F.L.O.A.T. (Facilitating Level Objectives Assessment Technology) An A.I. driven detection system to collect water parameters

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Introduction

We have developed a system that captures and logs water parameters along with any foreign objects.

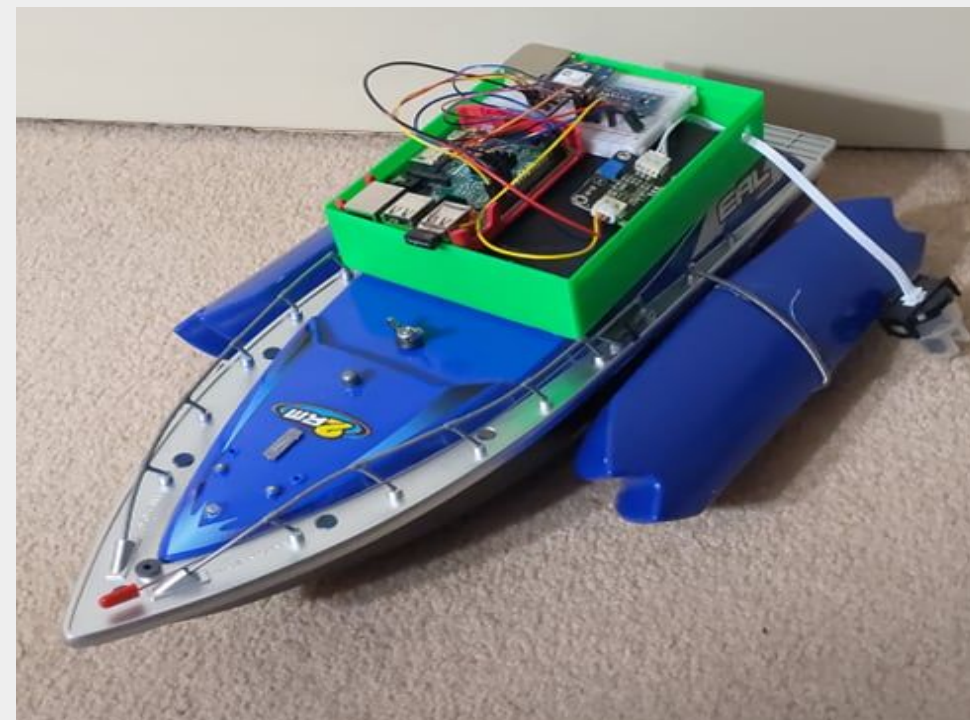Our system automates collection of data and provides a clear view on water quality on any body of water.

Figure 1: Operator boat

Motivation

Water health plays a vital role in our lives and maintaining public waters is a multi-step process
Our goal is to create proof-of-concept prototype system that that could aid in maintaining the quality of public waters in Saskatchewan.

Materials and software used

- AWS
- YoloV4
- Darknet
- Raspberry pi
- GoPro HERO7
- Turbidity Sensor
- GPS Sensor

Methodology

Video, GPS data, and the parameter of turbidity are collected by an operator driven boat. Litter is then identified and tagged with the algorithm. All other information is tagged by time and location. This information is then stored into our database via operator upload. The logged data is then presented and shown to the viewer.

