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Motion Pattern Classification on Online/Active Data-Machine Learning

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Abstract: ***Ship behaviour recognition and prediction is very important for the early warning of risky behaviour, identifying potential ship collision, improving maritime traffic efficiency etc., and thus is a very active topic in the intelligent maritime navigation community.***
The high flow of vessel traffic affects the difficulty of monitoring vessel in the middle of the sea because of limited human visibility, occurrence of vessel accidents at the sea and other illegal activities that illustrate abnormal vessel behaviour such as oil bunkering, piracy, illegal fishing and other crimes that will continue and will certainly have an impact on losses in several aspects.
An existing system involves, Automatic Identification System (AIS) for short-range operation, Long-Range Identification and Tracking (LRIT), Vessel Monitoring System (VMS) are widely used automatic reporting systems for the ship/vessels. Further few classification algorithms like Bayesian, CNN and many other methods which does not permit to draw definite conclusions about the overall effectiveness of the identification procedure because of noise level.
Automatic identification system (AIS) trajectory will collect data from multiple sensors that record dynamic and static ship information. AIS sequences (and records) are affected by subjective ship-officer behavior such as collision-avoidance decision-making and good seamanship.

I. INTRODUCTION

A. Purpose

The detection of ship patterns on offline data is possible by applying the mathematical algorithms. However, the problem statement is to detect online ship/vessel manoeuvring patterns in sea such as Zig-Zag, Loop, Parallel movement & sudden stop in mid sea for [2,3,4]Undergraduate Student, Department of Computer Science Engineering Sridevi Women's Engineering College, Hyderabad
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Radar/AIS track data and The ship detection and pattern of the motion is observed at regular intervals based on time series for the above best classification technique. Finally, a smart object recognition system will be developed for the automatic motion pattern recognition of the vessel in videos/Frames.

B. Scope

Oceans are very important for mankind, because they are a very important source of food, they have a very large impact on the global environmental equilibrium, and it is over the oceans that most of the world commerce is done thus, Ship behaviour recognition and prediction is very important for the early warning of risky behaviour, identifying potential ship collision, improving maritime traffic efficiency etc., and thus is a very active topic in the intelligent maritime navigation community. In port areas condensed water way traffic of various ships easily creates hazardous situation, which requires reliable traffic management and security control.
In the last decades, an important effort has been deployed to improve the security and safety associated to the maritime domain. The high flow of vessel traffic affects the difficulty of monitoring vessel in the middle of the sea because of limited human visibility, occurrence of vessel accidents at the sea and other illegal activities that illustrate abnormal vessel behaviour such as oil bunkering, piracy, illegal fishing and other crimes that will continue and will certainly have an impact on losses in several aspects[8]

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C. Model Diagram/Overview

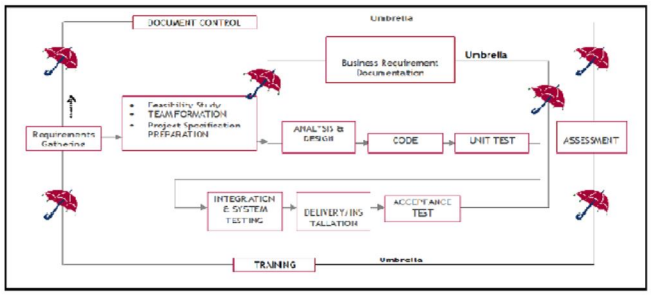


Fig. Model Diagram

The above model diagram refers to the placement of these software components on physical machines. Two closely related components can be co-located or placed on different machines. The location of components will also impact performance and reliability. The resulting architectural style ultimately determines how components are connected, data is exchanged, and how they all work together as a coherent system.

II. SYSTEM ANALYSIS

A. Existing System

The existing approaches include SAR (Synthetic Aperture Radar) image-based ship motion detection approach. This approach is not satisfactory as the requirement of real-world applications as the number of SAR sensors is limited. Ship motion detection is an important task for maritime security, its applications include searching for lost ships up to commercial and military control This task is usually performed by Automated identification Systems (AIS) that use VHF radio frequencies to wirelessly transmit their location, identity and destination to nearby receiving devices on other ships and terrestrial systems.

