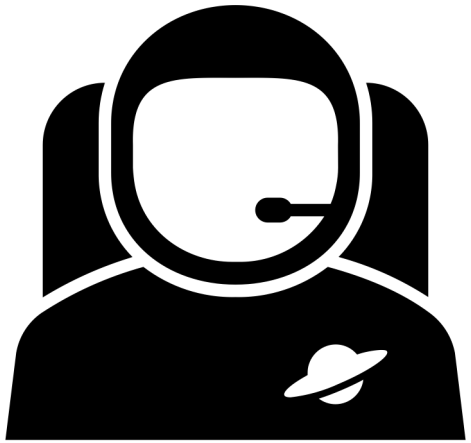
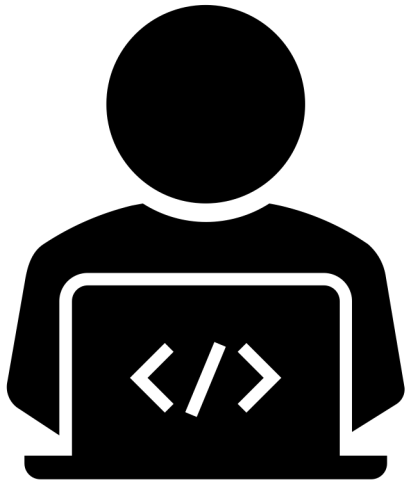
Flood Measurement from a Photo

By

Shaffer, Hoke, Pander & Kuehl Partners



Clint Hoke



Jamie Shaffer

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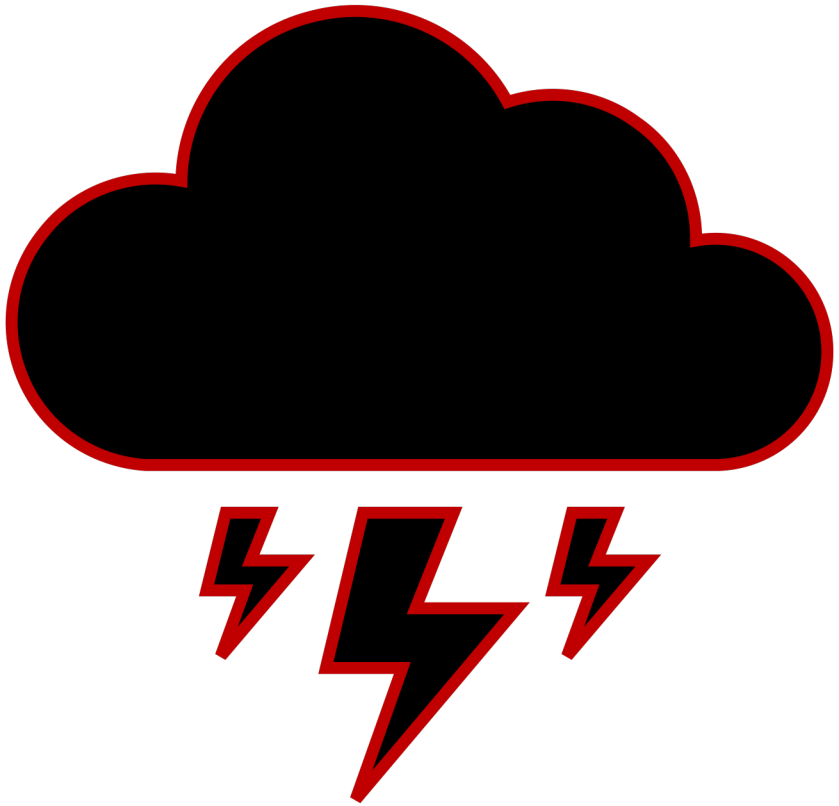
Partners

Agenda

- Problem Statement
- Research
- Solution
- Issues

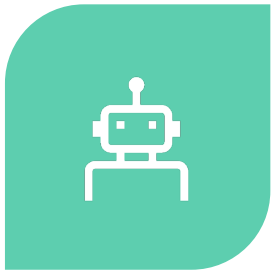
Problem: Create a machine model that can detect flood depth from a photo.



