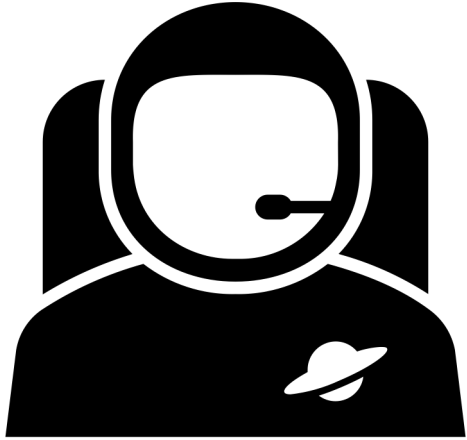


A bright sun shining through white clouds against a deep blue sky. The sun is positioned in the upper right quadrant, creating a strong lens flare effect. The clouds are scattered and vary in density, with some appearing as soft white patches and others as darker, more defined shapes. The overall scene is a clear, sunny day.

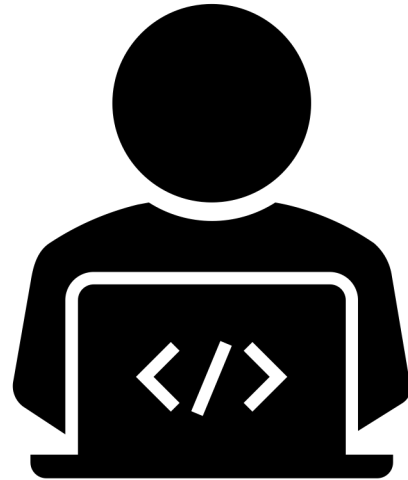
# Flood Measurement from a Photo

By

Shaffer, Hoke, Pander & Kuehl Partners



**Clint Hoke**



**Jamie Shaffer**



**Jonna Pander**



**Josh Kuehl**


Partners

A 3D rendering of puzzle pieces, with one red piece standing out among several grey pieces. The red piece is in the center-right, and the grey pieces are arranged around it, some overlapping. The lighting creates soft shadows, giving the pieces a three-dimensional appearance.

# Agenda

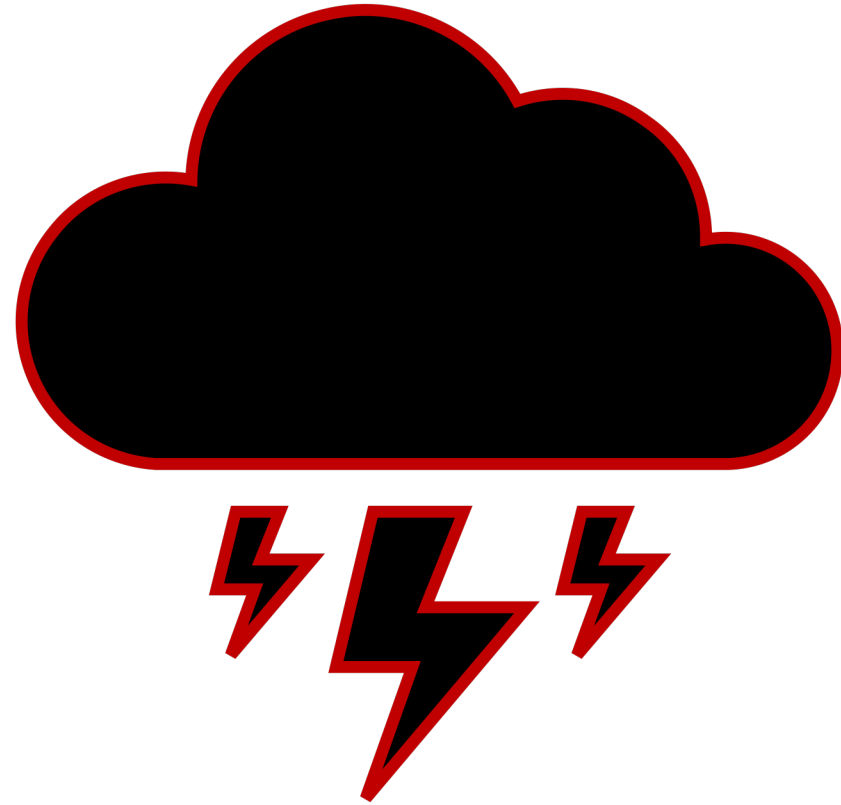
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- Problem Statement
- Research
- Solution
- Issues



Problem: Create  
a machine model  
that can detect  
flood depth from  
a photo.

