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# Software Requirements Specification for Ship detection using CNN

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# **1. Introduction**

## **1.1 Category**

Desktop application

## **1.2 Purpose**

The purpose of developing this system “Ship Detection Using SAR Imagery” is to create a methodology to detect ships in the ocean using SAR data. This application is also used to estimate the size and location of ships in open sea to create ship hotspots and maritime routes with minimal traffic.

## **1.3 Intended Audience and Reading Suggestions**

This project is a prototype for the ship detection system and it is used widely in marine transportation, fishery management, and maritime disaster rescue. This has been implemented under the guidance of college professors. This project is useful for the navigation team and as well as to the search and rescue team.

## **1.4 Project Scope**

Detection of ships is complicated, especially under unfavourable conditions, such as during night-time or on cloudy days. Our project aims to mitigate this problem. Using SAR we can scan for ships and determine its characteristics. This application is also used to estimate the size and location of ships in open sea to create ship hotspots and maritime routes with minimal traffic.

# **2. Overall Description**

## **2.1 Product Perspective**

### **2.1.1 Existing System: Improved YOLOV3**

One of the existing ship detection system is YOLOV

- It is extraordinarily important to increase the ship detection speed, because it can provide real-time ocean observation and timely ship rescue

- This approach achieves high speed ship detection in SAR images, requiring only 24ms per image
- The detection speed of our improved YOLOv3 is 2.3 times faster than the original YOLOv3

### **2.1.2 Proposed system**

- In this project we present an innovative way to detect ships in the ocean using SAR image
- Detection of ships is complicated, especially under unfavourable conditions, such as during night-time or on cloudy days
- Estimation of size and location of ships in open sea
- To create ship hotspots and maritime routes with minimal traffic
- Using SAR, we can scan for ships and determine its characteristics

## **2.2 Product Features**

The main feature of this project is to detect ship in open sea using SAR imagery.

- Here we would input the SAR images into this system to locate the locations of ships
- SAR images undergoes denoising to remove unwanted speckle noise
- The images are then processed by image enhancement
- The ships are detected using YOLO with which we could determine the size of the bounding boxes
- Thus, size and location of the ship is calculated

## **2.3 User Classes and Characteristics**

Users of the system should be able to retrieve location and the size of the ships in open sea even in unfavorable conditions. Users will have access to the information regarding the ship routes and the location of the ship. The users of this project are navigation and marine surveillance team and search and rescue team. The users should be able to do the following functions:

- Calculate the latitude and longitude of the ship
- Estimate the size of the ship
- Find the routes of the ship
- Get the SAR image of the ship

## **2.4 Operating Environment**

**Operating System Server:** Window 8, Linux, UNIX

### 3. System Features

#### 3.1.1 Description and Priority

The ship detection system maintains information on latitude, longitude, location, size and sea routes of the ship. Of course, this project has a high priority because it is very difficult to detect the location of the ship in unfavorable condition

#### 3.1.2 Stimulus/Response Sequences

- Search for SAR image
- The SAR image undergoes ship detection process where image enhancement, object detection using YOLO and determination of size of bounding boxes occur
- Then the details regarding the location size and sea route are sent to the user

#### 3.1.3 Functional Requirements

- Users must have valid User ID and password to login thus creating their individual profiles
- Users can check the SAR images of the ship
- From this information we calculate the latitude and longitude of the ship
- Navigation team can find information about the ship routes and the size of the ship
- They can use this system for search and rescue and for maritime surveillance

### 4. External Interface Requirements

#### 4.1 Hardware Interfaces

**Processor:** Intel Core i5

**RAM:** 4GB

**Hard Disk:** 640 TB

#### 4.2 Software Interfaces

**Client:** windows machine

**Development Tools:** Microsoft Visual Studio Code and Jupiter Notebook

**Programming Language:** Python

## **5. Other Nonfunctional Requirements**

- Performance Requirements: Better component design to get efficiency at peak time
- Security Requirements: Secure access of confidential data such as detail about the location and route of ships and the details of the user
- Software Quality Attributes: Flexible service based architecture will be highly desirable for future extension.