- *Disadvantages of Existing System:* It not permit draw definite conclusions about the overall effectiveness of identification procedure because of noise level, Less Accuracy.

B. Proposed System

A new methodology has been proposed for detecting ship motion from AIS data. This approach utilizes deep learning techniques as the ship classifier.

Classification techniques will be compared with various performance parameters such as accuracy and to identify the best classification technique and to map the ship networks in various satellite images.

- *Advantages Of Proposed System:* Identifying the best classification technique. The ship detection and pattern of the motion is observed at regular intervals and High Accuracy.

III. SYSTEM REQUIREMENT SPECIFICATION

A. Hardware Requirements

Minimum hardware requirements are very dependent on the particular software being developed by a given Enthought Python / Canopy / VS Code user. Applications that need to store large arrays/objects in memory will require more RAM, whereas applications that need to perform numerous calculations or tasks more quickly will require a faster processor.

- Speed - 1.1 Ghz
- RAM - 256 MB(min)
- Hard Disk - 20 GB
- Key Board - Windows Keyboard
- Mouse - 2 or 3 Button Mouse
- Monitor - SVGA
- Processor - Pentium –IV

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B. Software Requirements

The functional requirements or the overall description documents include the product perspective and features, operating system and operating environment, graphics requirements, design constraints and user documentation. The appropriation of requirements and implementation constraints gives the general overview of the project in regards to what the areas of strength and deficit are and how to tackle them.

- Operating System - Windows7/8
- Programming Language - Python

IV. SYSTEM DESIGN

A. System Architecture

A system architecture is the conceptual model that defines the structure, behaviors, and move views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system and an architectural diagram is a diagram of a system that is used to abstract the overall outline of the software system and the relationships, constraints, and boundaries between components.

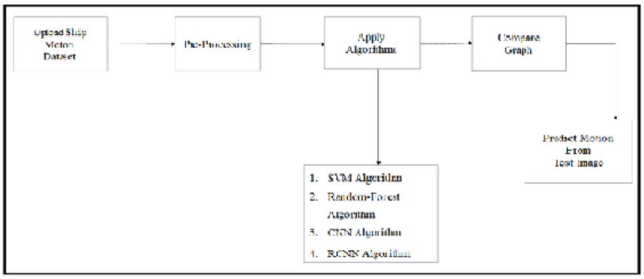


Fig. System Architecture

System architecture refers to the placement of these software components on physical machines. Two closely related components can be co-located or placed on different machines. The location of components will also impact performance and reliability. The resulting architectural style ultimately determines how components are connected, data is exchanged, and how they all work together as a coherent system.

B. System Components (Modules)

In propose paper author is performing following steps:

1) Upload Ship Motion Dataset
2) Pre-process Dataset
3) Run SVM Algorithm
4) Run Random Forest Algorithm
5) Run CNN Algorithm
6) Run RCNN Algorithm

- *Module 1- Upload Ship Motion Dataset*

Using this module we will upload dataset to application.

- *Module 2- Preprocess Dataset*

Using this module we will process dataset to convert all non-numeric data to numeric data.

- *Module 3- Run SVM Algorithm*

Using this module we will trained SVM algorithm on processed dataset and then predict on test data and then calculate HIT RATE between original data and predicted data.

- *Module 4- Run Random Forest Algorithm*

Using this module we will trained Random Forest algorithm on processed dataset and then predict on test data and then calculate HIT RATE between original data and predicted data.

- *Module 5- Run CNN Algorithm*

Using CNNs is their ability to develop an internal representation of a two-dimensional image.

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- *Module 6- Run RCNN Algorithm*

R-CNN is to detect objects in any input image defining boundaries around them.

