Iceberg vs ship: classification from satellite images

Problem proposal

Borislav Sabev s4726863

Drifting icebergs are a threat to naval activities in the northern part of the globe. Due to very large area of interest and harsh weather conditions the only working method of monitoring the environmental condition is with satellite imaging. The company C-CORE is working on computer vision surveillance systems and they have collected a labeled dataset of satellite images with either iceberg or ship. Together with the interested party Statoil they posted the dataset and a Kaggle challenge [1]. The goal of the challenge is to design a machine learning algorithm that gives the probability of iceberg present, minimising log-loss on the test dataset. The dataset consists of images with 2 channels HH (transmit horizontally, receive horizontally) and HV (transmit horizontally and receive vertically) and angle between the satellite and Earth at which the image was taken.

State-of-the-art approach to computer vision in recent years is ConvNets. Python with Tensorflow [2] and its higher level API version Keras[3] are suitable tools for creating and training neural networks and specifically ConvNets. For data preprocessing and exploration, visualization of the results the scientific distribution [4] of Python will be used. With this tools I can compare state of the art classifier proven on other image challenges, such as VGG16/19, ResNet50, InceptionV3 with a custom ConvNet implementation that is made with specific domain knowledge about the problem.

The results for the current project can be reliably compared with the results of the other 1210 teams that at the time of writing have enrolled in the competition. Given that the aforementioned ConvNets are used for natural images which are very different from the satellite HV/HH images some domain knowledge would be useful to preprocess the images and segment the object of interest. Previous attempt on the same problem (but different dataset) is presented in [5], demonstrating that ConvNets can be useful for the problem. Possible preprocessing is angle normalization as from [6], water/ice segmentation [7] to extract only the objects of interest and using the HV/HH beyond simple concatenation [8].

Reference:

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