FPT Education
FPT UNIVERSITY

CAMERA TRACKING
SEAPORT

F6886 - FPT UNIVERSITY

CONTENT

01 - F6886 TEAM

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02 - INTRODUCTION

INPUT

Using camera to detect ships, check time arrive and leaving, detect fire.

OUTPUT

- Identify ships to check their information
- Manage ships at seaport
- Detect fire at seaport to warning.

03 - APPLICATION

SEAPORTS

SEAPORT MANAGEMENT

- Number of ships in port
- Status of ships
- Ship statistics

IDENTIFY SHIPS

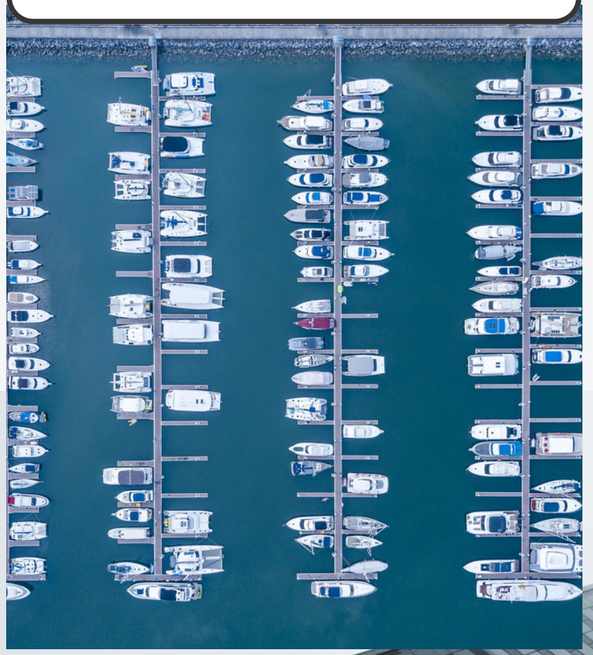
- Security
- Ship’s information
- Ship’s mission
- Ship owner’s contact
- Ship members’s information

TRACKING SHIPS

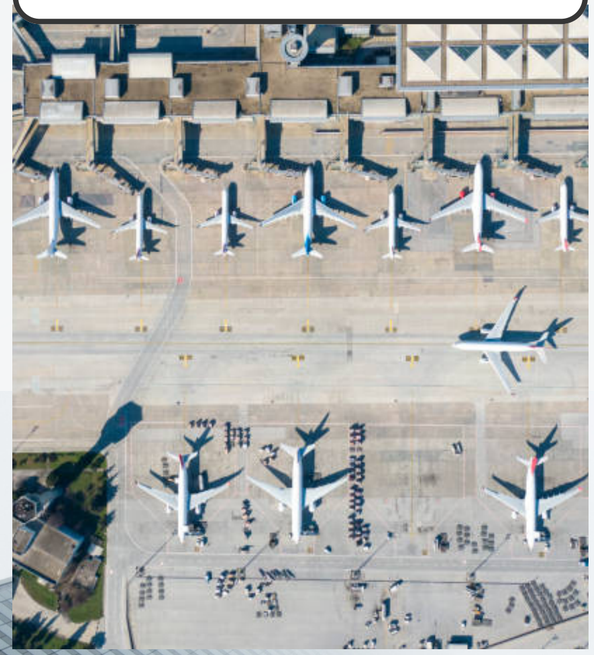
- Time arrival
- Time spent
- Time leaving