Underwater video is processed under multiple filters to identify common foreign objects against a specified dataset.
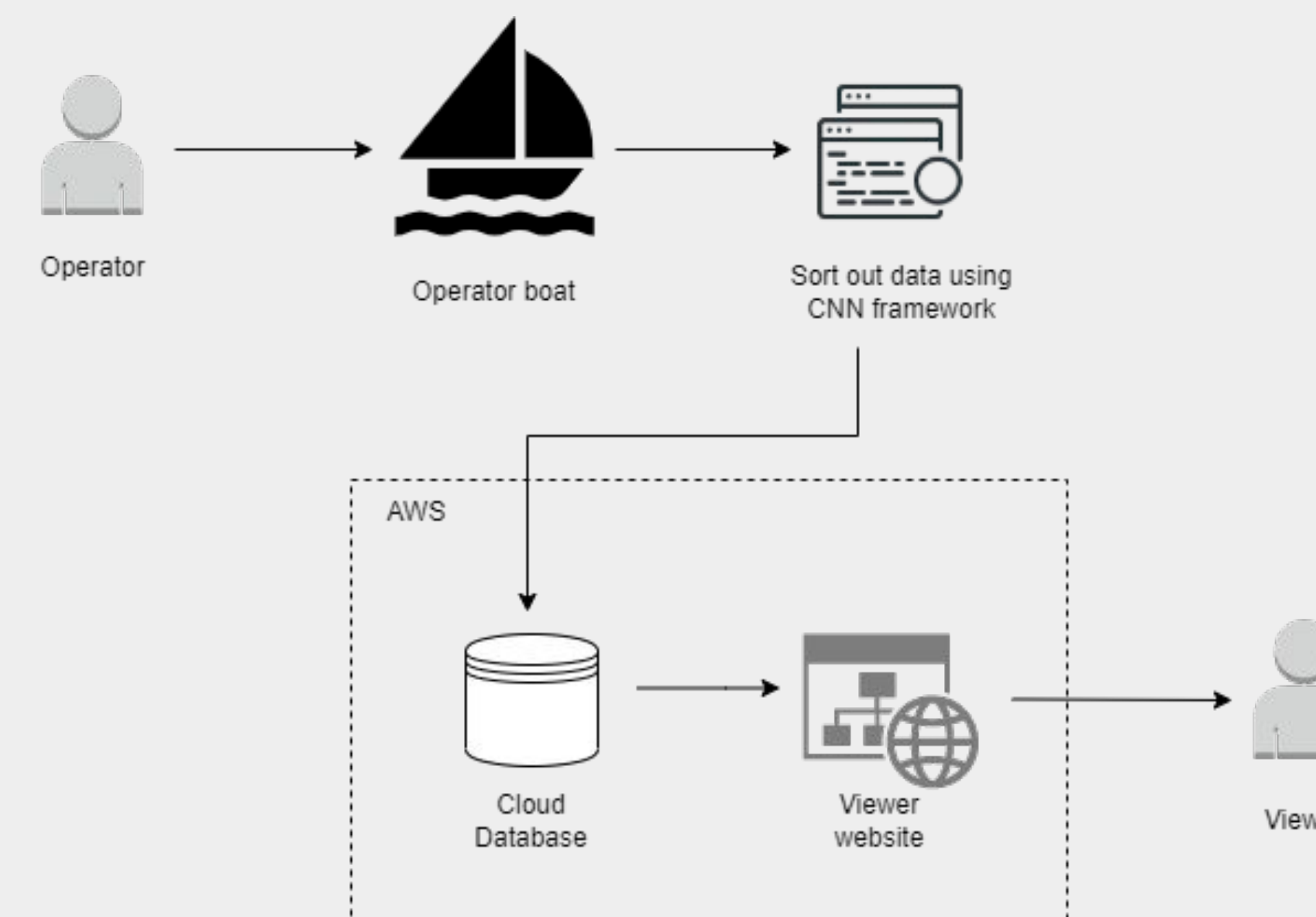
Figure 2: Systems architecture

