TreeTrace

Biometric fingerprints of trees: log tracing from forest to sawmill and early estimation of wood quality

With the increasing amount of imaging devices installed at sawmills, the importance of using these data for improving workflow and for increasing revenues in the wood processing industries is growing. In this context, challenging questions with respect to imaging and image processing technology arise, several of which will be tackled in this joint project.

The project considers two application cases as follows: The first application case is the question of tracing tree logs from the forest harvesting site to the sawmill by using biometrics related tree log recognition techniques based on image processing of cross-section data only. This approach of course assumes the additional availability of imaging sensors in the forest. Since there is a trend for installing CT imaging devices at sawmills, which are of course not available in the forest, the challenging issue of cross modality matching arises. The second application case is the determination of wood quality from cross-section imagery, applicable already in the forest, and/or at the sawmill.

Obviously, these two application cases share many aspects. (1) They can be combined at application level, i.e. wood quality may be determined already in the forest due to imaging devices available for the tracing application, and further refined using the sensors available at the sawmill. Conversely, CT data from the sawmill, acquired to analyse the wood quality, can be used for the tracing application; (2) data preprocessing and many features extracted are required for both, matching cross section images as well as automated wood quality analysis; (3) the questions which imaging sensors should be employed and how the resulting data can be combined effectively have to be answered.

Thus, synergies arise between these two application cases which will be efficiently exploited in the project. A common data set for experimental validation can be used (which implies also sharing employed sensors), ground truth data established wrt. annotating images can be shared, many software components implementing preprocessing (e.g. pith detection, cross section texture segmentation, contrast optimisation) as well as feature extraction techniques (e.g. annual ring detection, spiral growth detection) can be developed jointly and shared subsequently.

The project will break new grounds in the area of wood imaging and processing of corresponding data with advanced algorithms in vision and machine learning with particular focus on cross modality processing. While those techniques are being developed for two specific application cases, the developed algorithms will be applicable to a wide range of applications in wood imagery processing and analysis as well as for other domains where similar settings arise.