Research

SCHOLARLY ARTICLES

RESOURCES

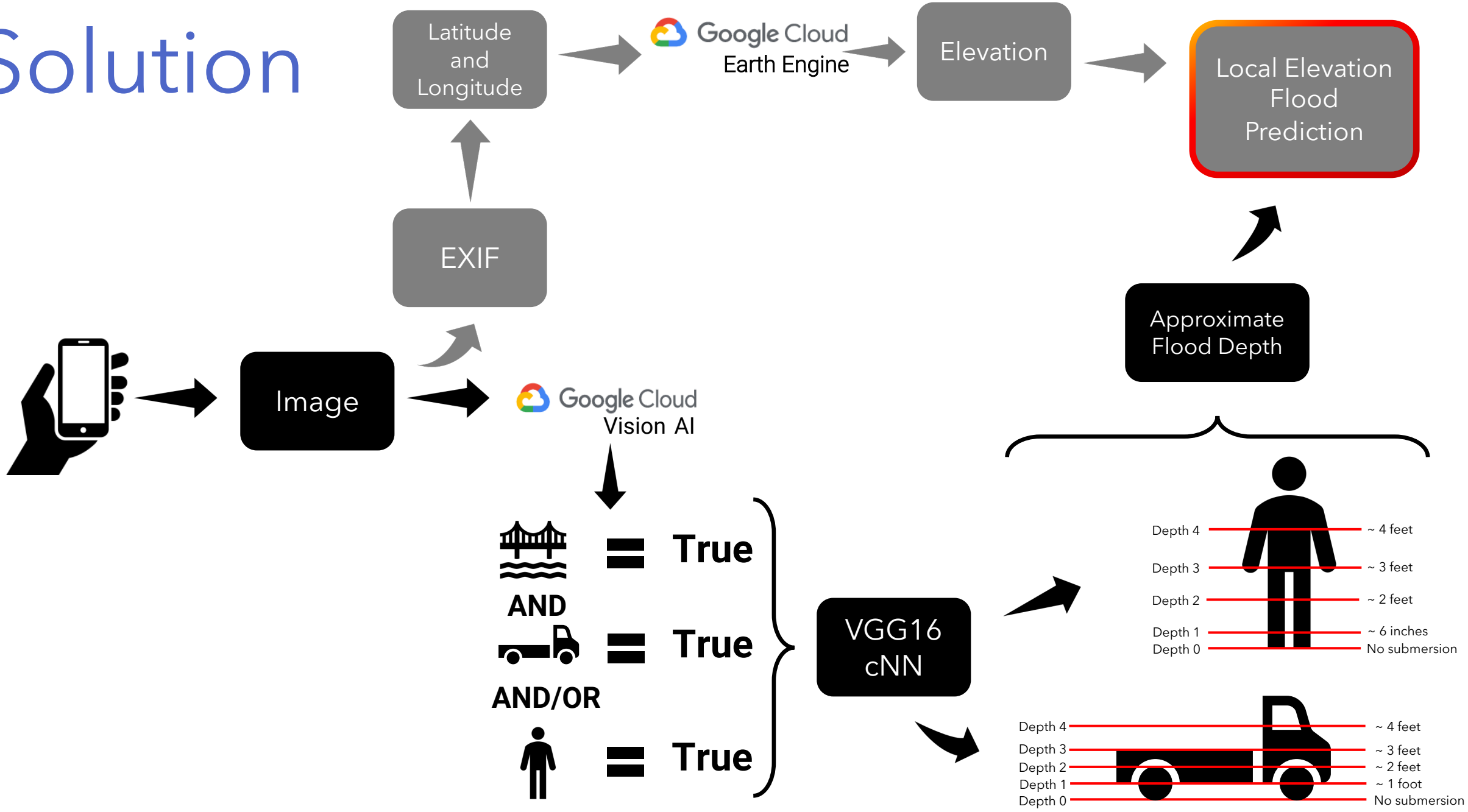


APIS

LIBRARIES

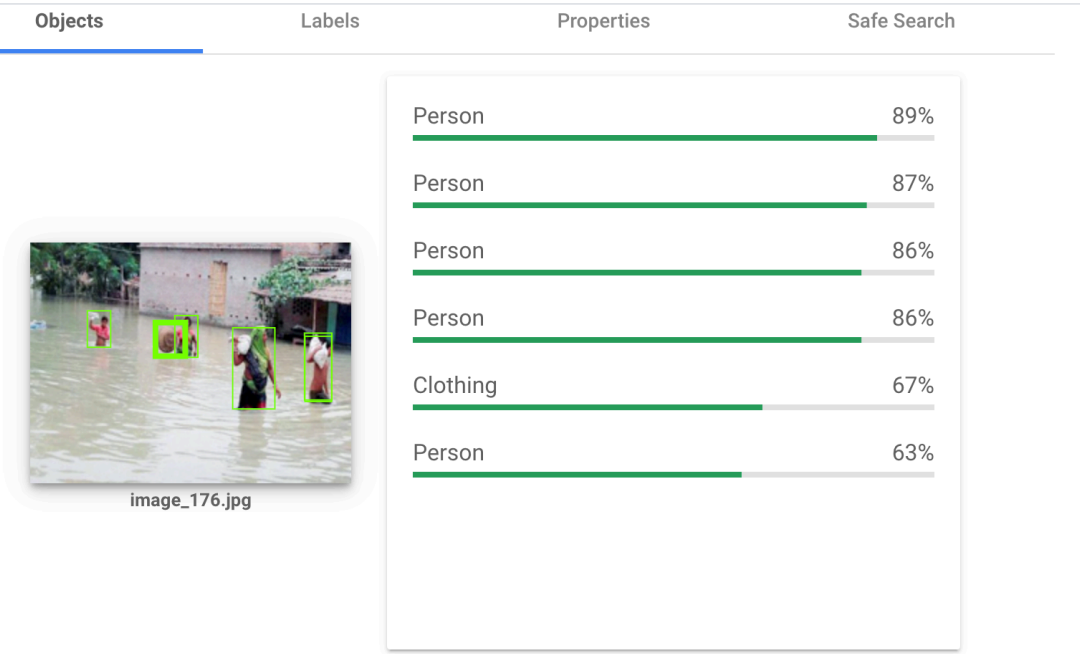
*Full list of research available here

Solution


Latitude and Longitude
Google Cloud Earth Engine
Elevation
Local Elevation Flood Prediction
EXIF
Approximate Flood Depth
Image
Google Cloud Vision AI
True
AND
True
AND/OR
True
VGG16 cNN
Depth 4
~ 4 feet
Depth 3
~ 3 feet
Depth 2
~ 2 feet
Depth 1
~ 6 inches
Depth 0
No submersion
Depth 4
~ 4 feet
Depth 3
~ 3 feet
Depth 2
~ 2 feet
Depth 1
~ 1 foot
Depth 0
No submersion