Results & Conclusions

Figure 3 displays our classification model able to detect litter underwater with a relatively high accuracy. Our model will improve with more training and by increasing the dataset of chosen objects.
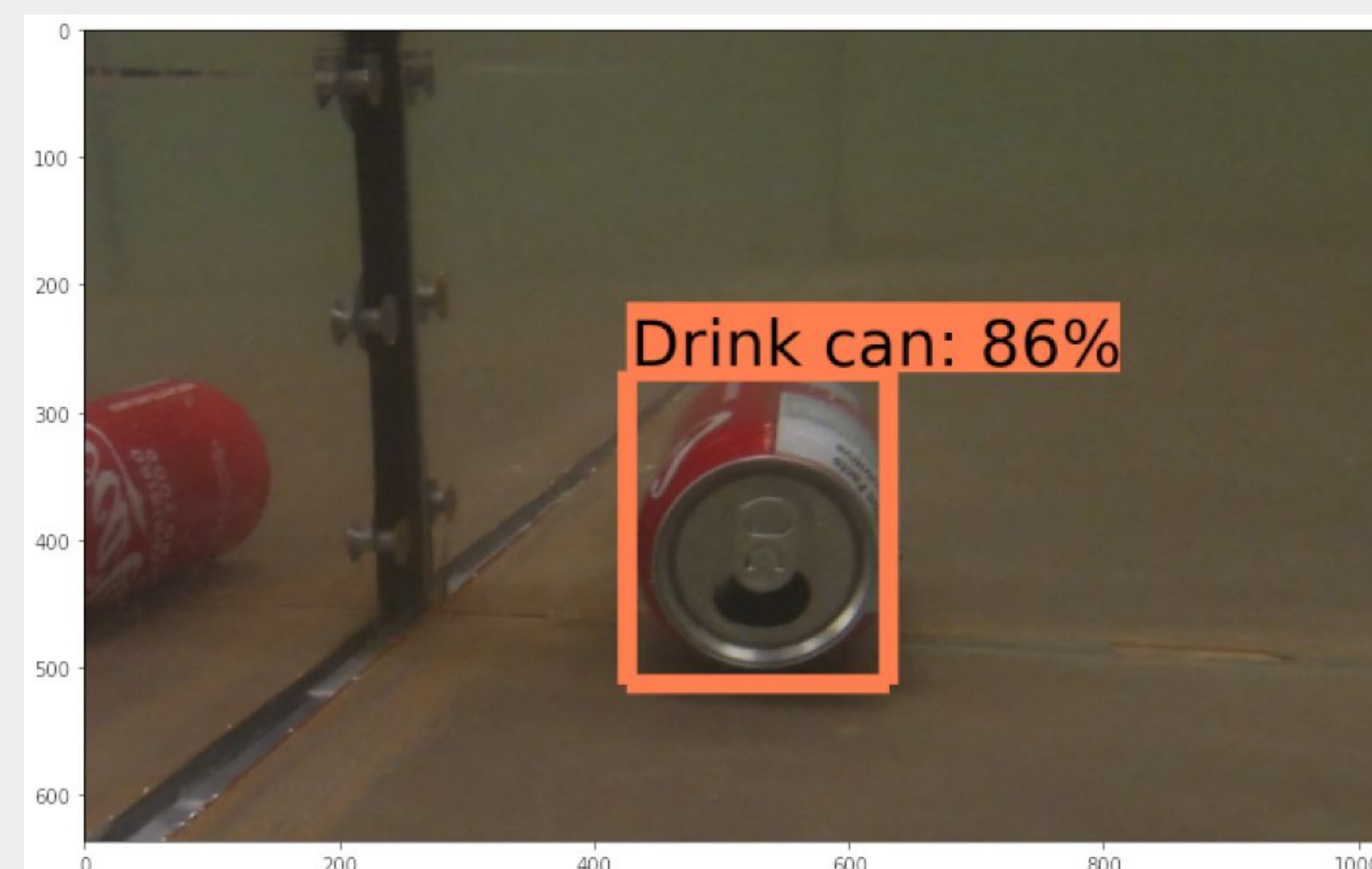
Drink can: 86%

