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## EO/IR based Ship Detection using Machine Learning

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### ABSTRACT

Maritime Domain Awareness (MDA) is essential for many applications in both civil and military fields in order to avoid non-traditional threats such as drug trafficking, illegal unreported and unregulated fishing and human smuggling. Real time ship detection mechanisms are needed for MDA and conventional ship detection mechanisms are not efficient, reliable, and economical due to the complexities in the sea and large scale human interventions. Therefore, there is a high demand for automated on-board ship detection mechanisms that can operate on a ship, unmanned aerial vehicle (UAV) or shore. The overall objective of this work is to lay the stepping stones to build an automated real-time ship detection system for MDA. Here, popular MobileNet V2 and MobileNet V2 - FPN lite machine learning models are trained, deployed and tested. They have the portability to run on portable embedded systems smoothly. In this work, the training data set is prepared using publicly available Electro Optical (EO) dataset and Near Infra-Red (NIR) dataset. Both models are deployed in a portable embedded platform called Jetson Nano. In our experiments, MobileNet V2 and MobileNet V2 - FPN lite models show mean Average precision (mAp) of 0.708 and 0.882. The Frames Per Second (FPS) rates of the video streams in MobileNet V2 and MobileNet V2 - FPN lite are 40 FPS and 5 FPS.

**Keywords:** *Maritime Domain Awareness (MDA), mean Average precision (mAp), MobileNet V2, ship detection*