Google Vision AI

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



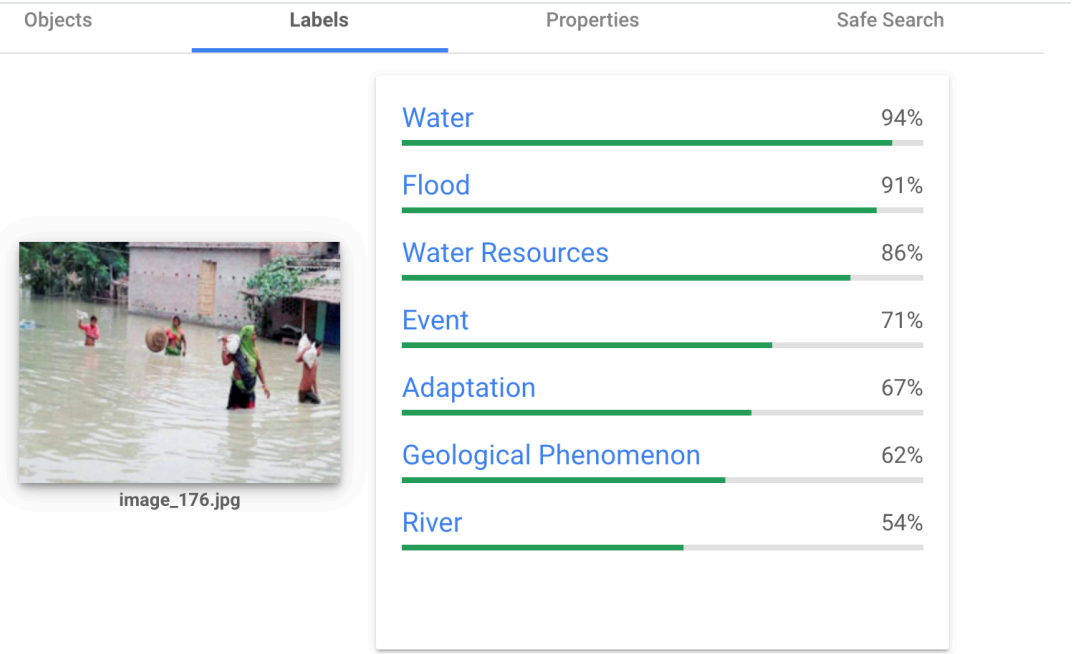
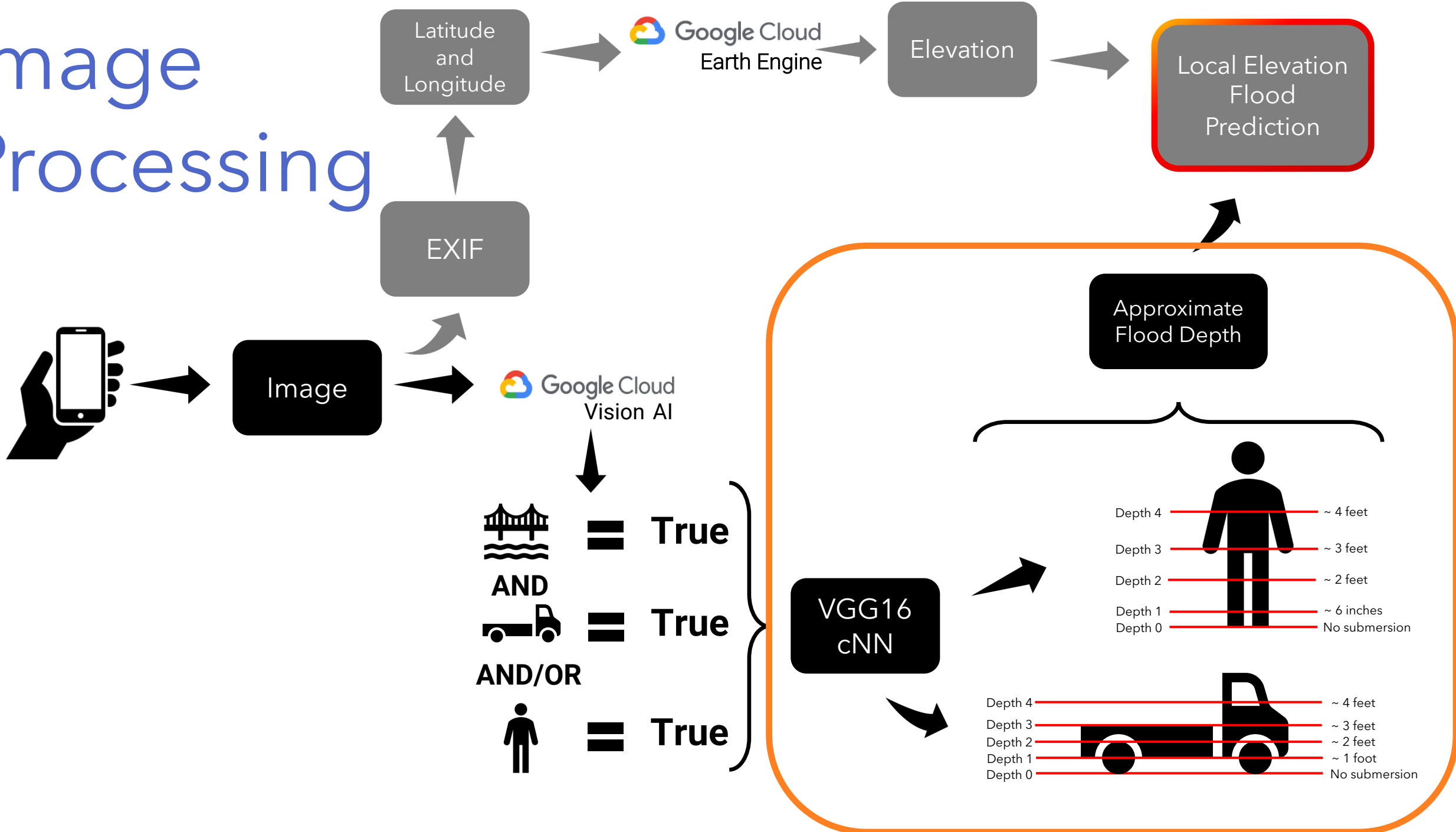


