence threshold [0.1-1.0] 0.5

External URL URL Upload

Video annotations  Dots  Bounding boxes

Import

### Objects

dirty(130 objects)



clean(104 objects)

### Results

Confidence threshold 0.5

Objects	Result	Average
<b>A</b> clean 1 objects	0.998	-

Zoom



# Uitvoeren op Mobile app

