

Targeting Direct Cash Transfers to the Extremely Poor

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DataKind GiveDirectly
USING DATA IN THE SERVICE OF HUMANITY

The DataKind DataCorps is a group of pro bono data scientists, including statisticians, analysts, developers, and designers, who work with mission-driven organizations for 6 month collaborations to clean, analyze, automate, and otherwise make use of data to maximize their impact.

GiveDirectly is an NGO at the vanguard of delivering unconditional cash transfers via mobile telephony to reduce poverty.

Unconditional cash transfers to the extreme poor represent a radical, new approach to giving.

GiveDirectly takes an end-to-end operations model and does not outsource or subcontract work to other organizations.

To date, more than 90¢ of each donated dollar has reached a recipient in Kenya or Uganda.

A key step in operations is the selection of extremely poor villages.

Village-level poverty data does not exist in these countries.

The poverty level of a household is associated with roofing material.

thatched



metal



thatched



metal



Use image processing and machine learning to estimate the proportion of thatched roofs in a village.

Villages with the largest thatched proportion are targeted for cash transfers (subject to logistical constraints).

Crowdsource training data labeling.


Firefox

Dymo

dymo.herokuapp.com/datakind

Dymo

User: datakind
Image: [KE2013071547-iron.png](#)
Number Left: 1467



Instructions:

- Identify **thatch** roofs by clicking on them.
- Identify **iron** roofs by shift+clicking on them.
- If you need to restart, press 'Clear'.
- When you're done with an image, press 'Submit'.

Labels:

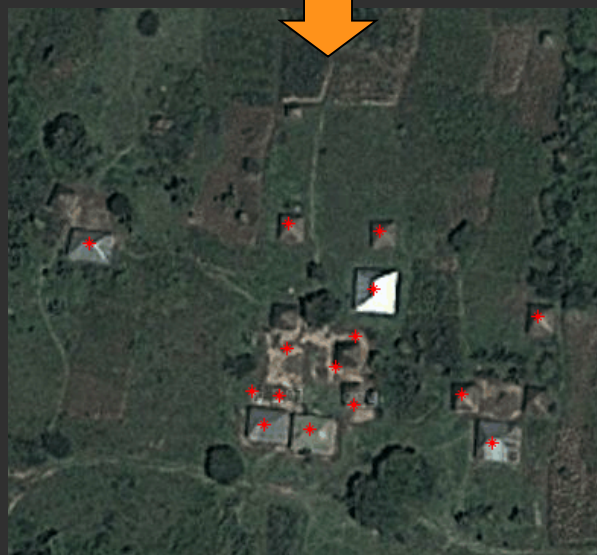
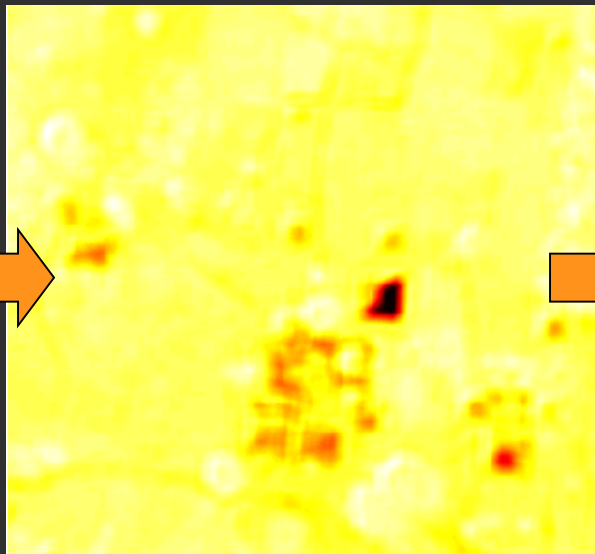
- **thatch** x: 59, y: 287
- **thatch** x: 138, y: 256
- **thatch** x: 175, y: 260
- **thatch** x: 213, y: 163
- **thatch** x: 275, y: 363
- **iron** x: 187, y: 172
- **iron** x: 64, y: 123
- **iron** x: 288, y: 391