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# Research

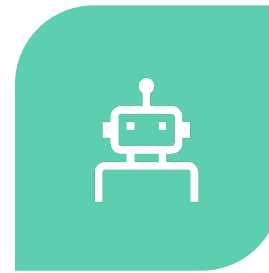
---



SCHOLARLY  
ARTICLES



RESOURCES

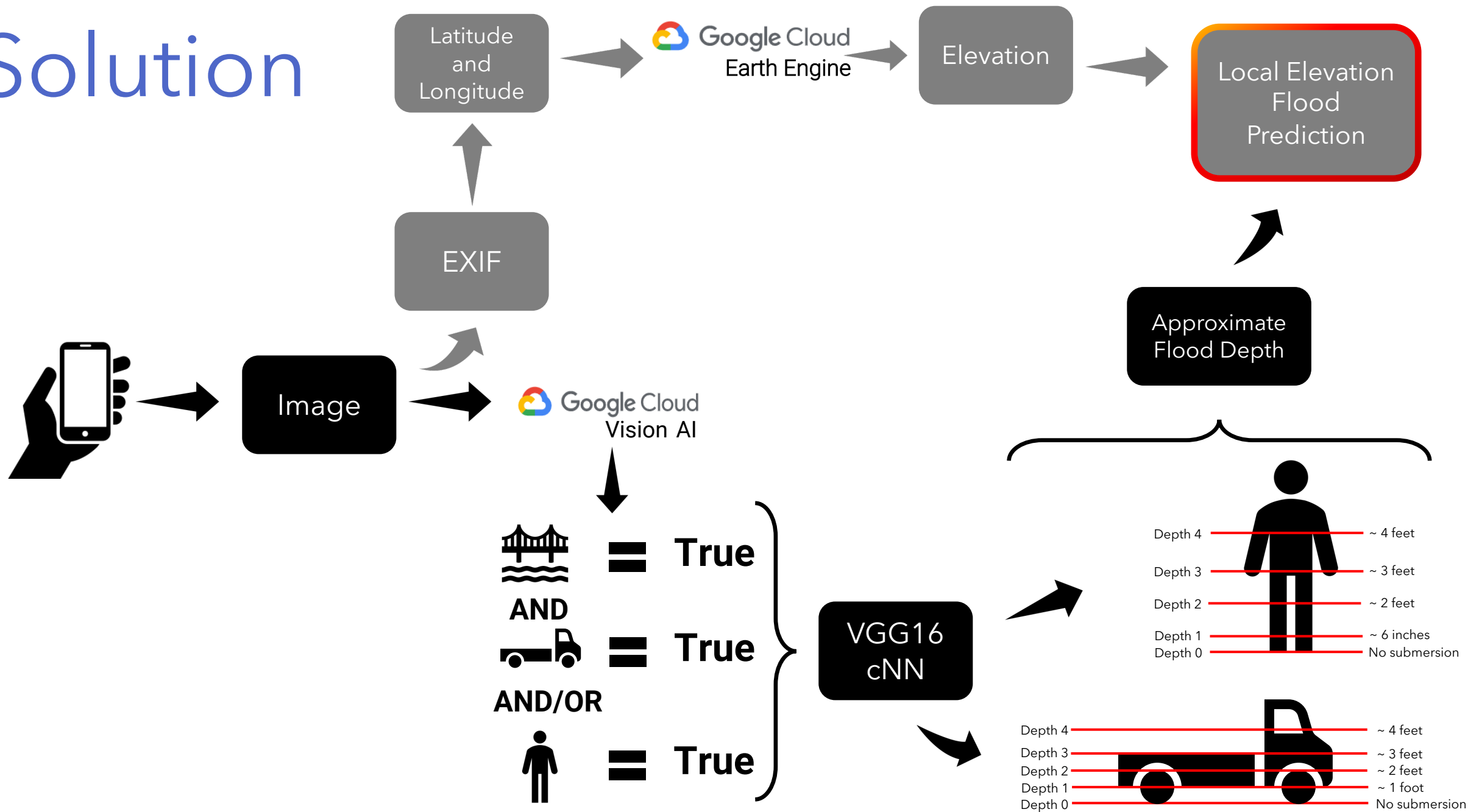


APIS



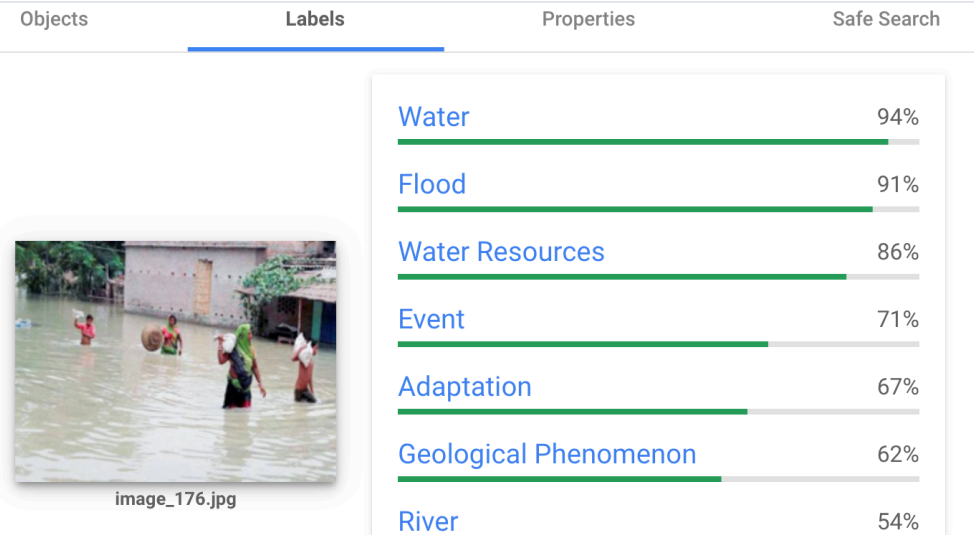
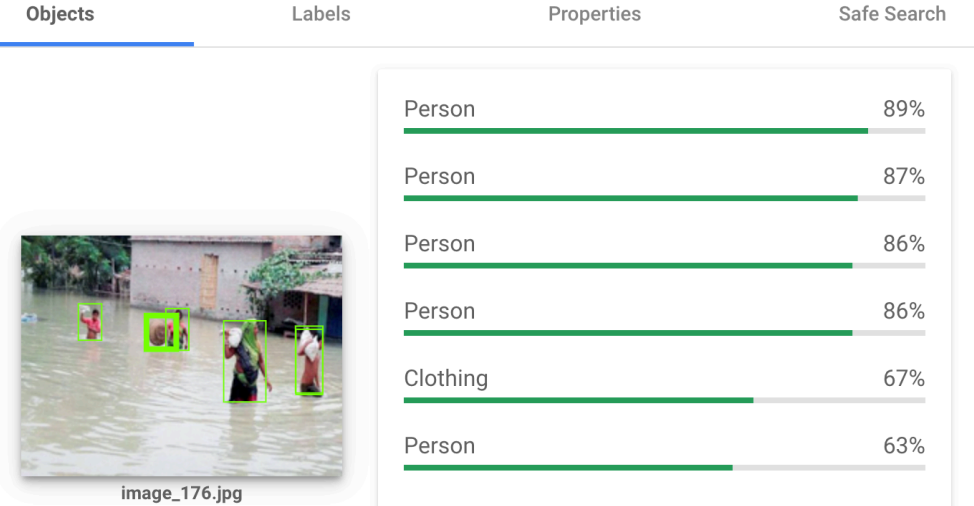
LIBRARIES

