

A QGIS based workflow for optimized cable road layout planning

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1st International Electronic Conference on Forests, 15–30 November 2020

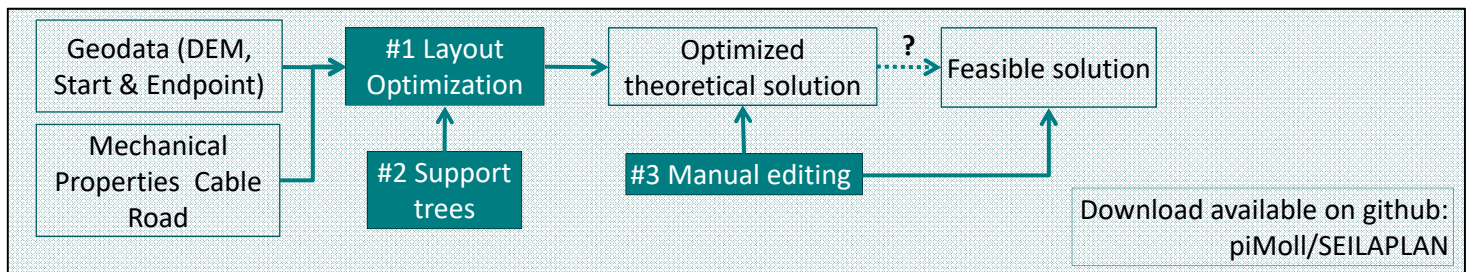


Context: Cable logging is the principal wood extraction method in steep terrain.

- Planning of a cable road is a complex task
- Available planning tools do not fulfil the requirements of the practice (unprecise or unknown method to compute skyline properties / not integrated in a GIS / do not optimize the solution)
- Solution may not be feasible as not matched with existing trees (for supports)

Aim: User friendly QGIS plugin, containing an optimization algorithm based on catenary and detecting support trees

Results: Workflow in QGIS

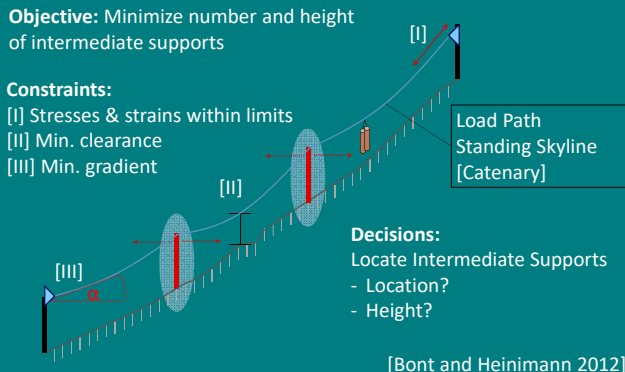


#1 Optimize cable road layout

Objective: Minimize number and height of intermediate supports

Constraints:

- [I] Stresses & strains within limits
- [II] Min. clearance
- [III] Min. gradient



#2 Identifying support and anchor trees from remote sensing data

- Objective: Predicting Tree Height and DBH from available Remote Sensing data
- 72 method combinations were evaluated (3 Types of CHM x 8 Filter Methods x 3 Tree detection algorithms)
- Best results were achieved based on ALS Data - resolution dependent Gauss Filter - local maxima tree detection algorithm
- Tree position and tree height of the correctly detected trees show useful accuracies for cable line planning.

#3 Manual Editing

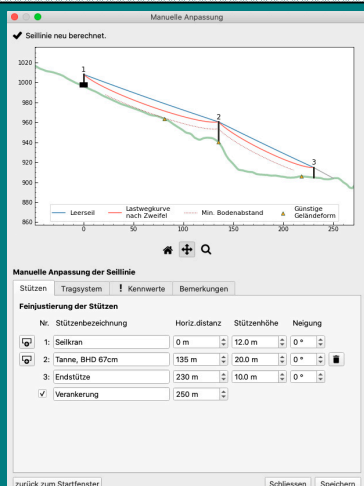
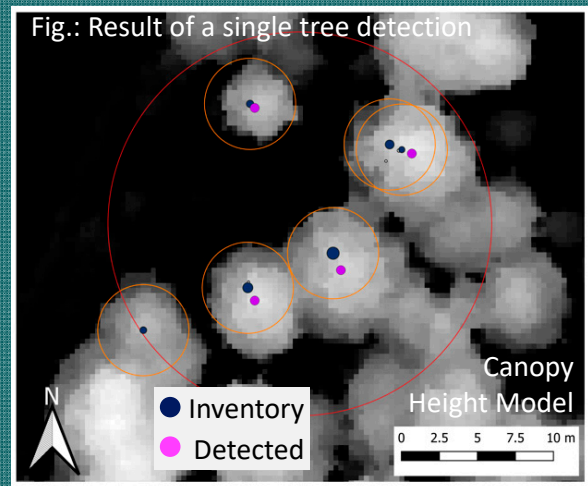


Fig.: Result of a single tree detection



Conclusions & Outlook: Workflow simplifies Cable Road planning and calculates more efficient solutions

- Master version available
- Ability for manual editing remains necessary