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Predicting Glacier Thickness: A Machine Learning Approach

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This study aims to determine glacier thickness based on observational data. Due to global warming the rising temperatures leads to increased melt from land-based bodies of ice. Increased melt from glaciers both pose a risk to societies that are based along rivers produced from glacier discharge, as well as having direct impact on sea level rise. Determining the thickness or the mass of these glaciers help to better predict increased river activity and sea level rise.

In this study, three different Machine Learning algorithms were used. First a Boosted Decision Tree and Neural Network model were implemented based on field measurements, to compare the performance based on the mean absolute error. Secondly, a Convolutional Neural Network were implemented on the field measurements and satellite images to test if the additional observations would improve the model.

From this analysis we found that the Boosted Decision Tree, XGBoost, had the lowest mean absolute error and thus was the best at predicting glacier thickness. Using the Convolutional Neural Network with satellite images, did not improve the precision compared to the other models. Further work could include adding additional features to the data, such as latitude and longitude to the satellite images and surface temperature at the location of the glacier to increase the precision of the prediction models.

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