Clear

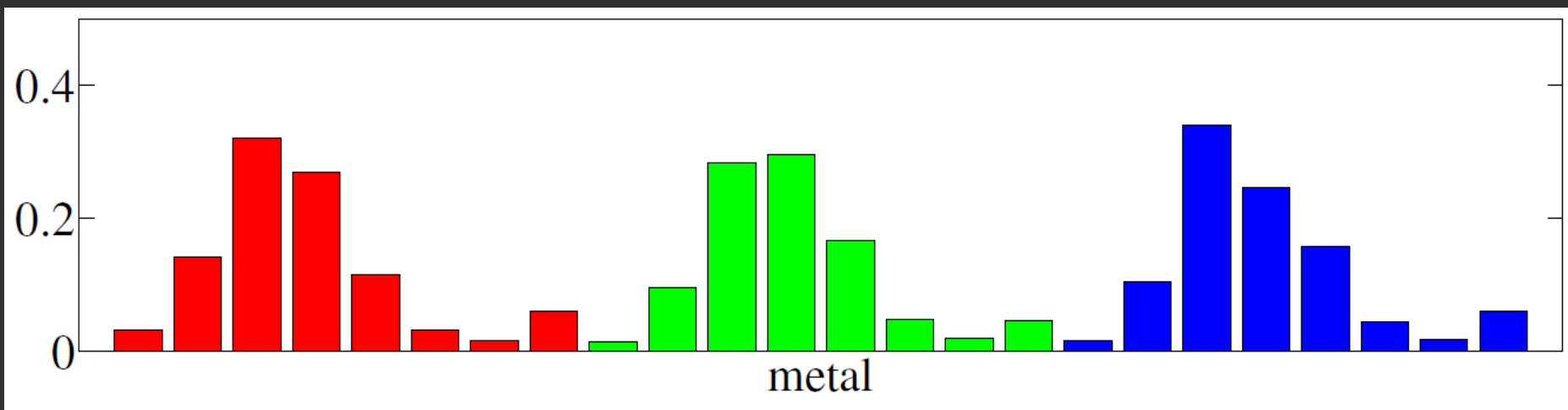
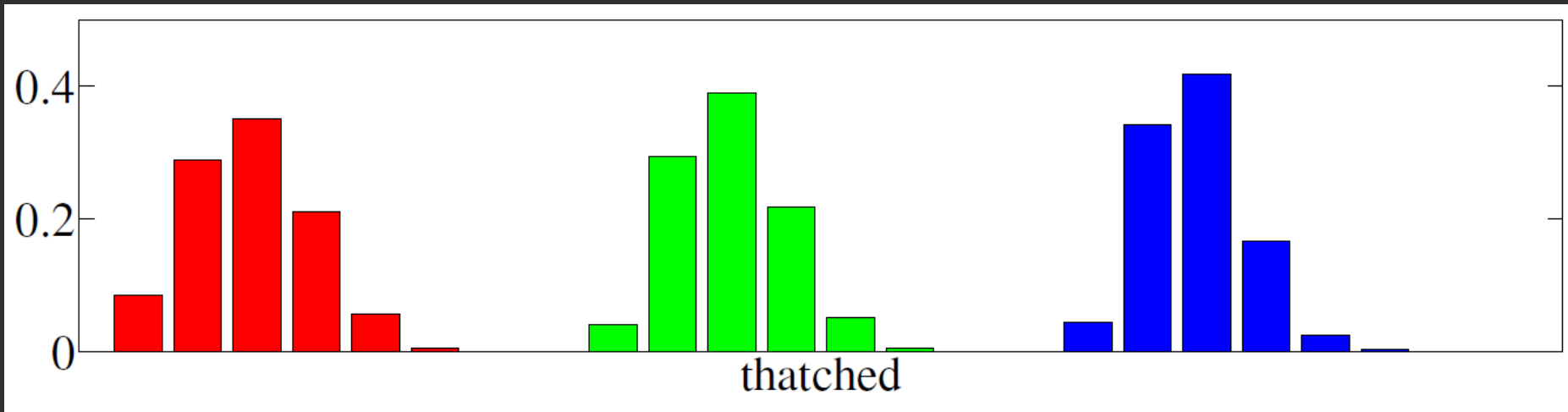
Submit

Google
Imagery ©2013 DigitalGlobe

Template matching.



