Learning from UAV based Spatio-temporal-Spectral Environment Maps

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Semester Project - Intermediate presentation

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Goal

- Thanujan Mohanadasan's Master Thesis: Multispectral Environment Mapping and Inference using Aerial Imagery
- Built pipeline from aerial images to 3D point clouds and 2D orthomosaics
- Multiclass segmentation using 41 spectral bands
  - Best accuracy: 67.7%
  - Best F1 score: 62.1

- Find out whether the classification accuracy can be improved using convolutional networks

Approach

- Extend Thanujan's methods to convolutional networks

- Choose fitting software
- Data preparation
- Machine learning methods

Current progress

Choose fitting software

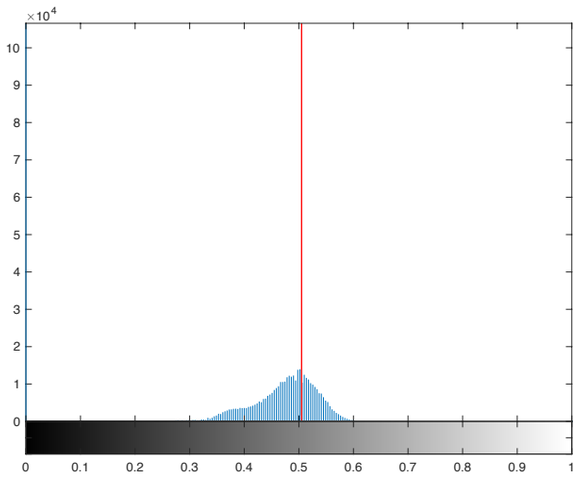
- Data preparation with Matlab
- Machine learning with Python (Keras)
  - Matlab does not support multispectral images, need 41 channels instead of the supported 3. Rewriting matlab functions proved to be too time intensive.

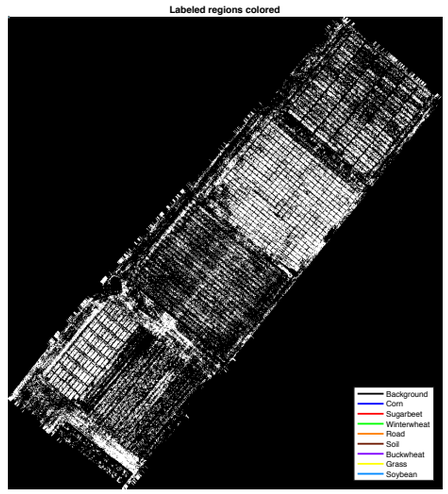
Machine learning

- Python pipeline works
- Choose Fully Convolutional Networks (FCN)

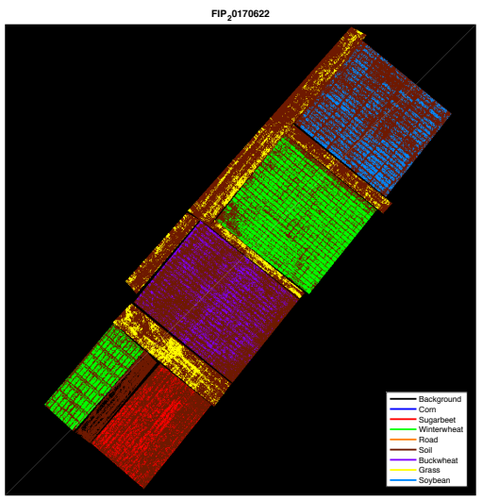
Current progress: Labeling training data

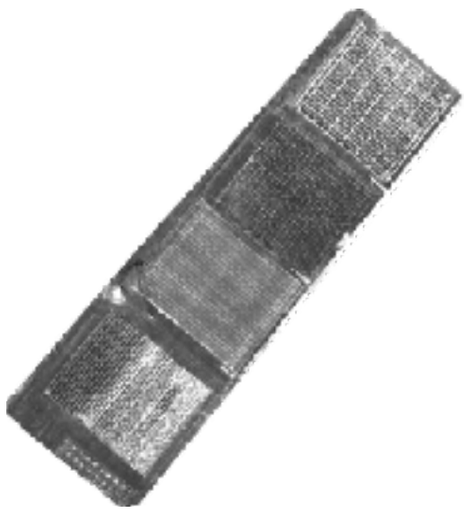
- NDVI to distinguish plants and soil/road

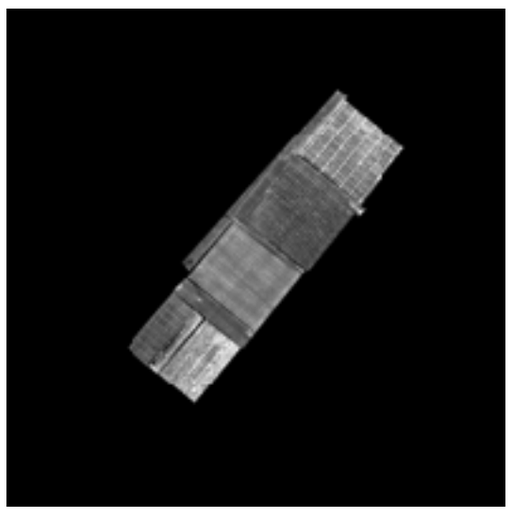




- Label and set all unlabeled pixels in the images to 0, pad images







Future work

- Fully Convolutional Network
  - Implement SegNet, U-Net
- Training data
  - More training data
  - Data augmentation
- Evaluate results

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