Quantitative Wood Anatomy (QWA) anomaly detection

Description:
Quantitative Wood Anatomy (QWA) analyzes multiple anatomical features of microscopic wood images of thin sections. These features can be directly related to environmental influences during tree growth. For this analysis, specialized software detects the lumen area of tree cells. Recently different machine learning tools emerged which increased the performance [1,2]. A still challenging and untackled problem is to distinguish between anomalies in the wood and the analyzable structures. Therefore we aim to train a deep neural network for segmenting different anomalies.
[1] https://www.frontiersin.org/articles/10.3389/fpls.2021.767400/full
[2] https://link.springer.com/article/10.1007/s00521-019-04546-6

Keywords:
Deep Learning, Semantic Segmentation, Instance Segmentation, Quantitative Wood Anatomy, microscopic thin slice images.

Labels:
Semester Project, Bachelor Thesis, Master Thesis

Goal
  - Implement a deep learning algorithm to detect anomalies in QWA images
  - Generate labels with the help supervision of Experts for Rays, Resin Ducts, ruptured cells, and Non-Cell areas with CVAT
  - Adapting, and evaluating deep learning models for this task
  - Investigate possible improvements for unbalanced classes

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