Building Damage Assessment via Image Processing

By Saied Mighani,
Anna Bukareva,
Brendan Chan

California Wildfires

- Wildfires more frequent
- The Tubbs Fire (2017)
  - Destroyed 5600 buildings
  - 22 fatalities
  - Costs $1.3 billion
- Situational information is crucial for effective response.

Project Goals

Client: FEMA, Humanitarian Assistance and Disaster Recovery (HADR)

Goal: Use satellite imagery to detect houses damaged by wildfires

Result: Automate damage assessment to accelerate recovery from natural disasters by creating a Housing Damage Prediction Model

The Data

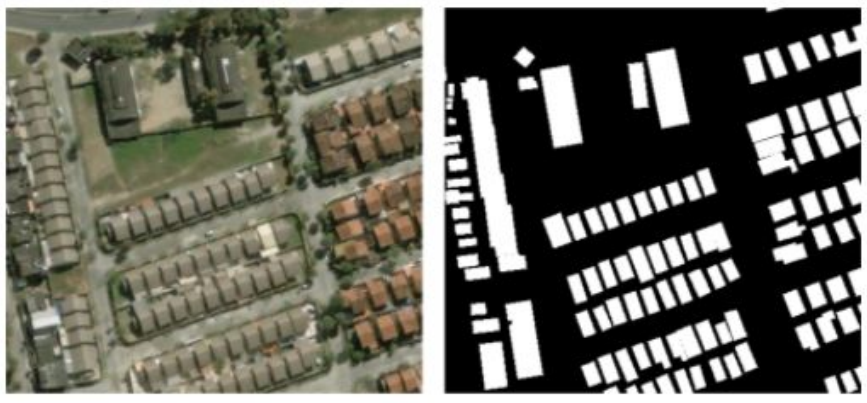
Computer Vision Image Analysis

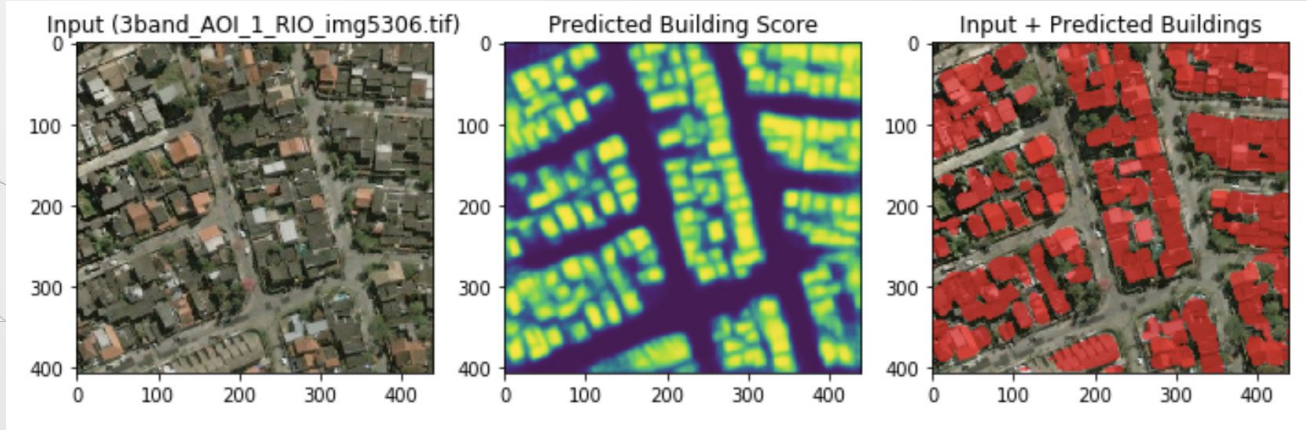
Process:

- Image Classification
  - Identify what is in an image
- Image Detection
  - Locate objects and their boundaries within an image
  - Destroyed vs No Damage
- Image Segmentation:
  - Create a pixel-wise mask for each object in the image.

SpaceNet Building Detection

- Left: SpaceNet Satellite image
- Right: image mask, (target)
- U-net, a Convolutional Neural Networks (CNN) developed for medical image segmentation.
- Trained on SpaceNet satellite images
- Credit: Motoki Kimura





Classification Model

- Model: CNN
- Localized image labels:
  - Damaged
  - Undamaged
- Dataset size: (validation/training: 0.25)

Classification model results

Model accuracy: 100%

Future Direction

- Multiclass classification
  - Level of damage
- Get more data
- Train our own CNN models
- Test Model on other disasters