Humanitarian AI Roundtable
Crisis Mapping and Super-Resolution

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Crisis response

Figure: Dam collapsed near Brumadinho on January 25, 2019

Mapathons: Volunteers Mapping

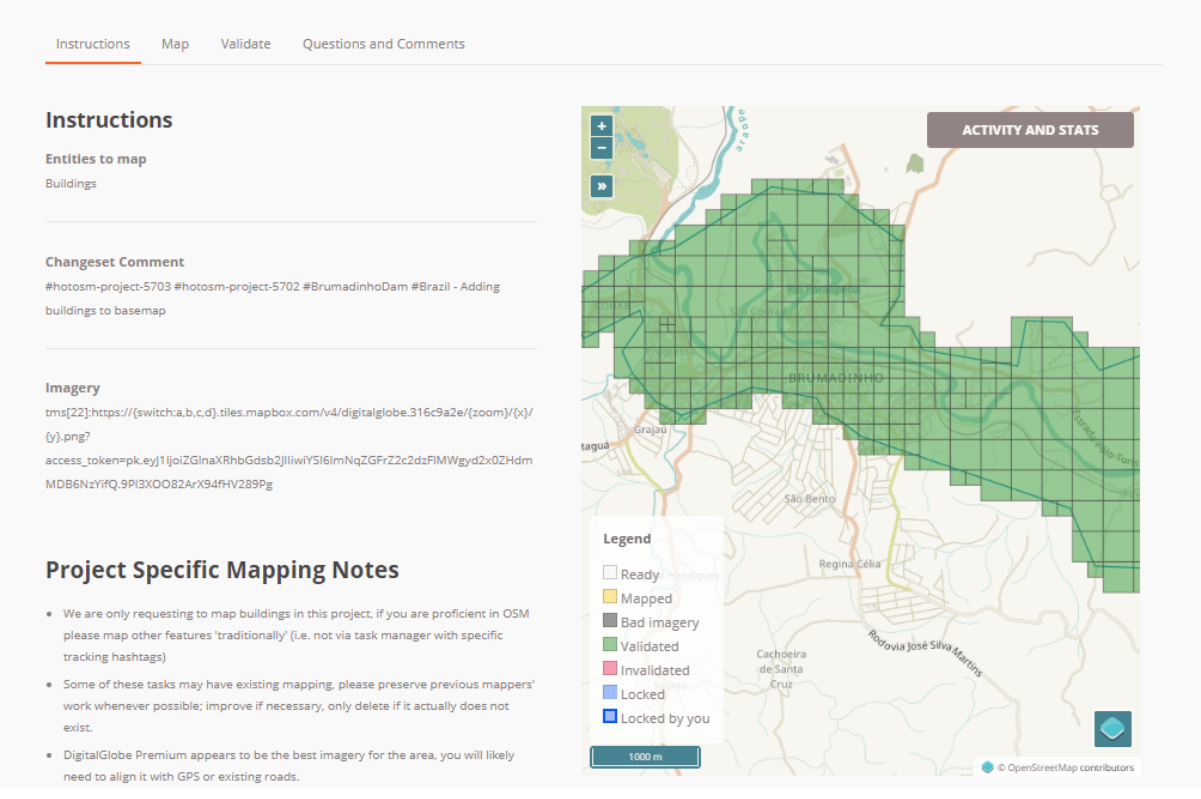

Figure: Pre-disaster basemap useful for planning search and rescue

Improving Sensing

- Map Annotation
  - How to augment human volunteers, and scale annotations?
  - Use case: Pandemic response planning

Figure: Exampling crowdsourcing session, from the MissingMaps websie.

Research Problems: Map Annotation

- **Conditional U-Net**: Models robust across a variety of environments
- **Interactive Corrections**: Leverage human volunteers efficiently
- **Useable Uncertainties**: Streamline validation and correction processes
- **Incremental Annotations**: Learn across a hierarchy of annotations