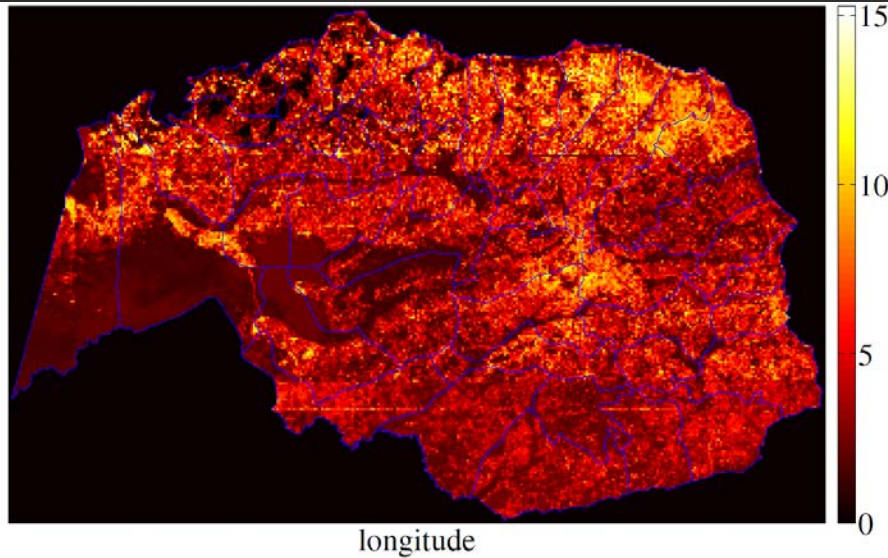
Color histograms.



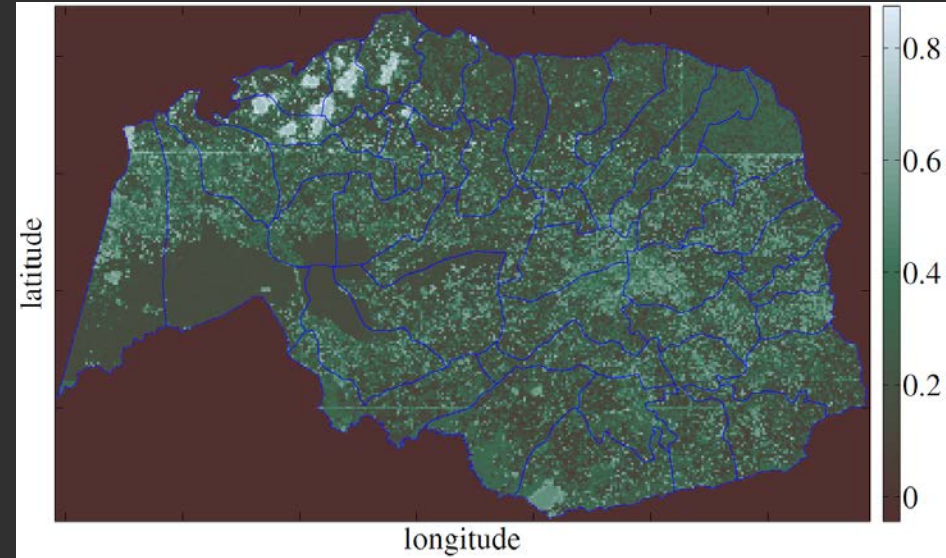
Learn predictive model to estimate number of roofs and proportion metal in image patches.

