

Forecasting Ship Data Using ASVM Algorithm

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Abstract: The increase in the improvement of maritime data in Maritime situational awareness causes an impact of storing and retrieving those data. Hence the amount of data collected from the ship using various satellites and RADAR system tends to be millions of data. Thus the data includes longitude, latitude, speed and etc. are to be collected from the ship for every ten seconds so as to monitor the moments of the ship. These data are stored and maintained for analyzing the future purpose to avoid correlations or interruption that happened during the journey of ship. To fulfill all this requirements and to make an efficient way processing these data a newly proposed algorithm namely ASVM is used in this paper. The ASVM is a decision classifier algorithm which is a combination of two powerful classification algorithms such as C4.5 and SVM. To predict the future values of ship form the historical data is done by using the ASVM algorithm. Thus the predicted data will give the assurance for the safe journey of ship. The entire system deals with the manipulation of geo space data and the classification function for processing those data in an efficient manner.

Key words:Geo space dataset • SVM decision classifier algorithm • C4.5 classification algorithm • ASVM classification algorithm • Prediction technique • GPRS application

INTRODUCTION

Now a days the amount of data goes on increasing day by day due to the improvement of technology growth. Hence it is an important aspect for developing the proper and efficient technique to organize the data. The collection of maritime data from AIS (Automatic Identification System) and Synthetic Aperture Radar (SAR) are fused by using data fusion algorithm namely Knowledge-based (KB) fusion algorithm [1]. By fusing those data it can monitor the positing of the ship and can predict the direction of the ship in which it has to be project. Different types of satellites and sensors were used and compared for monitoring the positioning of the ship in which the data are to be fused using the state-of-art algorithm [2]. The novel vessel classification method (Pauli-theorem) and single-pass Polari metric synthetic aperture radar (SAR) is processed for classifying the vessel thus by identifying the ship in 3d

view map images [3]. They implemented the classification algorithm in ship SAR signature which is based on decision rule using fuzzy logic for identifying the parametric vector P [4]. It can also aim to support the neural network and genetic algorithm technique for further classification. The data from AIS, RADAR and SAR are fused to analyze the positing of ship and also find out the motion of ship direction using azimuthally shift [5]. The detection algorithm uses Radon transform for integrating the information by exploiting each pixel in the images [6]. The dynamic data is used for tracking the ship and the method of data association in implemented for processing the incoming message and the exciting data [7]. Though there exist lots of technique for processing and managing ship data and images to identify and tracking the ship for safety and security purpose [1]-[7]. In this paper, we are going to process those data that collected from various sensors and satellite in means of storage and maintains the data in an efficient manner.

The amount of data that collected and stored in the data base tends to increase which leads to a technique called big data. They are in need to extract and classify those data for gaining information knowledge from the large dataset. Hence there exists various kind of machine learning technique in which the data can be classified [8]. According to this project, C4.5 and SVM are the two types of classification machine learning algorithm that we used to classify the mean accuracy of data. Also a newly proposed algorithm namely ASVM is finalized and proved that it gives better results than the other two algorithm and hence it is used for predicting the future value.

Machine Learning Algorithms: According to learning technique it can be classified in two ways such as supervised and unsupervised learning. The paper is fully based on text classification which comes under supervised learning [9]. Therefore the classification algorithm such as C4.5, SVM and ASVM are performed for the given dataset and results are compared to analyze which one is best for prediction [10]. In some concepts the classification also done by scattering the data or polymeric images in order to give proper resolution of the ship [11].

C4.5 Decision Classifier: The classification is done in two types of data as test data and training dataset. This type of classification uses the decision tree for better knowledge discovery techniques [12]. The process of quick classification and high precision is done by C4.5 algorithm. Hence it classifies the data by changing the thread values. The training dataset is classified by constructing the decision tree.

$$\text{GainC4} = (-1) * \text{GainC4}$$

ASVM Classification Algorithm: This classification algorithm is that derived from the SVM classification algorithm. The method of classification and regression is done effectively in SVM by margin maximization and kernel function [13]. In this paper modified SVM which is named as ASVM is applied to large data set of geospatial data which has multi class of classification [14]. Based on the values achieved by classification it determines that ASVM gives the better average accuracy values while compare to C4.5 [15]. While there exists many techniques for improving the performance of SVM, the implementation of ASVM gives the higher accuracy rate by changing the math values [16].

$$\text{ASVM} = (\text{inVal} * (i/2)) * \text{Math.log}(i) * (\text{Math.log}(i) / \text{Math.log}(8)) / 8.$$