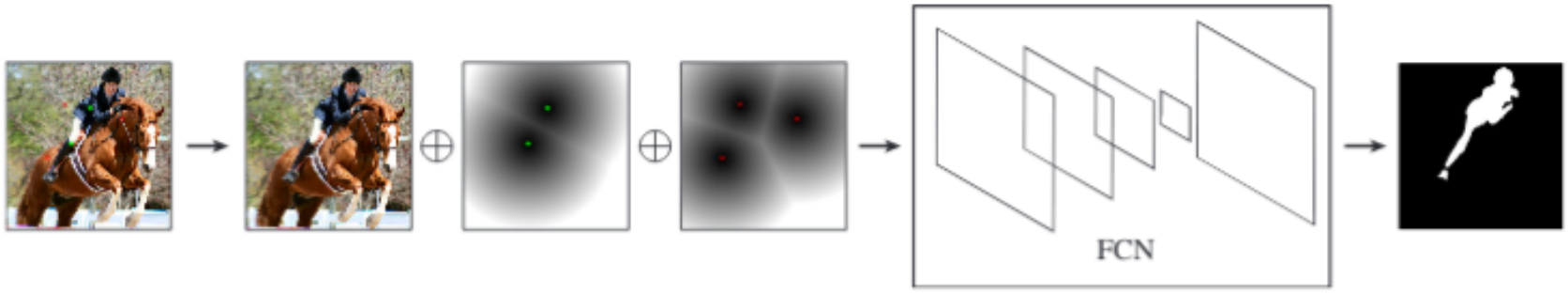

Figure: One approach to more interactive image segmentation, from "Deep Object Selection."

Improving Sensing

- Super-Resolution
  - How to end monopolies on high-res maps?
  - Use case: Quantifying extent of violence in Darfur

Figure: A high-resolution image of a street in Khartoum.

- Super-Resolution
  - How to end monopolies on high-res satellite images?
  - Use case: Quantifying extent of violence in Darfur

Figure: Corresponding low-res views.

- Super-Resolution
  - How to end monopolies on high-res satellite images?
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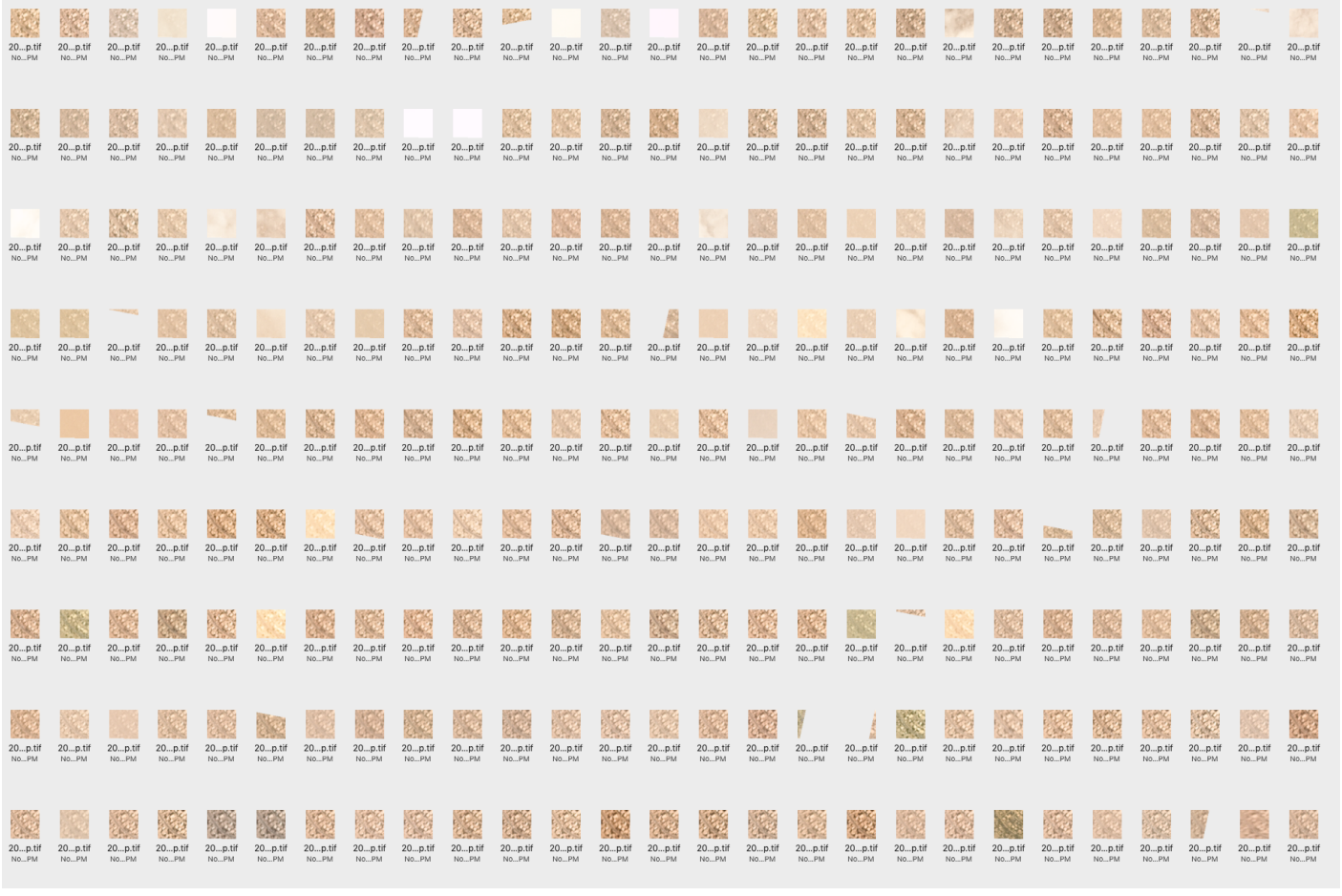

