Bark recognition on *Robinia pseudoacacia* L. logs using computer tomography

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1 Introduction

Information on log dimension and its internal wood properties are very important to determine the quality of wood. Computer tomography can support decisions on wood products and the way they should be used as it creates a model of the internal stems properties. A CT.LOG scanner is installed at FVA Baden-Württemberg, which allows such investigations. This project aimed to develop an automated method to detect the boundary between bark and wood in *Robinia pseudoacacia* L. using in CT reconstructions of cross-sectional slices, in order to calculate the wood dimension under bark for further use of the logs in round shape for construction purposes.

2 Material and methods

Seven trees of *Robinia pseudoacacia* L. were felled and cross-cut into 21 logs of different length. The logs were scanned on a CT.log® tomograph and disc slices reconstructed in 5 mm slices along the log length (Figure 1). Stem diameter under bark was derived from the CT reconstruction using image analysis procedures. Physical reference measurements of stem diameter under bark were carried out on stem discs taken at defined positions in the log to match with the disc slices of the CT scan, and compared to the diameters extracted from the CT.

An individual grey scale threshold value was derived for selected disc slices to mark all pixels representing wood/bark boundary as accurate as possible. This way a preliminary interval of potential threshold values was determined representing grey values between 750 to 850. It was found that using these threshold values, the boundary between wood and bark could be detected in good approximation. In a second step the sensitivity of the threshold values in the identified grey values interval was tested. Four diameters per slice were measured step-wisely increasing the threshold values in the given interval and

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compared to direct measurements on the respective stem disc (Figure 2). The grey value of 820 was found to mark the wood/bark boundary most accurately and was applied as constant threshold value in an automated procedure to extract the stem diameter under bark in the CT reconstruction for the full length of the logs.

Figure 1: *Robinia* stem disc (left) and CT reconstruction slice (right)
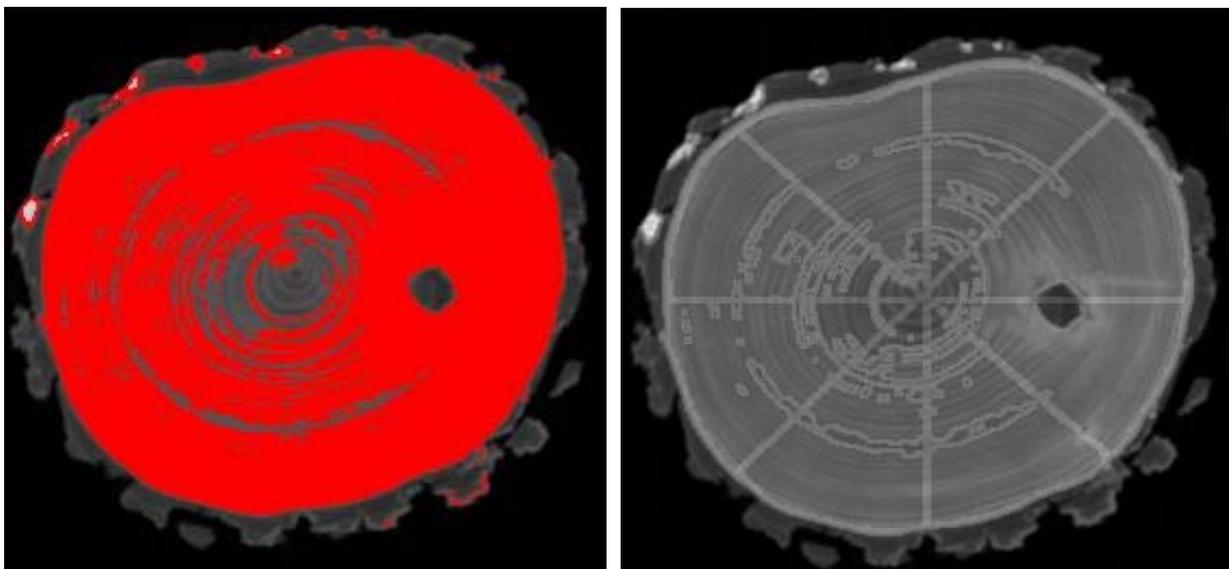
- Figure 2: Slice with threshold and slice with boundary and diameters

Validation on an independent set of slices and discs however showed that the diameter of the woody cylinder was systematically overestimated by 0.5 to 1.1 cm. Further refinement of the settings of the threshold value for an automated detection procedure is ongoing.

Key words: Computer tomography, wood/bark boundary, automated detection procedure