Architectural Design

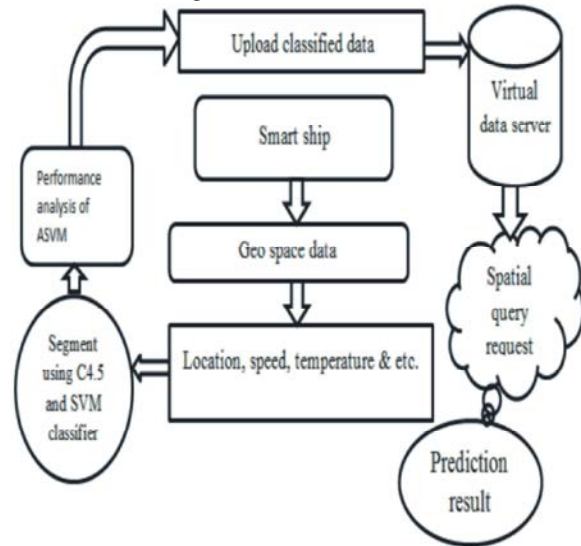


Fig. 1: System Architectural diagram

Fig 1 shows the architecture of the system, which explain that the data comes from the ship are of geo space data. Those include location, speed, temperature, wind speed and etc. It is then collected and formed as a dataset which is classified by using classification algorithm. Thus by using the ASVM algorithm it gives efficient classification results. Once the classification is done the classified data are stored in the data server. Hence the prediction can be done from the classified data for future analysis of ship travel.

Algorithm for Experimental Model:

Input: dataset.

Output: classified data.

- Take a data set as input.
- Upload the data set to the server.
- Apply classification from step 4 to step 6.
- Evaluate the success, failure ratio and information gain ratio of all data.
- Construct the models separately using c4.5 algorithm and ASVM algorithm.
- Find the accuracy values and of the two model and store the value in array.
- Find a model that has maximum Accuracy.
- Done prediction by the algorithm which has maximum accuracy.
- End.

RESULTS AND DISCUSSION

In this phase the given data is classified by using the two algorithms such as ASVM and C4.5 for getting the accurate values of data.

Fig 2 shows that classification is done on both the algorithm. It gives the mathematical values of the given dataset. The algorithms are compared according to the gain values obtained for the above two algorithm.

Performance Analysis: This results show the performance analysis of the given dataset. After finishing the classification, we compare the performance of the two algorithms, which shows that ASVM gives the highest values than the C4.5 [17].

Prediction Technique: The predictive technique is crucial for early warning applications which provides additional information to analysis the accurate data and helps the