03 - APPLICATION

SEAPORTS
Tracking Ships

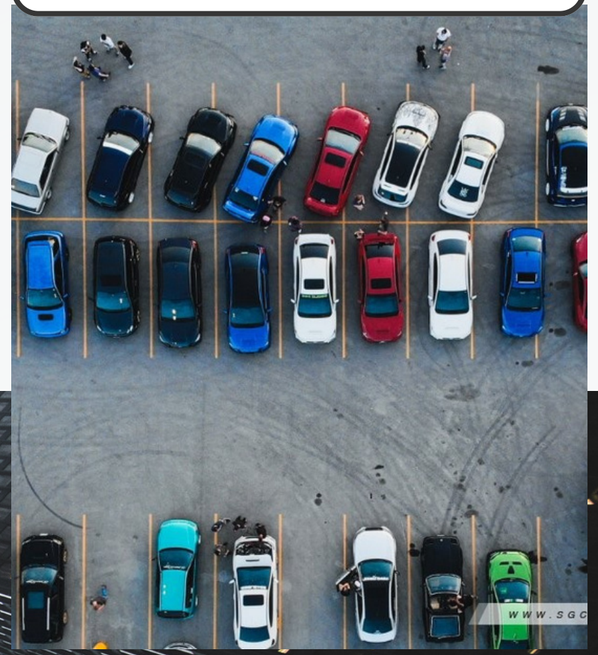


AIRPORT
Tracking Airplanes



FACTORY
Tracking Trucks

PARKING LOT
Tracking Cars



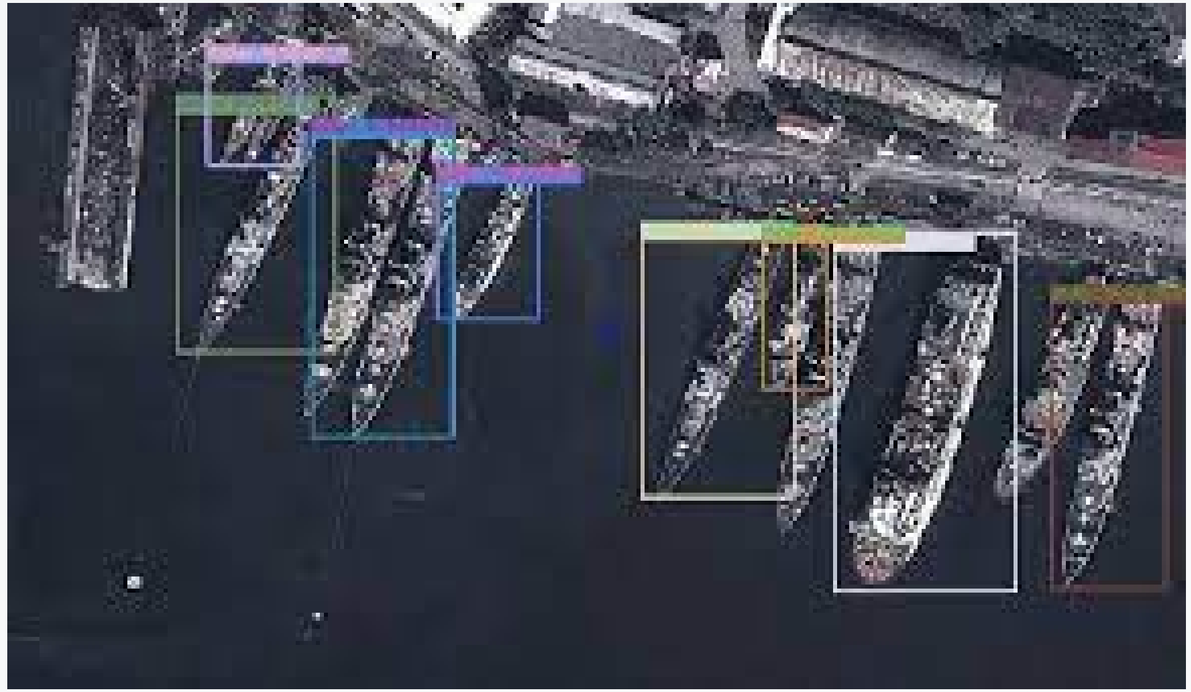
04 - FEASIBILITY

In the realm of maritime operations, the security and management of ports stand as paramount considerations. An essential component in this vast mechanism is the effective detection of vessels and potential hazards like fires. The following delve into the cutting-edge technologies we've incorporated for these purposes

04 - FEASIBILITY

01

Navigating through the vast expanses of the maritime domain requires accurate detection mechanisms. Traditional radar systems, which detect vessels based on the reflection of radio waves, have been the cornerstone of marine navigation for decades. On the technological front, high-resolution satellite imagery offers a bird's-eye view, making vessel identification in the open sea possible. Additionally, acoustic sensors play a role by detecting underwater sound patterns indicative of vessels. Optical imaging, often through infrared cameras, can capture and analyze images to identify vessels, especially in clear weather conditions. On the frontier of artificial intelligence, deep learning models such as Faster R-CNN, SSD, Mask R-CNN, and our chosen YOLOv8 have revolutionized vessel detection with their accuracy and speed.



