Sea Turtle Image Recognition Using Deep Learning

Jennifer Lopez, Sule Ozev

***Abstract*—Each year, hundreds of thousands of sea turtles are killed by fishing gear, with a considerable fraction being a result of bycatch by small scale fishing [1]. Recent investigations have shown that acoustic and light stimuli work as successful deterrents to reduce bycatch for several species, yet the optimal stimuli for a given species is not known [3]. By developing a sea turtle image recognition model, data can be collected to find the best stimuli deterrent for sea turtles and this data can be used to develop optimized nets that implement the stimuli.**

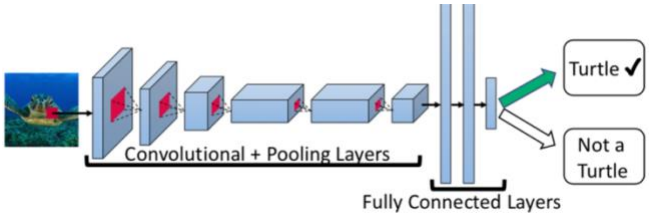

Figure 1: Sea turtle CNN using AlexNet

I. Description of Project

Every year, about 250,000 sea turtles are caught, injured or killed by U.S. fishermen alone [2]. In order to reduce this number, we will develop a model that can identify turtle images, so that data can be collected to find what stimuli works best at deterring sea turtles from approaching a net. Thus, a camera monitoring the space in front of a net can take pictures periodically and feed them into the recognition model. When it detects that a sea turtle is approaching, it would be able to respond with a stimuli response. After multiple encounters with sea turtles and different stimuli being tested, the best stimuli found will allow for the development of bycatch reduction nets that incorporate this stimulus.

Deep learning, specifically convolutional neural networks (CNN), allow for the development of image classification models by using training data to extract common features that will be used to compare and classify testing images.

Using images and videos from the internet, we compiled a database of sea turtle images and non-turtle images. All of the turtle images show a frontal view of the turtle in order to better train the model since it is expected that this is the angle that a camera will have as a sea turtle approaching it. The majority of the images accumulated will be used to train the network, and the remainder will be for testing and analyzing the accuracy of a network.

We will be using Caffe, a deep learning framework, in order to develop the sea turtle recognition model [4]. AlexNet, an existing CNN, will be used to train the data and build the model [5]. Since we are working with a small dataset, we will try to reduce overfitting through several techniques like data augmentation and transfer learning. As our dataset grows, we expect to have a higher accuracy in the model.

Our goal is to optimize the model so that it can correctly classify the images from a testing set with the highest accuracy, despite the noise an image may have, such as low resolution which simulates high turbidity conditions. Furthermore, it is to develop a model which can be extended for the addition of more data and other species.

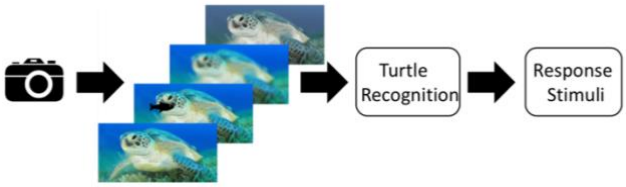

Figure 2: Application of model.

References

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