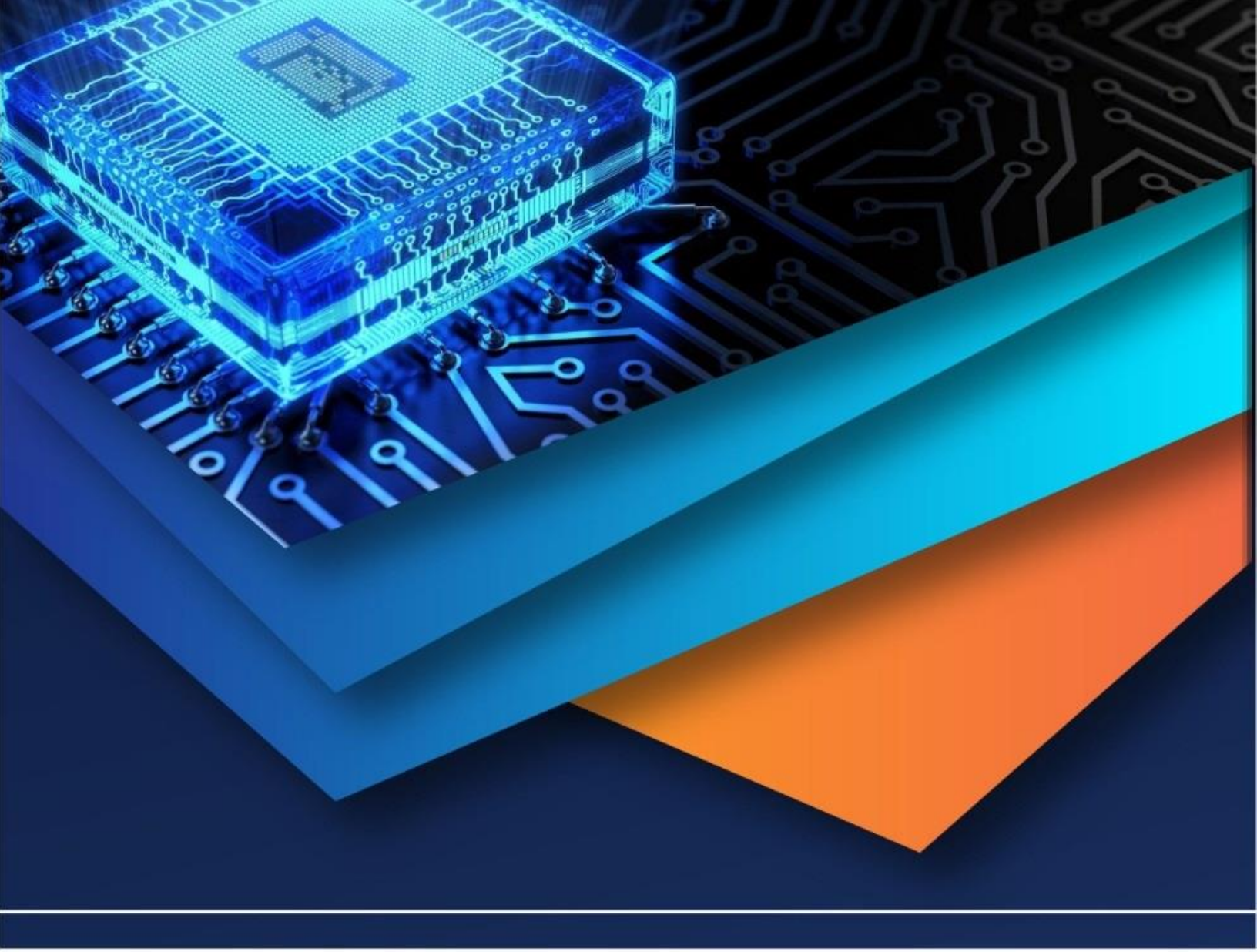
V. CONCLUSION

The following conclusions can be presented :

Automated identification Systems (AIS) that use VHF radio frequencies to wirelessly transmit their location, identity and destination to nearby receiving devices on other ships and terrestrial systems. A new methodology has been developed for detecting ship motion from AIS data. This approach utilizes deep learning techniques as the ship classifier. Classification techniques will be compared with various performance parameters such as accuracy and to identify the best classification technique and to map the ship networks in various satellite images.

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