# Ship Detection using Satellite Imagery

# Background

- Ship detection is an essential part of maritime surveillance
- Allows for the monitoring of maritime traffic, illegal fishing and sea border activities
- Typically carried out using Automated Identification Systems (AIS) which use radio frequencies and VHF transponders
- These methods are very effective as ships are legally required to install a VHF transponder however without one the system cannot function
- So how do you detect these ‘dark’ ships?

# Project Goals

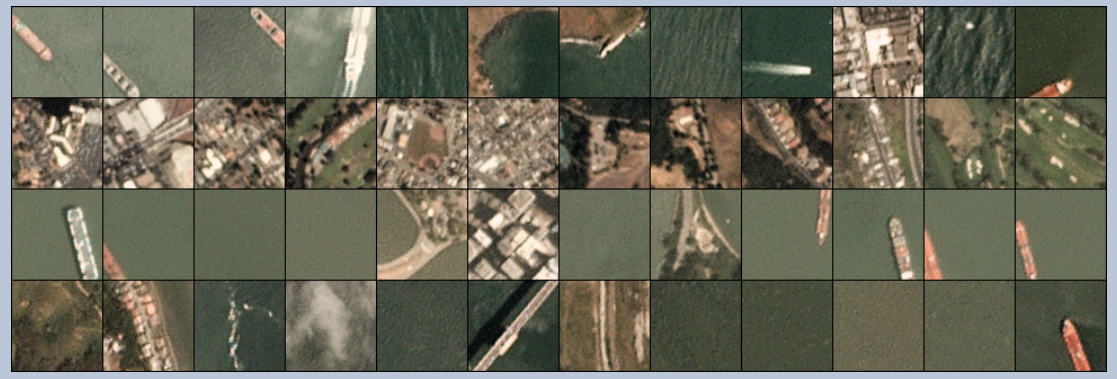
- In the last decade, numerous companies have deployed surveillance satellites to improve monitoring capabilities
- I propose two models that seek to automate the detection of ships from satellite images

    1. Identifying images that contain ships and those that do not
    2. Detecting and delineating each ship from its background

- Using satellite imagery, in conjunction with traditional AIS monitoring, stakeholders can benefit from a **clearer**, more **complete picture** of the seas

# Our Data

Ship Class

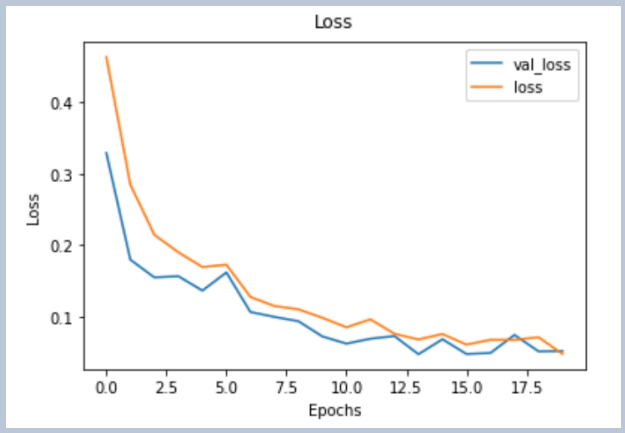


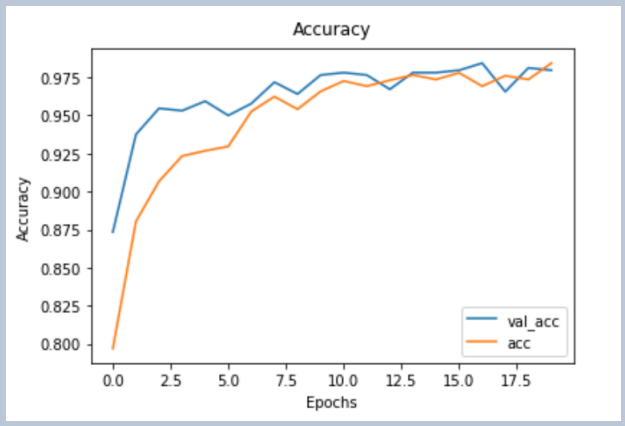
No Ship Class

# Satellite Image Classification: Ship or No-Ship

- Using 4000+ images
- Baseline model: Decision Tree Classifier
  - Validation accuracy: 86.25%
- Final model: Convolutional Neural Network
  - Validation accuracy: 97.9%
  - Test accuracy: 97.8%

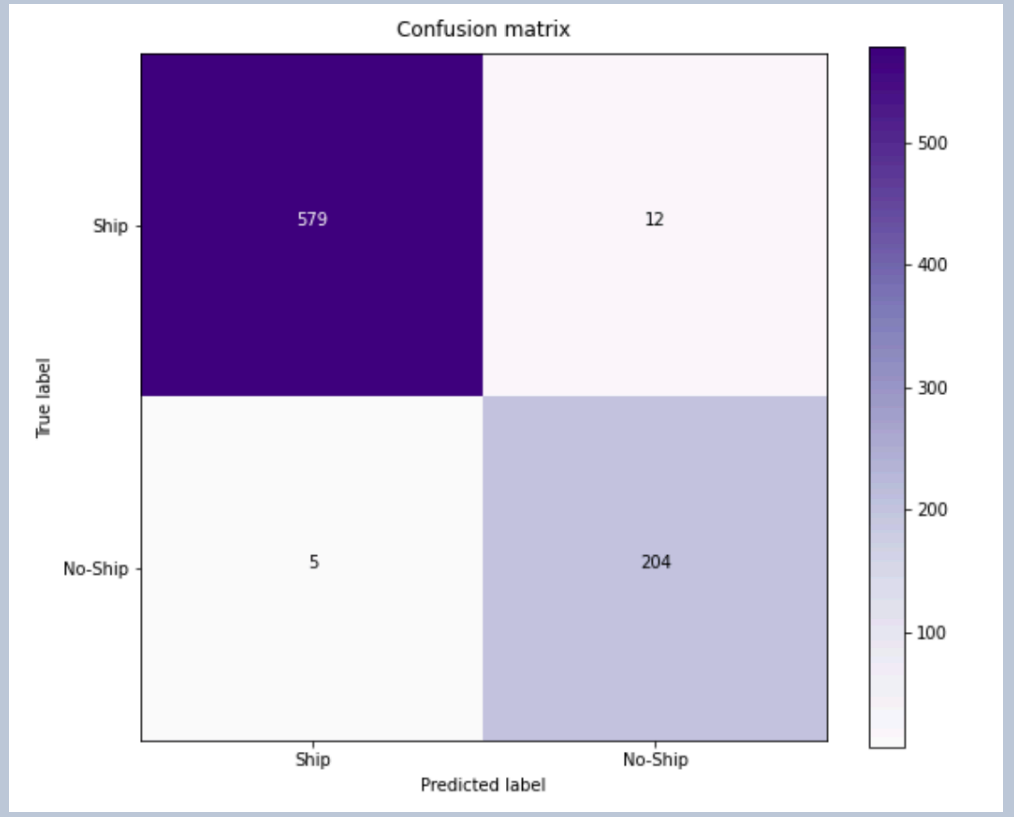
*Final Model*



# Evaluation Metrics

- Accuracy: 98%
  - The model correctly classified images 98% of the time
- Recall or True Positive Rate: 98%
  - The model was able to correctly identify ships when they were present 98% of the time
- Sensitivity or True Negative Rate: 98%
  - The model was able to correctly identify images that do not contain ships 98% of the time



# Instance Segmentation