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Road Detection and Characterization from LIDAR Data

Summary

Lack of knowledge about private roads makes it hard to plan an energy efficient route for logistics. Skogforsk wants to broaden their knowledge to optimize the energy consumption and cost using LIDAR data. Information about the road's slope, width and crossfall and the ditch depth tell us whether a road is and accessible or not. This was to be achieved by evaluating the LIDAR data and mock GPS coordinates about roads of interest.

Introduction

A challenge in the forestry industry is logistics. This is a huge cost, both financially and in terms of energy consumption.

Knowledge of the roads properties is important in order to estimate the energy consumption for a route, as well as the roads accessibility and bearing capacity during various seasons.

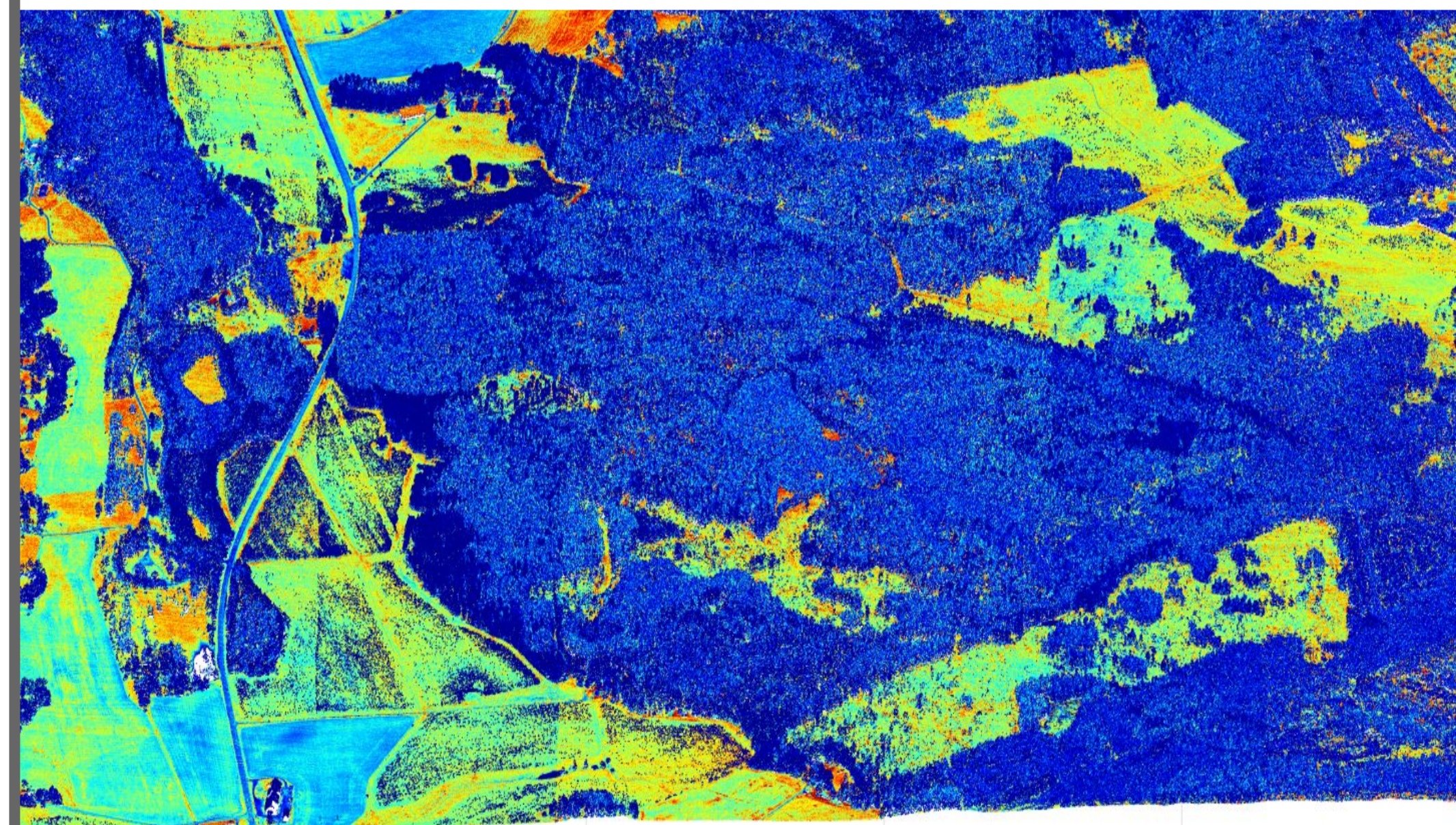
LIDAR data is accurate 3D-laser data also containing i.a. intensity values. LIDAR data has not yet been used in large scale extraction or characterization of roads.

Problem and Goals

Using LIDAR data and GPS data from trucks, driving on roads of interest, construct a deterministic algorithm that:

- computes gradient of roads of interest,
- estimates road width, crossfall and ditch depth of the roads.