Score image patches that tile a large region of Kenya to produce heat maps. (50,000 image patches)

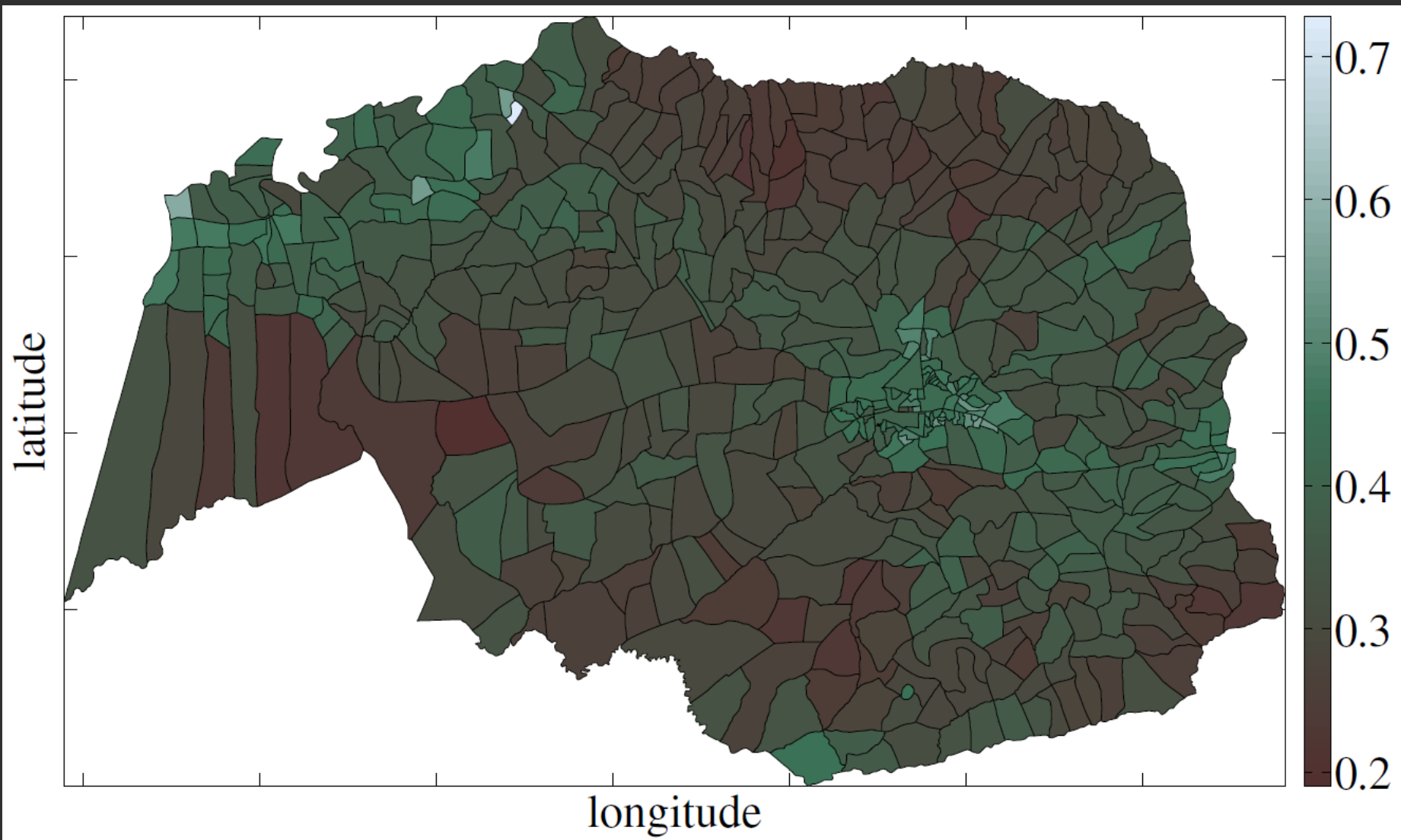
number of roofs



proportion metal



Aggregate these heat maps to obtain village-level metal roof proportion.



Piloted in February to select 50 Kenyan villages in GiveDirectly's largest campaign thus far.

Moved \$4M in cash transfers.

Using data-driven approach saved 100 person-days of manual effort.

Future work:

Village boundaries.

Roofed structures that are not the main house.

Remote sensing has many more possible social good applications.

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