

LOTYLDA DL

Deep Learning

LOTYLDA DL

It is an **Artificial Intelligence tool for advanced quality control or machine diagnostics**. It uses machine vision and deep neural networks. It is ideal for image, video, sound, or vibration recognition. Neural networks learn similarly to humans when they use real-life examples (patterns) that influence the reaction to stimuli from the real world.

Their advantage is the ability to generalize i.e. the learned knowledge is applicable to various conditions different from the original one used in the learning process. An example can be the recognition of parts where the network is set to identify different types of pads. The new M4, M6 and M8 pads were used as a model. Once learned, the network is able to recognize an M2 or even M32 size pad of different age and pollution.

LEARNING

The system learns by patterns identified by the user in a web browser. The detected types of defects are determined. The learning takes place on a powerful server that can also be rented.

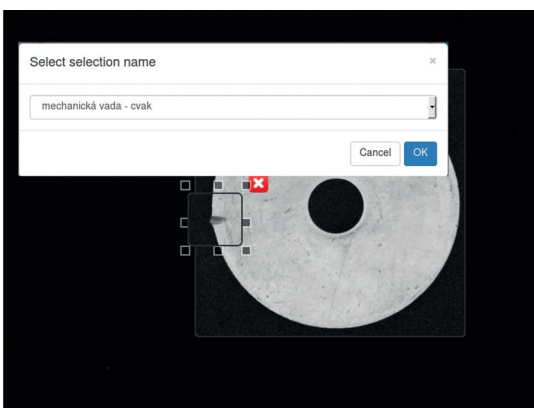
EXTRA LEARNING

The system can be improved by adding new patterns. In the event of a new defect, the user only marks new images and lets the system learn automatically. All processes are run on a user-friendly basis without the need of extra programming.

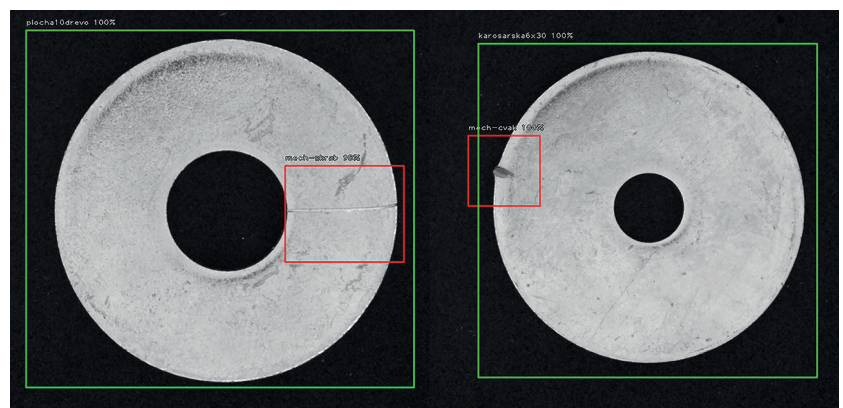
QUALITY CONTROL

VISUAL CONTROL

- detection of surface defects of material
- in still pictures
- by video - the ability to look for dependencies in video development
- can be run on a less effective computer



Defect marking



Visual control

POSSIBLE APPLICATION

- quality control, selection of parts, production processes check
- LOTYLDA DL is optionally delivered with cameras, lighting, and PC
- possible extension in 2D dimension measurement ($\pm 0.002\text{mm}$) or in 3D ($\pm 0.02\text{mm}$)

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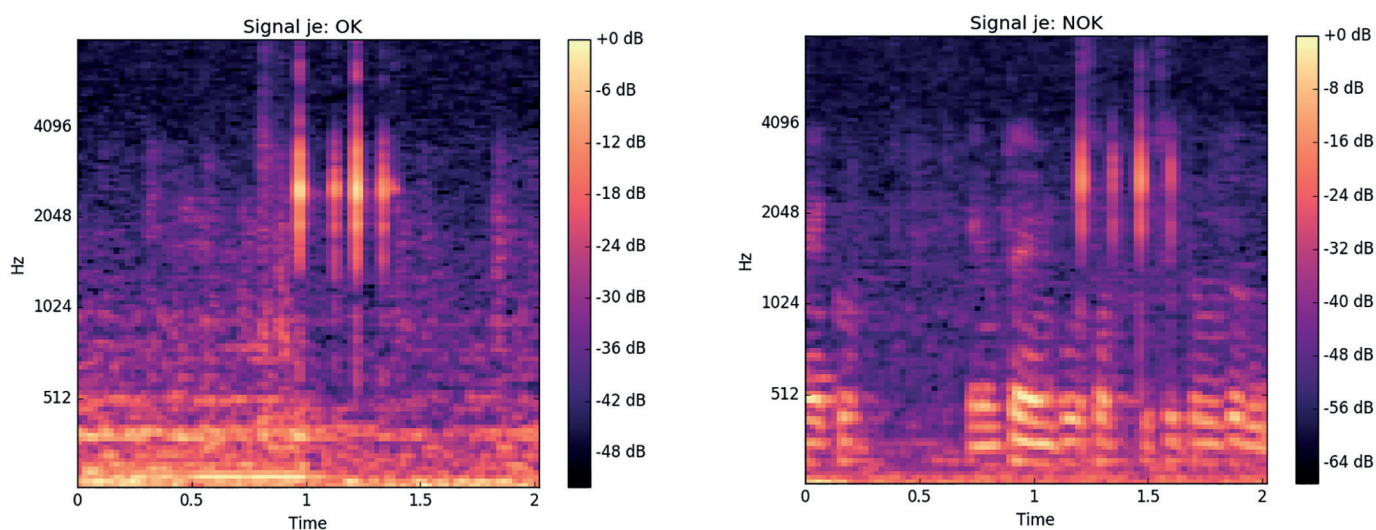
Deep Learning

ANALYSIS OF SOUND AND SIGNAL

Desired sound is possible to classify into categories (OK, NOK) or predict its future development (machine diagnostic). There is used microphone for recording sound in **audible and inaudible spectrum**. Then the sound data is inputted into neural network after Fast Fourier transform (FFT). Neural network is looking for similar patterns to classify sound or it explores dependences in time between previous and predicted sound.

CONTROL BY SOUND

OK / NOK sound classification by patterns. Sound development analysis.



LEARNING

User marks significant areas in record.

The screenshot shows the neurotylda web interface. At the top, there are navigation tabs: neurotylda, Images, Audio, Settings, and Trash. Below the tabs is a file list with several .wav files. The file '1510953658.wav' is selected. To the right of the file list is an audio player showing a waveform. A segment of the waveform is highlighted in blue, corresponding to the 'disk-error' event. Below the waveform are playback controls: Play, Start, Pause, and Stop. At the bottom right of the interface, there are buttons for 'Verify file' and 'Update file'. Below these buttons is a table with columns for Start, End, and Name.

Start	End	Name
0:22:382	0:26:864	disk-error