Image Processing



Results

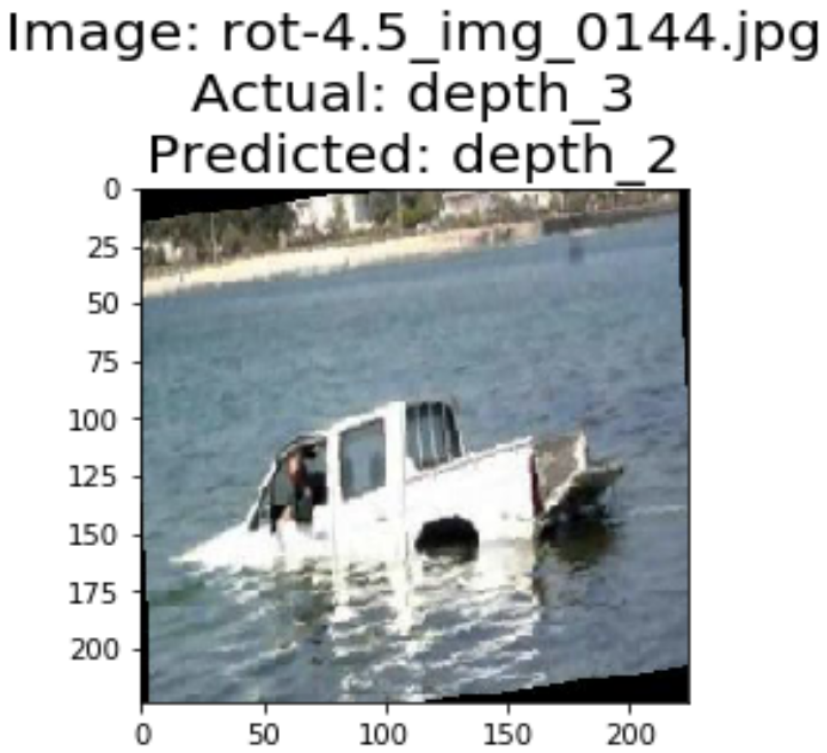
Truck Model

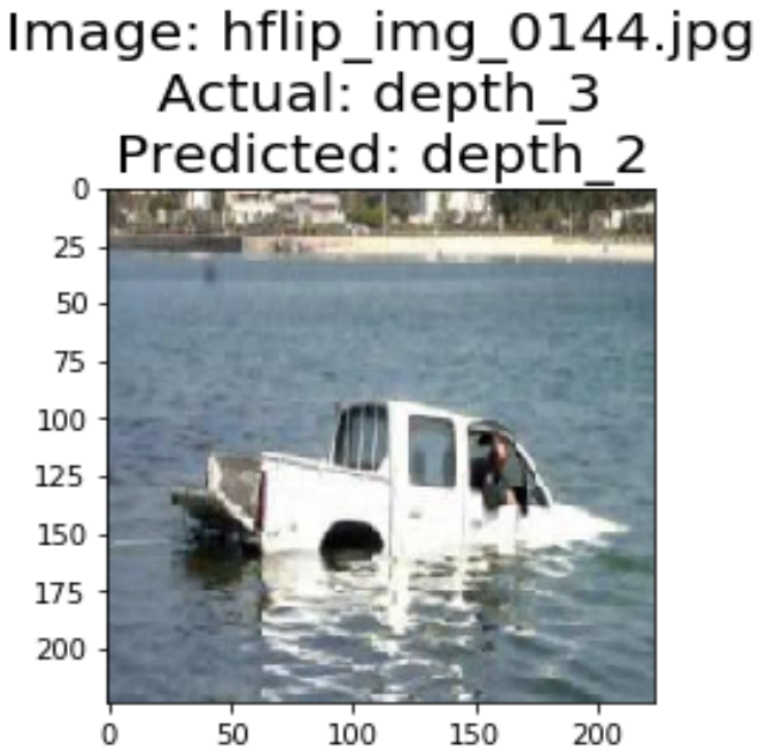
- Exact Accuracy: 32%
- Tolerance(+/-1) Accuracy: 80%
- Most accurate at depths 0 - 2

