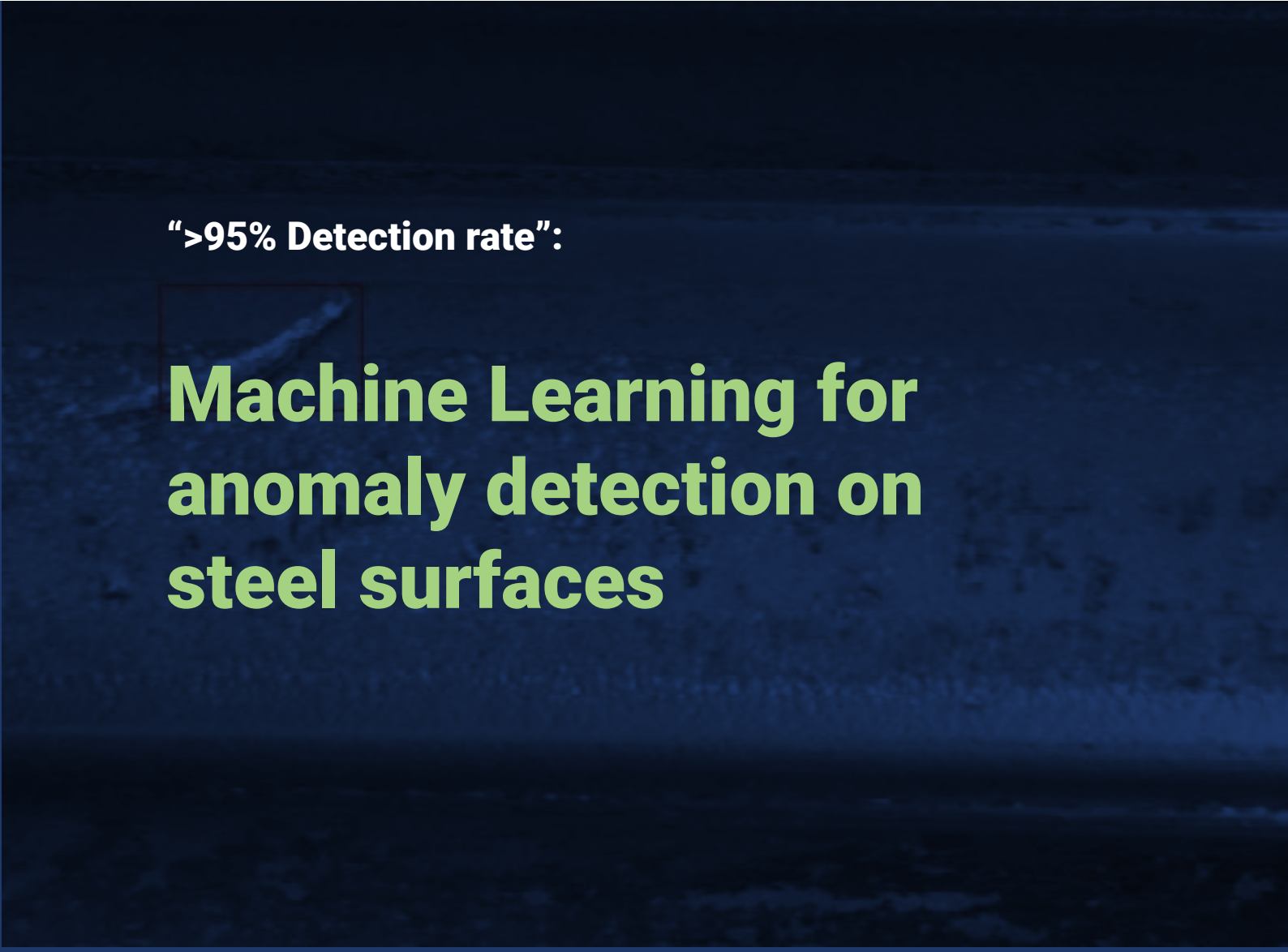

“>95% Detection rate”:

Machine Learning for anomaly detection on steel surfaces

The challenge:

In the past, it has been difficult to inspect vibrant/vivid materials like steel, wood and fabric for anomalies.

It is extremely difficult to design a traditional, feature based algorithm to detect anomalies in such materials. Often a traditional algorithm would have flaws, like too high false reject rate or a low detection rate on certain type of defects.With Machine Learning, this can be trained to a network, based on a large annotated sample set. A network is trained with both anomalies and acceptable sample images.

The optimum state of the Machine Learning network, is when the network is capable of generalizing and thereby detect anomalies in unprecedented images.
The JLI Rail Surface Inspection, is an example of a system, which previously required a number of people to visually evaluate each image for anomalies. The job requires a high level of focus and can be very cumbersome.

A Machine Learning solution on top of the Rail Surface Inspection, makes a lot of sense, when it comes to robust, repetitive inspections on the fly.

JLI vision a/s
www.jlivision.com

For further information, contact us at info@jlivision.com

Solution:

Combining advanced machine vision with machine learning

JLI designed a network that could work on the output from the Rail Surface Inspection system. The network was trained on a large number of annotated anomalies and tested on +10.000 images to ensure a low false reject rate and high true detection rate.

It is of great importance that a Machine Learning network is able to handle the large data flow – in the Rail Surface Inspection system case – live stream pictures from 6 mega pixels cameras. The hardware design utilizes a GPU to accelerate the algorithm locally. It can be scaled with more GPU's if required.

JLI have chosen to execute the Machine Learning network locally to avoid any latency in execution

The JLI Steel inspection system is designed to withstand the harsh environment. The Machine Learning network performs inline inspection for anomalies. Faster, better and more reliable than any human.

JLI vision a/s
www.jlivision.com

For further information, contact us at info@jlivision.com

Results:

Detection rate is >95% which is better and more consistent than the previous manual inspection.

Defective images are stored for review by an operator, who can decide how to handle defects.

An early warning signal can be raised, when recurring process related defects are detected. This feature, enables the operator to use the Anomaly Network as a tool to improve production yield and gain a higher throughput of good objects.

What is "hybrid vision"?

Hybrid vision by JLI vision is a combination of:

- Traditional machine vision with the use of 2D and 3D
- Machine learning
- Craftsmanship and deep knowledge about cameras, lenses, lightning, productions environments, etc..

Hybrid vision is the perfect solution for "aesthetic" applications. Aesthetic inspection aims at ensuring that the finished product fulfills the end-user's or consumer's expectations. Typical defects could be scratches, holes or color deviations. As opposed to structural applications it can be difficult to define objective requirement specifications.

JLI is currently experiencing an increasing demand in inspection of aesthetic defects in vivid materials.

The JLI Anomaly Network is a state-of-the-art technique to solve these inspections tasks. The Anomaly Network can also be combined with traditional vision to get the best from both worlds.

JLI vision a/s
www.jlivision.com

For further information, contact us at info@jlivision.com