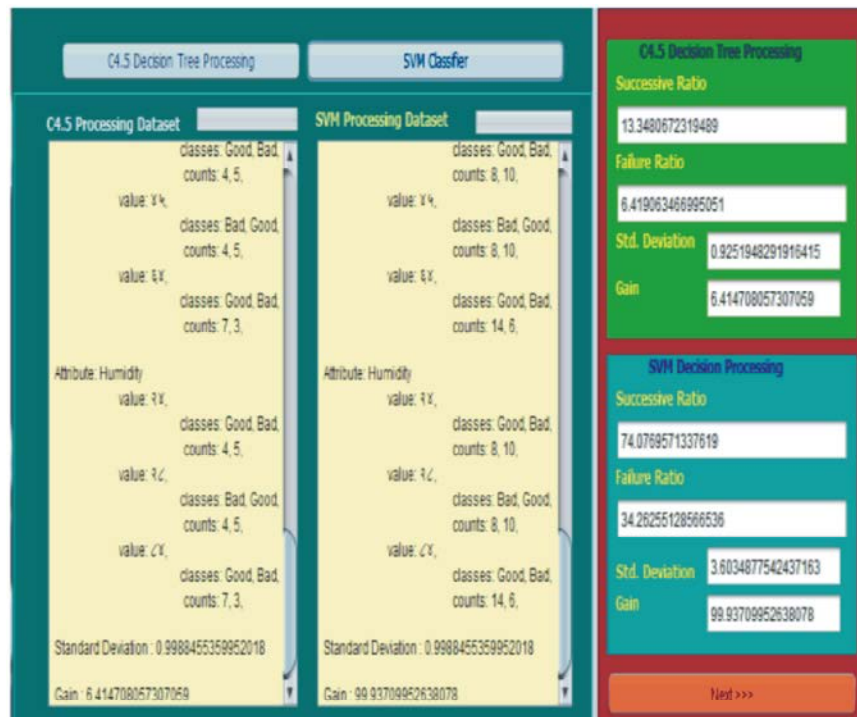


Fig. 2: classification results of C4.5 and ASVM algorithm

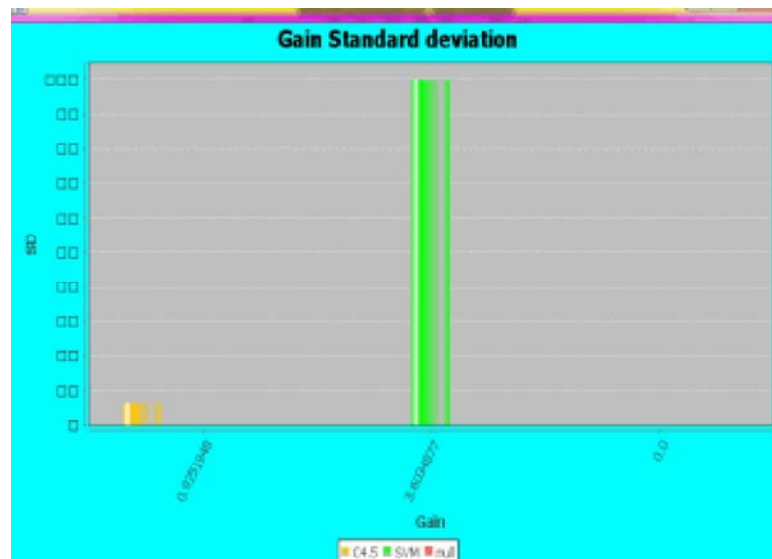


Fig. 3: Comparison of Gain standard deviation values

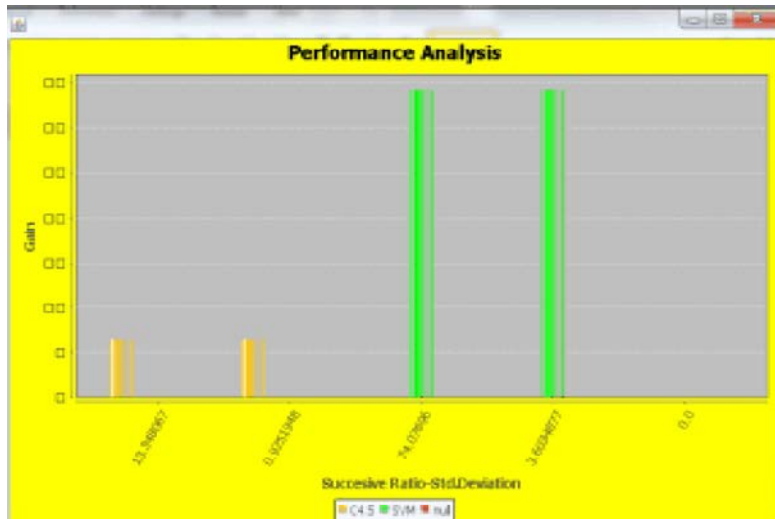


Fig. 4: Performance analysis of C4.5 and ASVM



Fig. 5: Graphical representation of ratio comparison

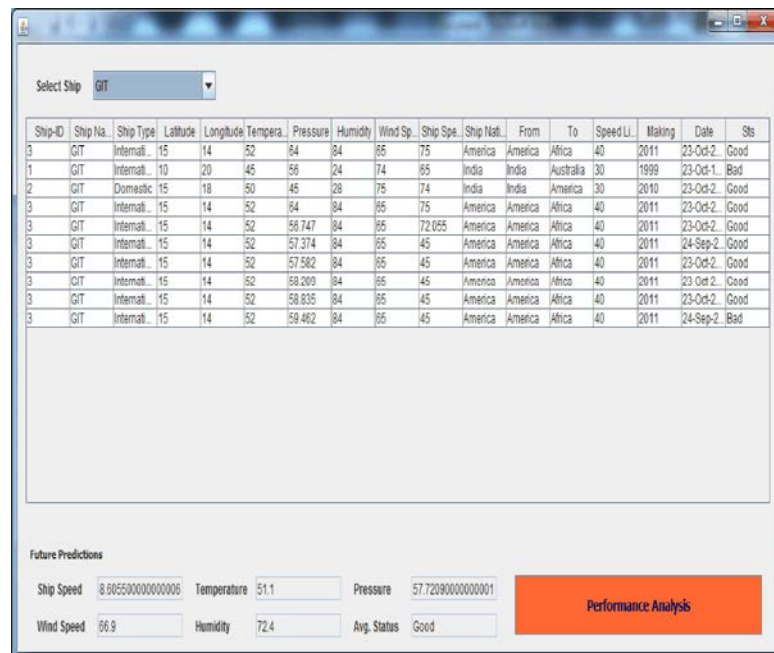


Fig. 6: Prediction results

Table 1: Experimental result on dynamic dataset

Various performance	C4.5	ASVM
Success ratio	13.348	74.076
Failure ratio	6.41906	34.262
Standard deviation	0.9251	3.603
Gain	6.414	99.93
Mean	6.77654	52.9277

users to get an idea of further proceedings [18]. For handling large data the prediction is more efficient to process the specific data that we incorporate immediately [19]. In Fig 6 shows that by giving the ship name as a query request it will give predicted values based on the given dataset.

The above Table 1 shows the difference of values by performing the classification algorithm. Hence it shows that ASVM gives the best values when compared to C4.5 algorithm. So that it is implemented that ASVM is used for prediction of future values.

CONCLUSION

This experiment is performed with geo space data that comes from the ship is analyzed and classified with C4.5 and SVM algorithms. As for better results the SVM is then improved to form ASVM algorithm. It is demonstrated through real data and an objective comparison of two algorithms is done. Thus by effective classification it is concluded that ASVM classification algorithm is the best algorithm. Hence it is used for the predicting the future values. The prediction is done on classified data which gives the accurate values. Thus by predicting the values we can consult the conditions of the collected ship data. Hence we can come to conclude that for further travelling of ship it can give the safest route and safe journey of ship movement.

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