# Solution

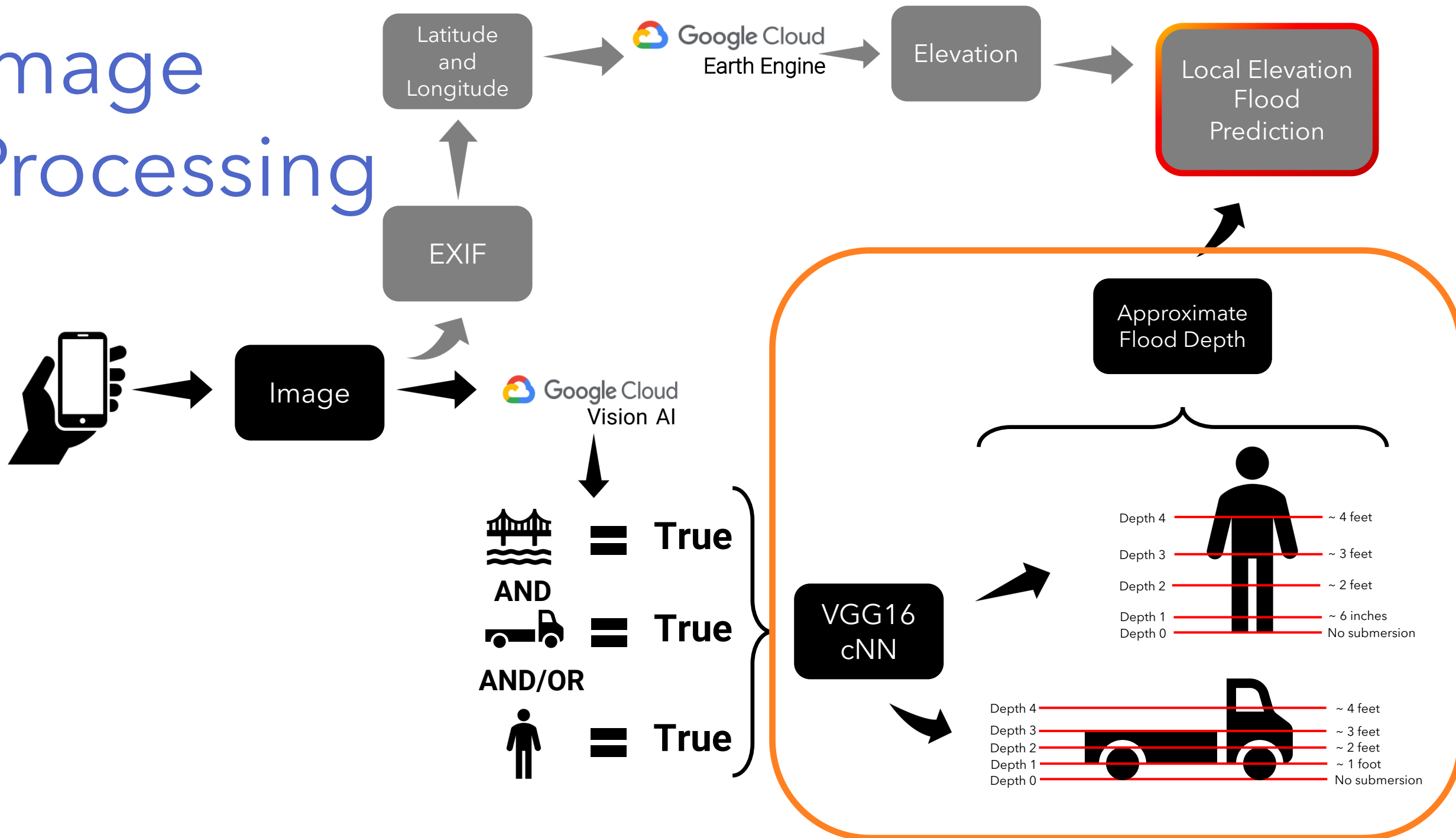


# Google Vision AI

- Detect objects automatically
- Data labeling service
- Image pre-processor
- Built API to run batches of images
- Paid Service



# Image Processing





# Results

## **Truck Model**

- Exact Accuracy: 32%
- Tolerance(+/-1) Accuracy: 80%
- Most accurate at depths 0 - 2

## **People Model**

- Exact Accuracy: 25%
- Tolerance(+/-1) Accuracy: 60%
- Most accurate at depths 0 and 4

# Image Augmentation and Challenges

Image: rot-4.5\_img\_0144.jpg

Actual: depth\_3

Predicted: depth\_2

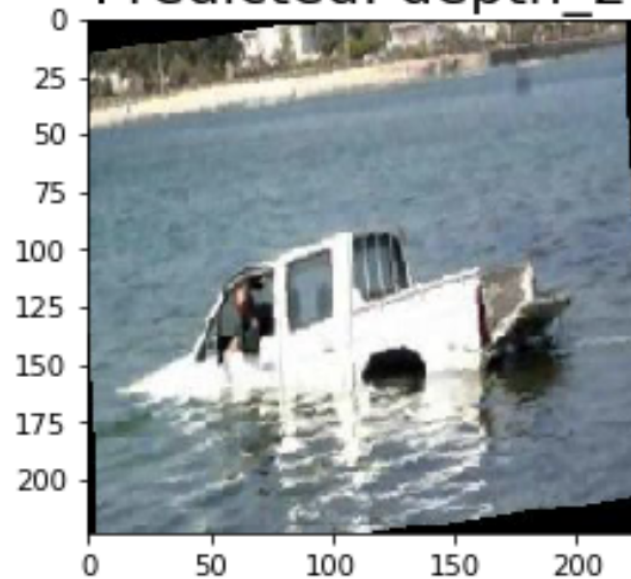
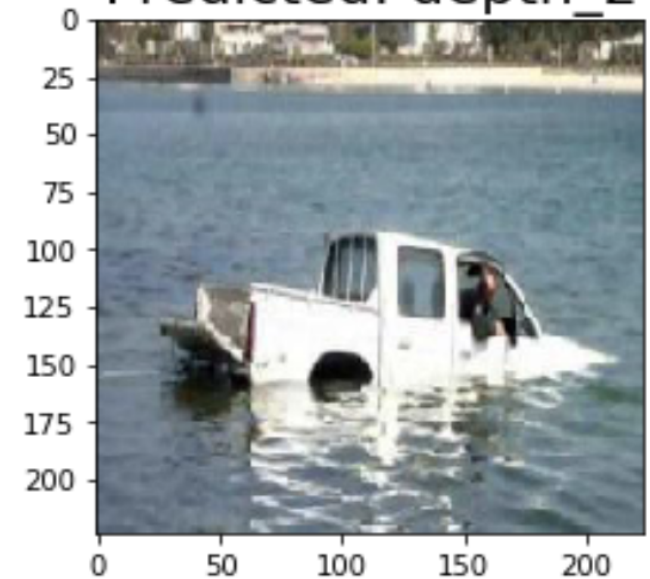



