Establishment of a Crop Mapping Methodology Using Remote Sensing for the Arequipa Region

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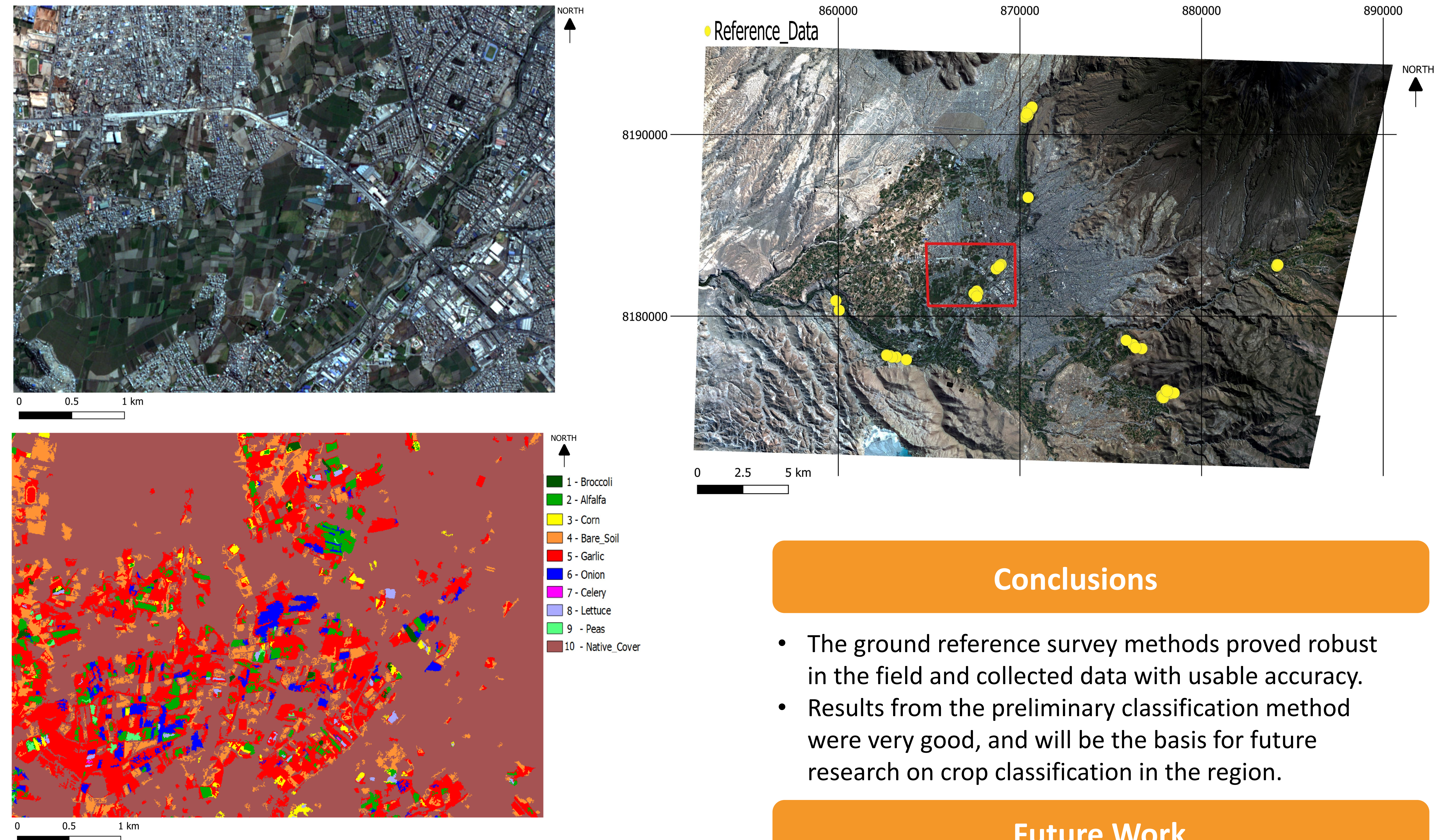Discovery Park

Introduction & Motivation

- Crop maps are important tools for farmers, land managers, and policymakers (Howard and others, 2012).
- Local farmers desire crop maps for the region of Arequipa, Peru for use in agricultural planning.
- Agriculture surrounding Arequipa city has certain particularities that complicate the use of existing approaches, such as:
  - Year-round growing season
  - Small, terraced fields
  - Many crops grown in the same immediate area
- The goal of this study was to test the possibility of creating detailed crop maps of the region surrounding Arequipa city using high-resolution satellite images.

Methodology

- Ground reference data were collected in the Arequipa city region using Epicollect5.
- RapidEye satellite images (5m spatial resolution) were used to cover the region of Arequipa, Peru.
- The images were processed and then classified using supervised classification methods.
- Agricultural fields marked by 53 reference data points were used to train and validate the classification. Large fields were used both for training and validation. Small fields were used only for training.
- Only data points with plants of sufficient maturity (typically 3 months or older) were used.

Results & Discussions

1 - Broccoli
2 - Alfalfa
3 - Corn
4 - Bare_Soil
5 - Garlic
6 - Onion
7 - Celery
8 - Lettuce
9 - Peas
10 - Native_Cover

Cover Type	User Accuracy (%)	Producer Accuracy (%)	Crop-Normalized Cover Percentage (%)	Areal Cover (km²)
Broccoli	100.0	78.63	0.39	0.28
Alfalfa	83.61	97.07	19.36	13.8
Corn	100.0	91.92	5.4	3.85
Garlic	84.91	100.0	67.97	48.45
Onion	73.33	95.65	4.16	2.97
Celery	100.0	58.72	0.31	0.22
Lettuce	100.0	48.48	0.74	0.53
Peas	100.0	65.0	1.67	1.19
Total	89.01		100.0	71.28

Conclusions

- The ground reference survey methods proved robust in the field and collected data with usable accuracy.
- Results from the preliminary classification method were very good, and will be the basis for future research on crop classification in the region.

Future Work

- Use the established ground reference survey methods to train more observers and obtain data.
- Use growing database to build a more robust and accurate classification.
- Investigate even higher spatial resolution, e.g. 3m, satellite images.

References

Daniel M. Howard, Bruce K. Wylie, and Larry L. Tieszen. (2012). Crop classification modelling using remote sensing and environmental data in the Greater Platte River Basin, USA. *International Journal of Remote Sensing, 33:19*, 6094-6108.

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