Applications of Artificial Intelligence in Lumber Industry

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BID Group GradExpert[™] - 15 years of Innovations



- > More than 130 transverse autograders sold
- R&D driven company
- > Several new products developed
- > Switching to Linux platform
- Using Machine Learning since first autograder
- > Introducing Deep Learning Al Module
 - > Species Identification
 - Wood Defects Detection

What is Artificial Intelligence?

- Simulation of human Intelligence Processes with computers
- Computers are fed with large amount of data. They interpret and process it on their own Deep Learning ≠ Machine Learning

Input

 Information is analysed through "Neural Network" – brain inspired network of interconnected layers of algorithms

Hidden

Output





The Evolution of Al





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Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Proof of Concept - Al Wood Species Identification

- First prototype of the new product "SpecPro" developed uses a spectrometer to acquire the data and process it through AI neural network algorithm
- Average accuracy for Spruce vs Balsam separation at the sawmill: 93%











SpecPro Second Generation

- New version combines color vision and AI Deep Learning Platform
- No contact with lumber, no consumable and same accuracy in winter-summer seasons
- Offer standalone or add-on to an existing optimizer
- Low maintenance system



SpecPro Accuracy

Systems currently installed and running

- Eastern Canada Jack Pine vs All (Spruce + Balsam) at the planer mill = 99%
- Eastern Canada Balsam vs All (Spruce + Jack Pine) at the saw mill = 98.9%

Tests ran at the office for species identification with dry lumber

- Spruce vs Lodgepole pine = 98.8%
- Spruce vs Alpine fir = 97.7%
- Spruce vs Alpine fir vs Jack Pine vs Larch = 98.3%
- Spruce vs Alpine fir vs Lodgepole pine vs Hemlock vs White pine = 96.5%
- Hem fir vs Dfir = 99.99%
- Larch vs Dfir = 99.99%
- Hardwood Soft Maple vs Hard Maple vs Red Oak vs Cherry = 98.3%





Artificial Intelligence Used for Defects Detection Deep Learning for Several Wood Defects

- Our system is fed with data from boards from various provenance
- Using our in-house software, wood defects are tagged and the data is analyzed by the AI platform
- Several AI models are tested and optimized to achieve the best accuracy
- The system can be improved by adding new samples





Artificial Intelligence Tool - Demo





Grade Stamp Detection and Identification with AI Accuracy on grade stamp detection – 99.7%Accuracy on grade stamp detection and identification – 7 different stamps: 99.5% No grade stamps

VS

















Water Pockets Detection

Accuracy: 99.6%



VS









1536931829.0.5045.mid.bot.1.0.nng



1536931829.0.5045.mid.bot.1.1.nna



1536931829.0.5045.mid.bot.1.2.nng



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Visual Face Skip with AI

Accuracy: 99.4%



VS

















Rot Detection (end camera)

End Rot detection on small sample 93.7%











1528373845.0.2103.hi.near.end.0.png







1499840324.0.5157.hi.near.end.0.png



1528373897.0.2200.hi.near.end.0.png







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Rot Detection with Raw Image

VS













Knots Prediction Using Al Platform

Cedar





Rot Prediction Using AI Platform











Cedar

















Mixed Wood on the Chains with Al

Accuracy: 99.31%



VS





Optimization team The brains behind the Al