GPS data is inaccurate and GPS coordinates cannot directly map to LIDAR data. We need to detect and extract relevant data from the dataset.



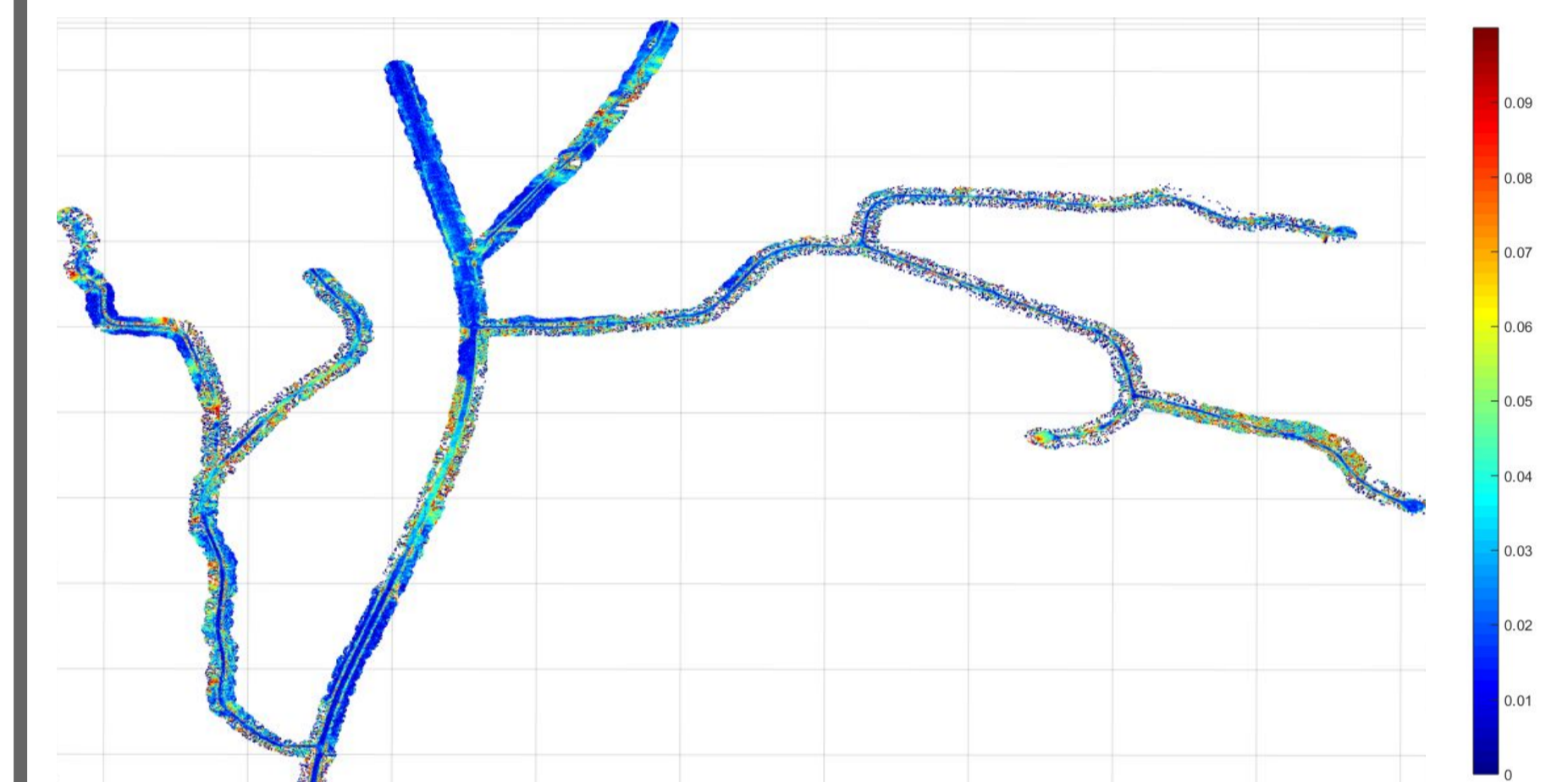
The LIDAR data set used in this project. The colors represent intensity values.

Future work

- Solve the problem with the road detection → Better results.
- Road detection without truck GPS data → More universal and useful algorithm.

Results and Conclusions

- Road detection - Unsuccessful, unable to distinguish roads from other flat surfaces.
- Road gradient - Successful, would be more useful with successful road detection.



The road gradient. The colors represent the slope in percent and the scale is from 0 to 10 percent.

- Road width and crossfall - Algorithm might be sufficient with successful road detection.



The road width. The colors represent the width in meters. However the width is actually the width of the whole flat surface, not only the road.

- Ditch depth - Still needs to be implemented.

Project in
Computational Science

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