

ShortTitle: GeoPointClouds

Title: 3D point clouds for geological investigations: python package for I/O and feature calculation

Project lead and contact details: Zane Jobe and Nataly Chacón Buitrago, Colorado School of Mines zanejobe@mines.edu

Suggested team size: 2-4

Logistics: Can work from anywhere, but an office on Mines campus will be available for use.

Project description: The proliferation of 3D models created from drone flights or LIDAR surveys has revolutionized the way geologists study outcrops, enabling them to extract spatial statistics from the models. However, tools to manage point cloud data and extract these statistics are desperately needed to enable automated lithology predictions using machine-learning. You would help build a python package to:

- import and export point cloud data
- user-selected sub-sampling methods
- calculate color-based transformations (e.g., RGB to LAB)
- calculate geometric features (e.g., normals, nearest-neighbor)
- find and remove outlier points

This package would be deployed on Github and PyPi under an Apache 2.0 license. No intellectual property issues (everything that is generated will be open-source, open-access).