COMBATTING ILLEGAL TIMBER TRADE USING CHEMICAL FINGERPRINTS: THE POWER OF MATHEMATICS, MASS SPECTROMETRY AND NEAR INFRARED DATA

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BACKGROUND

All

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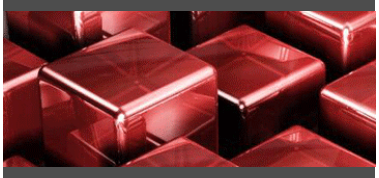
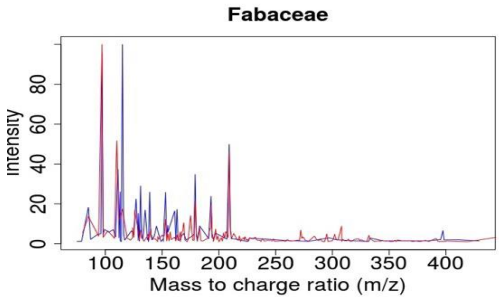


Background

Combatting illegal timber trade using chemical fingerprints: the power of mathematics, mass spectrometry and Near InfraRed data.

The identification of timber species in trade to combat illegal logging has become prominent. Current techniques for species identification of traded timber are isotope-analysis, wood anatomy and DNA-analysis. However, these techniques are often time consuming and are sometimes only capable of identifying to the genus-level. A new technique uses Direct Analysis in Real Time – Time of Flight Mass Spectrometry to determine the species almost instantaneously. A small piece of wood is held in a heated helium gas stream which leads to ionization of the molecules in the wood piece. The obtained chemical mass-spec pattern (chemical fingerprint) can be unique for a species and allows identification. Hyperspectral NIR imaging is a promising technique as well for wood identification, given it is non-destructive and easy and fast in use.



Scope of the thesis

Over 600 mass- and NIR-spectra (30 species) are available for the student to discover. The student will determine a model that is capable in distinguishing the different species based on the mass-spectra and/or NIR-spectra. The student will use chemometrical and machine learning methods, in particular he/she will implement specific clustering and classification algorithms aiming at automated wood identification. Requirements: no prior experience with machine learning techniques is expected, but an interest in data analysis is appreciated. It is recommended to follow the course Predictive Modelling (Prof. Dr. Willem Waegeman).