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Using Deep Learning Approaches to Determine and Map the Spatial Extent of Core Trays

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Summary

Core photography is a rich source of geological information that contains important textural, mineralogical and geotechnical information. Currently, core photography is underutilized in exploration and mining due to inconsistencies in the data and the difficult task of transforming historical photography into the cropped and depth-registered form required for integration with other geological data.
Photographs taken on different sites are now mostly standardised, but we have millions of historic core images from 100s of thousands of drill holes. As a new generation of image analysis techniques is becoming more powerful and prevalent within exploration and mining, these large image repositories will eventually become rich sources of quantitative data. Cropping core images is an exhausting job when done manually. When the core trays aren't in a locked position relative to the camera which is the case for much historical core images, cropping need to be manually adjusted in each image. Depending on the quality of the core image, each drill hole could take up to an hour to manually crop. If the exact extents of the core rows can be automatically defined, then this could result in up to 80 – 90% decrease in the time spent cropping drill core images manually.
This study will focus on different deep learning algorithms, specifically Convolutional Neural Network techniques to identify core boxes automatically. Approximately 2000 core images and corresponding mask images (created by our geologists from our database) will be used for training and validation and 200 images will be used for testing purposes.