Figure 3: Litter classification

In Figure 4, the map displays water parameters with its corresponding gps data. In addition to this, our web client contains the resultant video taken by the GoPro, that is then filtered through our software to detect litter. This data and video footage could be provided to the Government of Saskatchewan to be further processed.
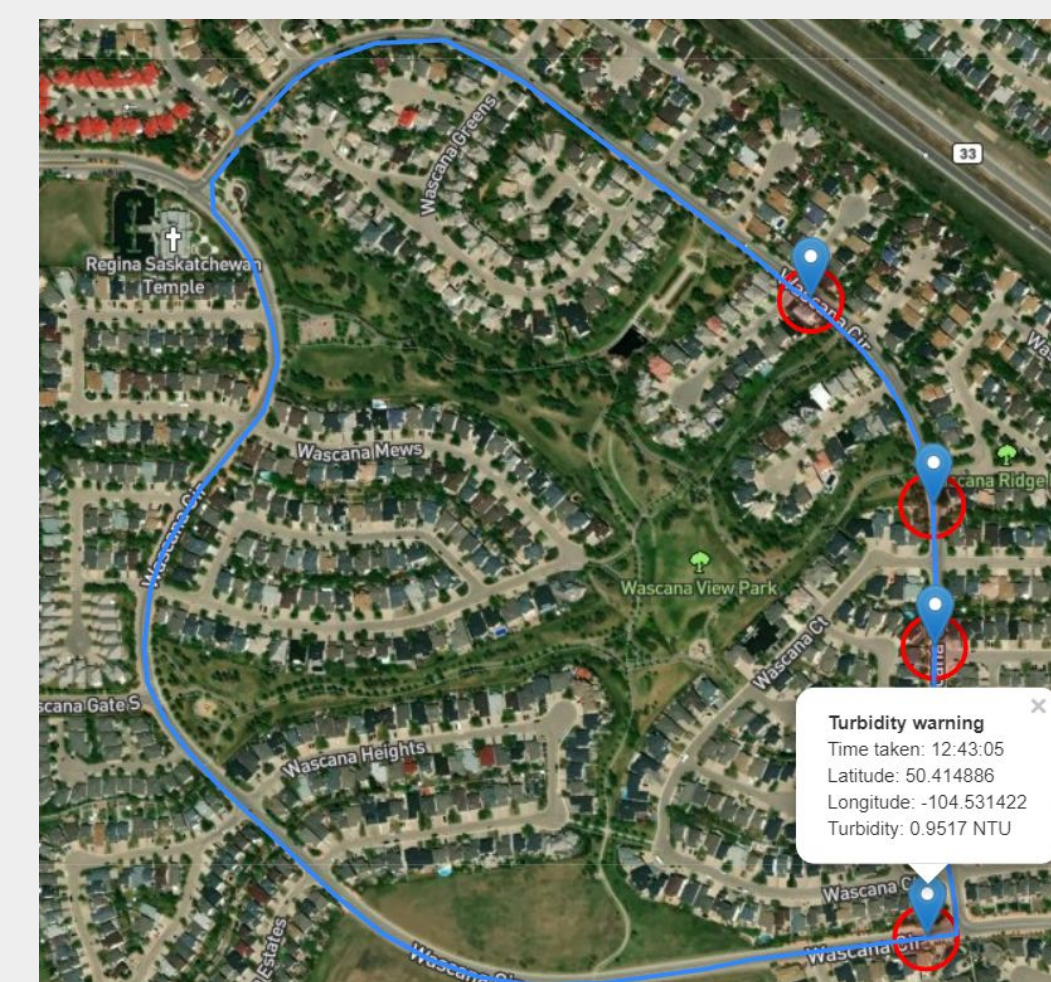
Turbidity warning
Time taken: 12:43:05
Latitude: 50.414886
Longitude: -104.531422
Turbidity: 0.9517 NTU

Figure 4: Map readings

Future additions

Real-time Object Detection
Deepsort integration
Improve classification model
Heatmap integration

Resources cited

[1]Alexey Bochvosky (Oct 2021) Darknet https://tinyurl.com/43y9m838

[2] Google open images: https://tinyurl.com/4k9xca2m

[3] Saskatchewan water quality search: https://tinyurl.com/ytc75djh

[4] Guidelines for Canadian Recreational Water Quality Third Edition (Aug 2012) https://tinyurl.com/2862e4f8

Acknowledgements

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https://github.com/
Rubber-Duck-Solutions/
F.L.O.A.T.