

Object Detection of Ship images using Deep Learning techniques

Group 11: Xu Yan (G1703193H), Ong Shen Hoong Kevin (G1802234A), and Wang Hongtao (G1503602C)

Project Motivation

To implement deep learning technique for locating and monitoring of ships on satellite images as quickly as possible.

Project Description

This project focuses on applying deep learning on a combination of image datasets where ships may and may not be present. The dataset and labels are obtained from Kaggle Competition. The data analysis will be carried out by three ways: (a) Training the model with different architecture and over-fit the model; (b) Regularization to close the gap between test set and training set in order to generalize the model prediction; (c) Visualization of filters in different layers of the trained models to analyze vanishing gradient problem with existing models (eg. ResNet versus VGG versus inception etc.). Finally, we will utilize region proposal techniques, such as Faster R-CNN, to differentiate multiple ships from an image. Lastly, conclusion and future work will be discussed.

Existing Solution

Existing solutions uses VGG16 and ResNet34.

Proposed Solution

ResNet with Faster R-CNN which not only classify, it can also count the number of ship within an image. In addition, we will perform benchmarking of with existing CNN models such as VGG16 and Inceptionv2. Part of the tweaking process will include utilizing DeCovnet, to visually understand the decision at each layer, and optimizing hyper-parameters empirically Faster R-CNN is proposed to detect multiple ships in the same image.

Milestones and deliverables:

- Project Proposal (Week 8): Project plan and Identify suitable datasets;
- Data Preparation (Week 9): Dataset exploration and finalization, Data Cleaning and Preprocessing, Further read-up and prototyping of proposed CNN architecture;
- Data Analysis One (Week 10): Data Analysis with different architectures. codes of algorithms, training models, visualization, comparison of results and some trials;
- Data Analysis Two (Week 11): Data Analysis and Benchmarking. Comparison of results and visualization of results;
- Slides Preparation (Week 12): Data Analysis, Presentation Slides and Python Notebook with code on Github;
- Group Presentation (Week 13): Presentation preparation, Final presentation.