A new software to analyse wood anatomical features in conifer species

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1. BACKGROUND

☞Wood anatomy analyses are a powerful tool for investigating past environmental dynamics, and have the advantage of a very high temporal resolution.

☞The study on the variation of the wood anatomical features started in the 1960s, but has intensified lately due to the development of high precision digital image technologies.

☞Image analysis software products are largely used nowadays for this purpose, although they have the disadvantage of not being specialized in identifying explicit cell features.

2. AIM

To develop an easy to use, flexible and efficient software to measure anatomical features in transversal wood sections of conifer species.

3. SOFTWARE DESCRIPTION

Technical details and requirements:

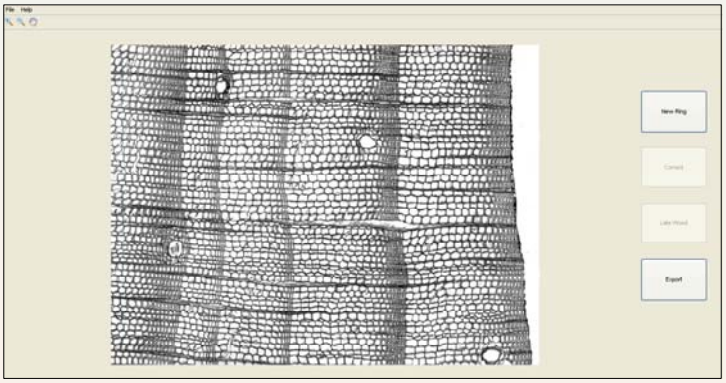
☞Free Matlab®-based software (available on request)

☞Operating systems: Windows XP or newer; Mac and Linux under development

Outputs:

☞Measured anatomical features include **number of tracheids** per ring, **lumen diameter**, **cell-wall thickness** and **total cell diameter**. The **area** of the tracheids will also be available in the short future.

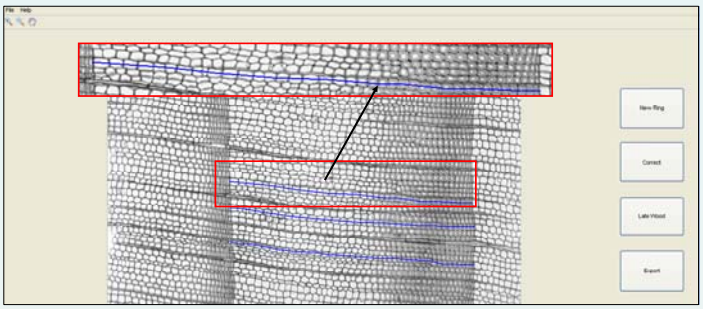
☞The exported measurements are given at the whole ring level and/or separately for the earlywood and the latewood.



4. EXAMPLE OF APPLICATION

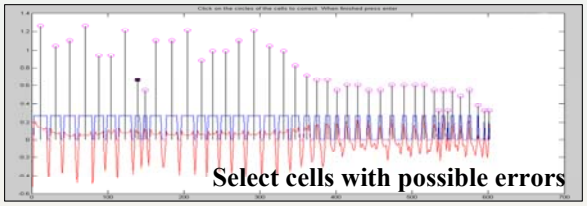
Basic functioning:

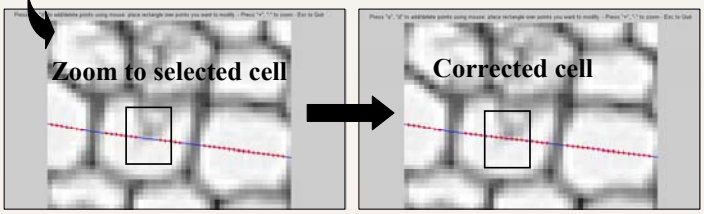
☞Several radial rows of tracheids can be marked along tree rings using a segmented flexible line.



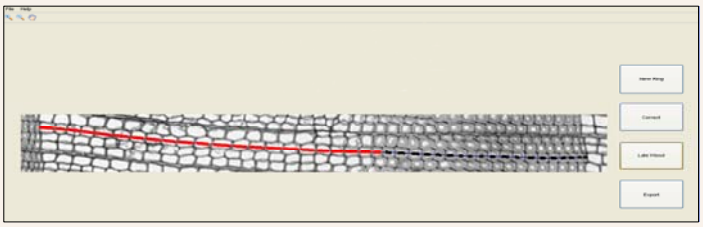
☞State-of-the-art thresholding techniques are used to automatically detect the tracheid features.

☞A pixel by pixel correction is further on possible through a graphical interactive interface, allowing an accurate delimitation of the tracheid lumen and cell walls.





☞Separate latewood from earlywood.



☞Data export in “Excel” or “text” format.

5. CONCLUSIONS

The main methodological advantages of this software are:

☞the **high flexibility** of the line used to mark the tracheid rows to be analyzed within a tree ring;

☞the quality of the **thresholding method**;

☞the **easiness and precision** to correct possible errors.

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