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Image Classification for Natural Disasters

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Table of Contents

Business Problem

1 First step in FEMA Natural Disaster Response

Monitoring and situational Awareness

2 Current monitoring tools

- Sensors
- Satellite imagery
- Phone calls

3 Objective

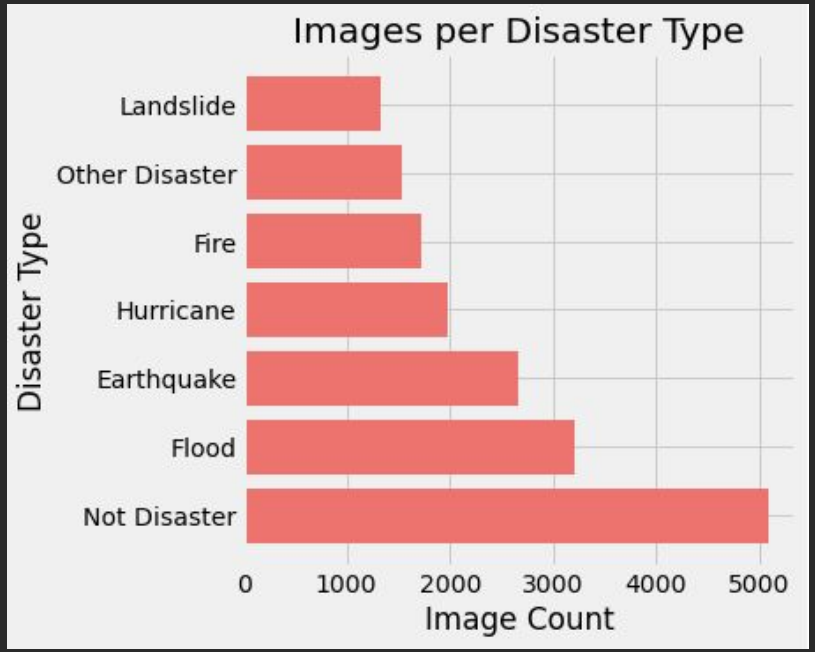
Augment data with social media photos to improve awareness of disasters as they are happening!

4 Importance

- Gain visual understanding
- Deploy correct resources based on disaster type
- Save lives!

Data

- CrisisNLP Disaster Types dataset
- ~17,000 images of Natural Disasters and Non Disasters, divided into 7 classes
- Scraped from Instagram, Google, and flickr

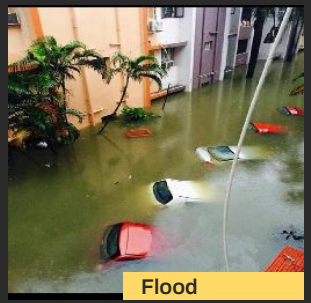


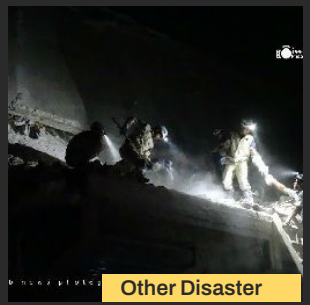
Sample Images

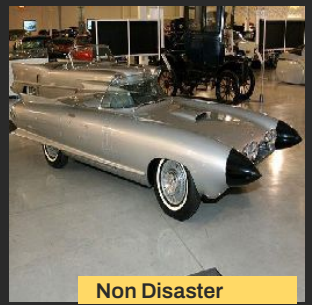

Hurricane

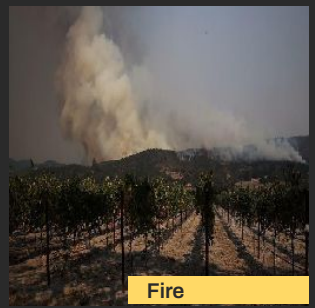

Landslide


Earthquake


Flood


Other Disaster


Non Disaster


Fire

Modeling

Read in the data and rescaled to 224 x 224 pixels using Tensorflow

Passed in zoom, rotation and horizontal flip parameters

Modeled on my machine using CNN models

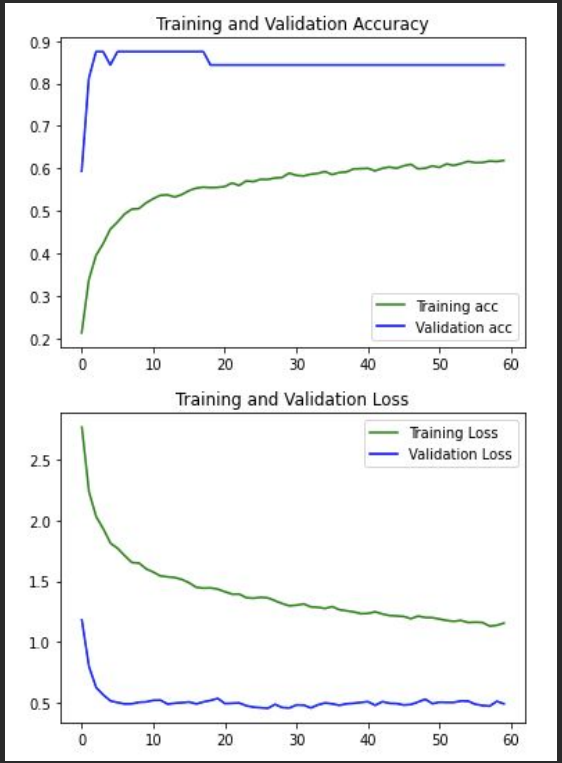
Utilized cloud GPUs to speed up performance on Transfer Learning Models

Model Evaluation

Best model: DenseNet121
- Transfer Learning
- Pretrained on millions of images

Architecture
- 8 layers
- “Relu” and “softmax” activation
- L2 Regularization (dropout .5)
- Batch Normalization

	Train Accuracy	Test Accuracy
CNN	31%	34%
Resnet50	41%	46%
VGG16	50%	56%
DenseNet121	61%	72%



Use case

1 User takes photo

2 User posts on Twitter

3 Scrape image from Twitter and the app classifies photo

DEMO

Let’s check it out!

Next Steps

Incorporate real time image scraping into app

Implement other cloud based modeling techniques

Perform more tasks on the images

Gather more images to improve models

Thanks!

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