04 - FEASIBILITY

02

In the expansive marine environment, detecting fires demands more than traditional methods. Thermal cameras, sensitive to temperature variances, are a frontline defense in spotting potential fires by identifying heat sources. Conventional smoke detectors, while effective in enclosed spaces, might face challenges in the open environment of a port. However, gas detectors, sensing abnormal concentrations of flammable gases, can act as precursors to alert of possible fires. Ultraviolet (UV) detectors work by sensing the UV radiation typically emitted during fires. Advancements in AI have brought forth deep learning models such as Convolutional Neural Networks (CNNs), Residual Networks (ResNets), and our premier choice of YOLOv8, explicitly designed for fire detection in visual data, elevating the level of safety and security in maritime ports.

05 - DEMO

For the purpose of demonstration, the operational code for both our ship detection and fire detection models is housed within the inference.ipynb file. Within this notebook, we have integrated the functionality to process a pre-existing video, execute predictions using our trained models, and subsequently output a labeled video. These labeled videos are illustrative of the predictions and can be found in the designated folder. It's important to note that the code utilized in this demonstration is tailored for this specific showcase. Real-world deployment would necessitate a different coding approach to cater to the nuances and dynamics of a live environment.

06 - RELATED WORKS

1. Ship Detection Using Deep Learning:
Aside from YOLO, deep learning models have been employed for ship detection in maritime settings.

- Jones et al. (2018): The study presented a Convolutional Neural Network (CNN) model for automatically identifying ships from satellite imagery. The proposed approach demonstrated a high accuracy rate in different maritime environments.

2. Fire Detection using Machine Learning:
Swift fire detection is paramount in port settings to mitigate hazards.

- Williams et al. (2019): This work introduced a machine learning-based approach for fire detection in urban environments. The model proved effective in early fire detection, which is essential for timely emergency response.

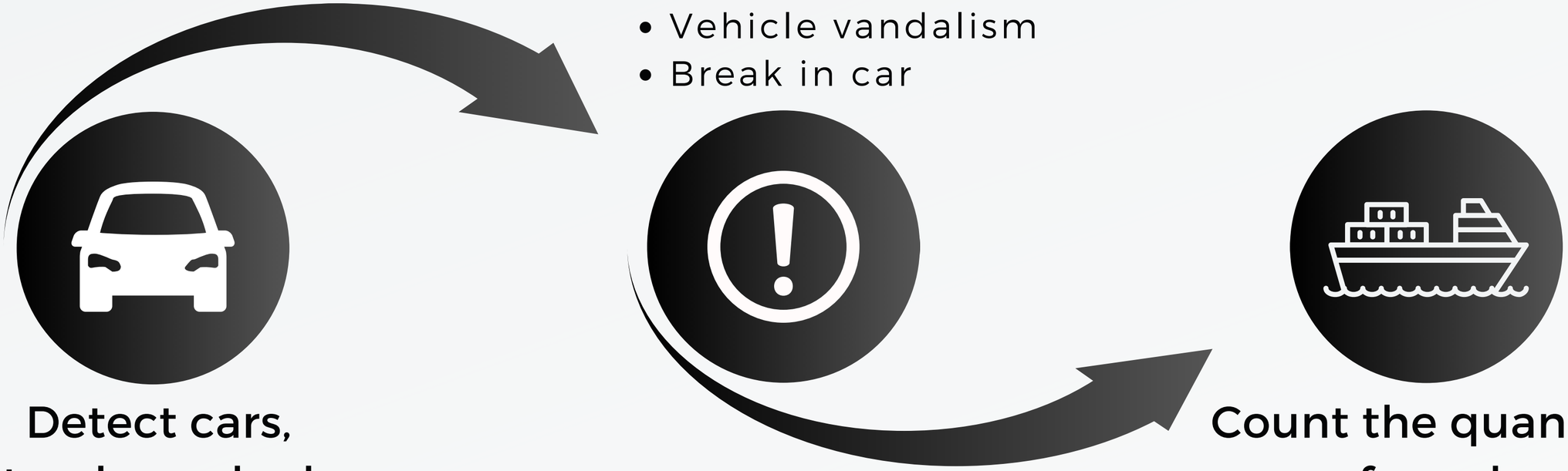
3. AI in Port Management:
AI applications in port management range from optimizing cargo handling to monitoring environmental factors.

- Brown & Smith (2017): This research highlighted the use of reinforcement learning for optimizing container stacking in ports, reducing waiting times, and enhancing operational efficiency.

07 - FUTURE WORKS

Detect improper behavior

- Vehicle vandalism
- Break in car



Detect cars, trucks parked

- To apply model at parking lots (supermarket..)
- To apply model at factory trucks parking lots.

Count the quantity of goods

- Counting number of containers transported
- Counting number of suitcases, boxes..

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THANK'S FOR WATCHING