

BOOK OF ABSTRACTS

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Automated wood species identification in microscopic images of fibrous materials using machine learning / AI

T5.16 IAWA-IUFRO Symposium: Advancing Methods and Applications of Wood Identification
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Abstract: Illegal deforestation is a global problem that affects us all. The laws designed to prevent this are only as good as they can be controlled over a wide field. Meanwhile, the global production of paper and fiberboard is constantly increasing. The wood species composition of a small amount of these materials is currently analyzed at great expense by highly qualified wood anatomists. In order to improve this time-consuming process, our latest research project was initiated. The goal of this project is to simplify the application of the controls worldwide by using machine learning. To achieve this, a methodology for the systematic generation of a large image dataset of macerated wood references was developed. For the dataset, stained specimens of vouchered wood samples were prepared. Overview scans of entire slides allow the display of as many individual cells as possible in five focal planes in one image file. The first dataset contains more than 2,000 of these huge microscopic images of hardwood and softwood genera. These images form the basis for a modern image recognition software that uses deep neural networks to detect and correctly identify the contained species. The final solution will be the first approach for the fully automatic identification of the most common wood species in fibrous materials. A modular and generalizable combination of artificial intelligence solution is used to achieve this goal.

The presentation will show how microscopic images of fiber samples can be analyzed with these algorithms by using a specifically designed graphical user interface. It will close with a comparison between wood anatomists and artificial intelligence.

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