LiDAR Change Detection

ABOUT

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INTRODUCTION

LiDAR change detection is a valuable method used in geomatics engineering to determine changes in important components of an area over time. This project focuses on developing a semiautomated method to classify aerially collected point cloud data using ASPRS classification standards.



Fig 1: Image of Area of Interest.



Fig 2: Data Validation Points

OBJECTIVE

The goal is to detect significant changes in the University of Calgary's main campus from two aerial LiDAR datasets recorded at different times. Changes detected for buildings, ground and other man-made objects

METHODOLOGY

- Classify LiDAR point cloud data of University of Calgary's main campus for 2019 and 2022 into buildings, ground, and other man-made objects using ArcGIS Pro.
- Validate point cloud data by comparing elevation values of the point cloud data with the surveyed values of ground
- Generate Digital Elevation Model (DEM) for ground and footprints for buildings and manmade objects from the classified point cloud data.
- Comparing footprints and DEMs in ArcGIS Pro to visually detect changes including removal, addition and modification.
- · Deliverables are generated in terms of shapefiles and DEMs



Fig 3: Unclassified Data



Fig 5: Digital Elevation Model

RESULTS



Fig 4: Classified Data



Fig 6: Building Footprint

Fig 7: Building Footprints from 2019 (Purple) and 2022 (Orange)

CONCLUSION

Our sponsor company, OGL Engineering, represented by our mentor, Sam Rondeel, specializes in aerial surveying and has flown surveys over the University of Calgary campus on multiple occasions over many years, two of these occasions in 2019 and 2022. They have provided our group with unclassified point cloud data from those flights which we will classify and then detect any changes in the ground, buildings, and other permanent man-made objects such as bridges. Points will be classified to ground, building, other, and default for data in both years and then changes in each will be detected. For the ground, a threshold of 1m will be used to detect any changes in the ground elevation between the two datasets. Changes in any buildings and other permanent manmade objects will be qualified by if they have been destroyed, newly built, or changed in any way between the two datasets.