Figure: Corresponding low-res views.

Research Problems: Super-Resolution

- Conditioning: How to incorporate metadata into super-resolution?
- Multiframedness: Dealing with alignment and using multiple inputs (Knowledge Graphs, multichannel, and recurrence)

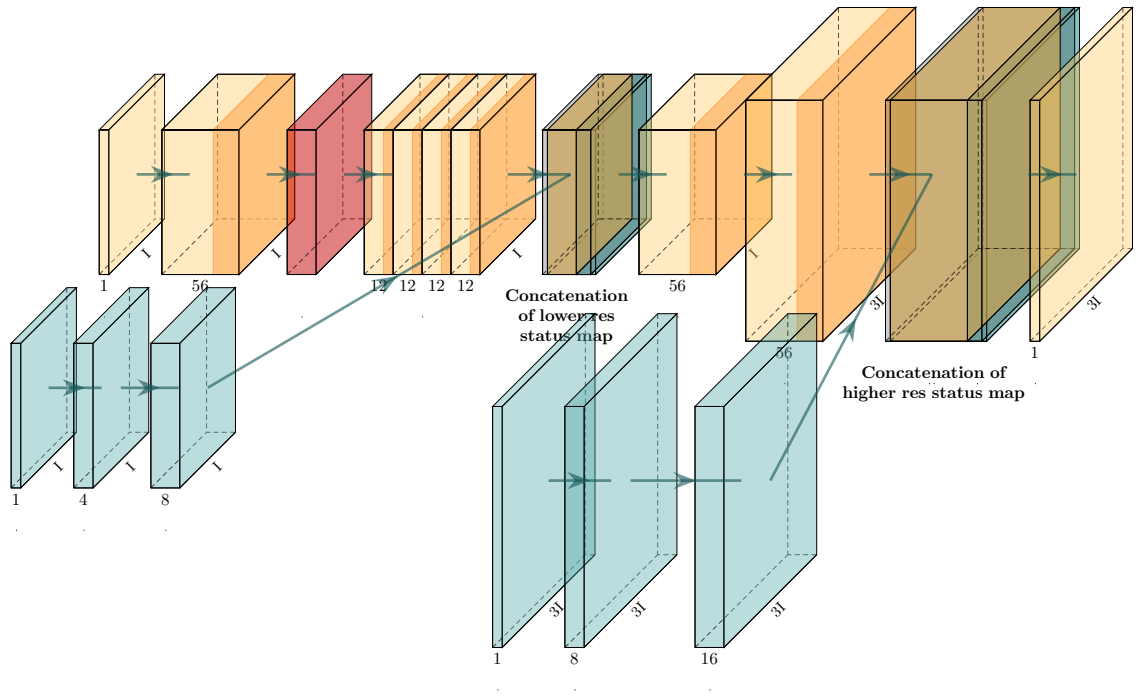

Figure: Example of conditioning architecture used for super-resolution.

Conclusion

- Challenges
  - Narrowing on problems – schools or bridges? Myanmar or Uganda?
  - Getting data!
  - Abstractions vs. applications
- Lesson Learned
  - Decide on your own MNIST
  - Define intermediate successes
  - There are more venues than you think