

# Implementation and comparison of U-Net and YOLO for ship detection

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## 1. Motivation

In satellite imagery analysis, rapid and accurate ship detection is critical to guarantee maritime security, environmental protection, and illegal activity monitoring. Existing methods must balance precision and speed, especially given the high volume of satellite data. This project aims to address these needs by evaluating two popular deep learning models, U-Net and YOLO, to determine an optimal approach for efficient ship detection. We believe this project will allow us to gain a deep understanding of the fundamental knowledge of object detection and segmentation.

## 2. Background

The *Airbus Ship Detection Challenge* on Kaggle provides a dataset of satellite images labeled with ship locations. This competition benchmark serves as a solid basis for comparing models in a realistic setting. U-Net has proven effective in segmentation tasks, while YOLO is known for its high-speed object detection. We will implement both models based on their original papers [2] [1], comparing their performance on the dataset. As this context needs both accuracy and speed, we will investigate the trade-offs of these two.

## 3. Project Milestones

We have defined the following timeline to complete the project on time:

TASK	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7
PROJECT SYNOPSIS							
STUDY U-NET PAPER							
U-NET IMPLEMENTATION							
STUDY YOLO V1 PAPER							
YOLO V1 IMPLEMENTATION							
PERFORMANCE COMPARISON							
POSTER							
REPORT							

## References

[1] Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi. You only look once: Unified, real-time object detection, 2016.

[2] Olaf Ronneberger, Philipp Fischer, and Thomas Brox. U-net: Convolutional networks for biomedical image segmentation, 2015.