Image: hflip\_img\_0144.jpg

Actual: depth\_3

Predicted: depth\_2

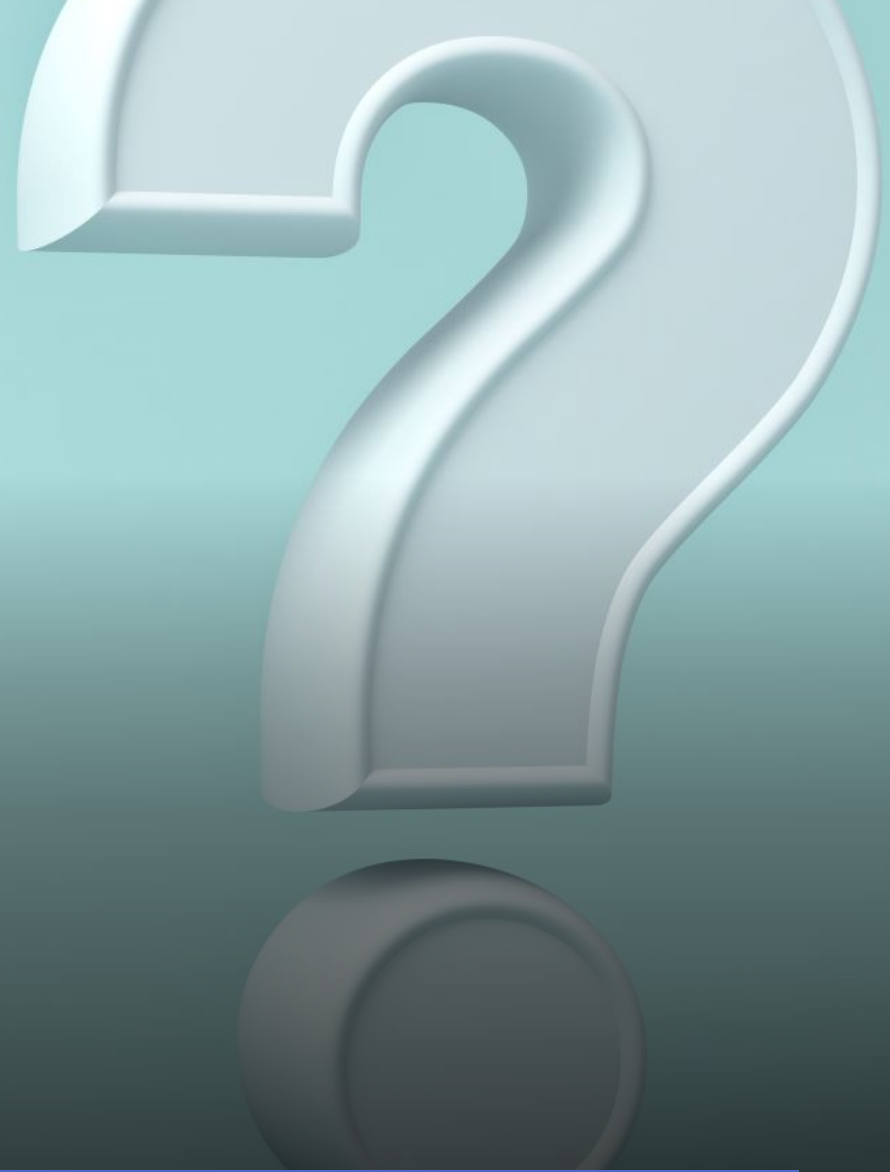


- 
1. People can swim
  2. Shortage of training data
  3. Bow wake
  4. Personal computer processing power
  5. Complex images
  6. Micro terrain
  7. Time constraint
  8. Definition of levels

# Issues

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Questions