People Model

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

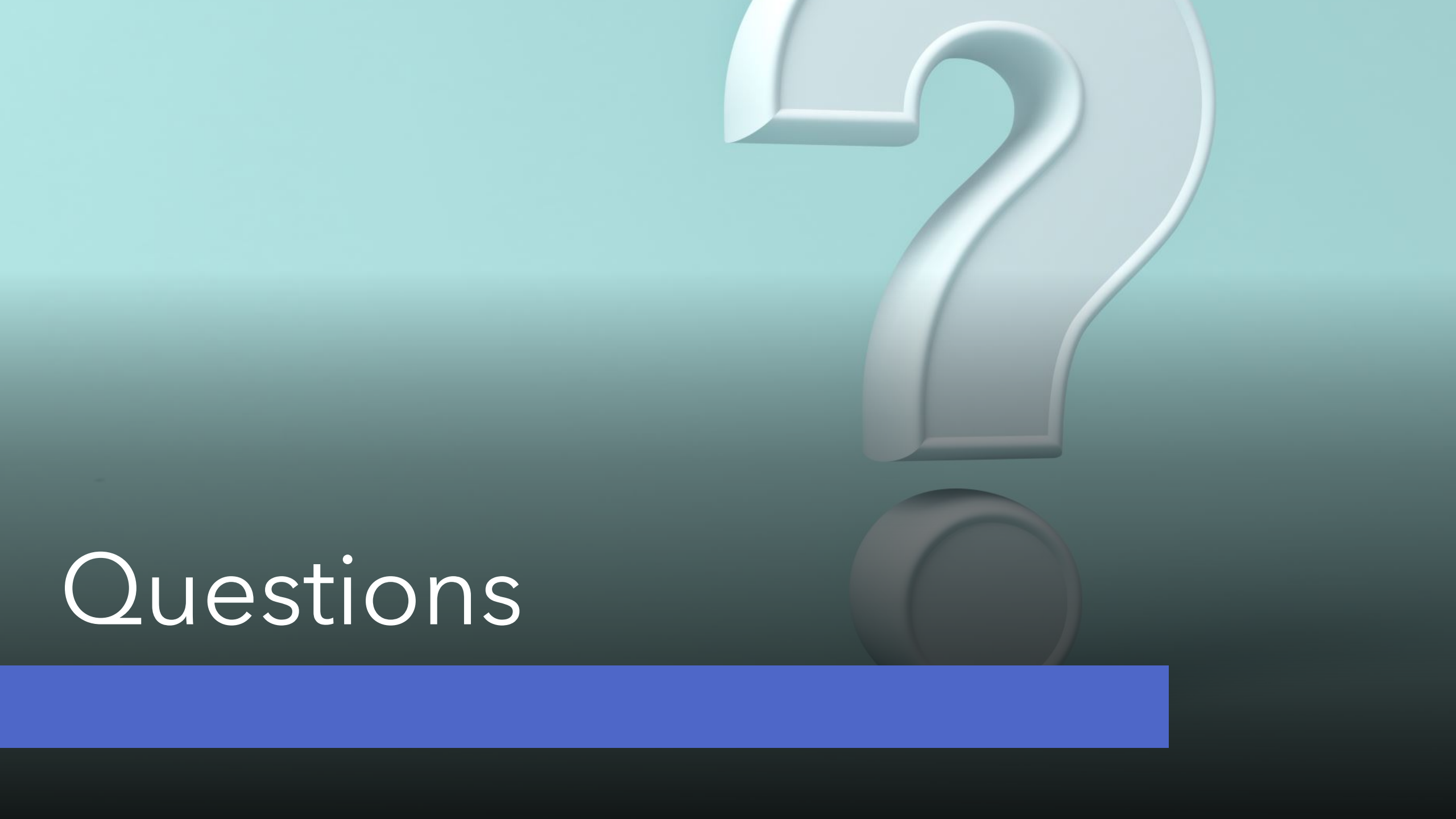
Image Augmentation and Challenges





Issues

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


Questions