

Monitoring Coastal Habitats Through Machine Learning

Abstract:

The purpose of this paper is to document my experience in the research and planning for the implementation of machine learning services to monitor trash accumulation and pollution in coastal environment and their impact on local flora and fauna. In monitoring trash accumulation in these environments, cities and municipalities around the globe can:

- Better understand the impact garbage accumulation in coastal environments is having on local wildlife and human ecosystems, as well as its contribution to the overall pollution problem plaguing our waterways and oceans.
- Automate monitoring of coastal garbage accumulation through worldwide remote camera systems and satellite imagery.
- Identify key concerns for the local environment and study current impact on wildlife and compare to historical data.
- Develop autonomous cleaning systems for local municipalities and governments to implement on beaches, high-pollutant waterways, and riverbeds in coastal regions.

I chose to research a non-profit organisation (NPO) called The Ocean Cleanup. Founded by Dutch inventor Boyan Slat, The Ocean Cleanup is a NPO that I have been following closely for several years now. This organisation was created with the intent to rid our planet's waters of 90% of their pollutants by 2040. One of many ways they aim to do this is by monitoring coastal environments to gain a better understanding of how plastic trash fluxes in these environments. My goal with this project was to develop a way to automate monitoring of local beach cameras around the world to identify patterns in trash accumulation and their impact on the surrounding environment.

The easy to build IoT solutions with video analytics capabilities uses Microsoft Azure Machine Learning (ML) to build hybrid applications with video analytics capabilities which captures, records, and analyzes live videos. Additionally, Google Cloud Video Intelligence API is deployed for Computer Vision Library specially designed for C++ and Python that works with the images or video streams that come from webcams, Kinects, FireWire and IP cameras, or mobile devices.

Long term this project will also incorporate the use of Geographic Information Systems (GIS) predictive modeling through satellite imagery. This will make it easier to work with local and state governments to develop and implement autonomous cleanup systems along beaches and non-invasive collection methods in highly congested areas where larger river systems cannot reach.