Retraction

Retracted: IOT Monitoring System for Ship Operation Management Based on YOLOv3 Algorithm

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

**Research Article**

**IOT Monitoring System for Ship Operation Management Based on YOLOv3 Algorithm**

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Combined with the YOLOv3 algorithm, the Darknet network developed on the Internet of Things offers boat maintenance, design, and deployment to meet the needs of developing and implementing the Internet of Things-based ship management. System maintenance was completed, solving the problem of care and identifying the vessels in the water important for care. Based on this, the YOLOv3 algorithm has been reported to achieve the target thinking based on the global data map, and the target area thinking and the distribution plan need to be set into a standard neural network. Add a penalty for fixing the boat to different parts of the system together. Binarily divide the needs by a set of logistic regression, allowing rapid tracking and identification of goals in high-risk situations. Experimental results show that the average validation rate of this study’s standard is 89.5% at 30 frames per second. Compared with traditional and in-depth training, this data algorithm is not only more practical and accurate but also more efficient in learning algorithms and various environments. The switches are more flexible and can control multiple ships and their essentials.

**1. Introduction**

In recent years, with the maturity of the Internet of Things and cloud computing, the application of the Internet of Things technology and Android technology to ship monitoring is of great significance for accelerating the construction of ship digitization, automation, and intelligence, improving the response to sudden accidents on water, ensuring the safety and smoothness of navigation channels, reducing the risks in the process of ship navigation, and reducing the economic losses caused by accidents [1].

With the development of economy, inland shipping accelerates its pace. Ship freight presents diversified and personalized characteristics, and more and more problems are gradually exposed. Because there are too many power supply equipment in the cabin, it is easy to cause the circuit to exceed the load and fire. Moreover, the cabin often stores items with high requirements for temperature, humidity, and light intensity and sometimes transports flammable, explosive, toxic, and harmful chemicals. Due to too many cabins, if the crew ignores the inspection, the accident probability will be greatly improved; in addition, the internal structure of the ship is complex. In case of fire, overturning, and other accidents, the personnel in the cabin often have no time to take timely and effective escape measures [2]. It can be seen that once a ship has a water accident, it will not only cause huge direct economic losses but also bring indirect losses such as air pollution, water pollution, and ecological environment damage. Therefore, in order to find the abnormal conditions of ships in time, reduce the probability of ship accidents, and ensure the safety of ship navigation, the construction of the ship intelligent monitoring system is imminent [3].

Compared with foreign inland waterway shipping, China’s inland waterway shipping is the most complex in the world, and China’s inland waterway development is very unbalanced. Many river sections are still in a natural state, with low average tonnage of inland ships, backward navigation aids, high transportation cost and low efficiency, generally older inland river crew, and low educational level. In addition, China’s inland river ports have a small number of berths and small handling capacity, simple and crude...
port facilities, and low mechanization level, which make the development of inland river shipping in China slow (Figure 1) [4].

2. Literature Review

Domestic researchers have extensively discussed the economic and management issues of inland waterway transportation from different aspects, such as the status and role of inland waterway transportation, sustainable development, transportation development strategy and engineering economy, ship development and management, channel capacity-building, traffic management, the application of information technology, and the reform of the inland waterway transportation system, which played an important role in promoting the scientific decision-making of inland waterway transportation management [5].

Hassan put forward the short-term demand analysis of Jiangsu inland river for the first time, in combination with the specific problems existing in Jiangsu inland river shipping and the application prospect of industry [6]. Li put forward the concept of the inland river intelligent transportation system, according to the development of shipping technology level. He believed that the construction of the inland river intelligent transportation system needs three key technologies, namely, ship positioning, wireless data communication, electronic river chart display, and information system. At the same time, he put forward good suggestions for the development of the intelligent inland river shipping system in China [7].

In China, the research on the inland waterway shipping system is at a low level as a whole, and the investment in the infrastructure of inland waterway shipping has been seriously insufficient for a long time. At present, the developed and utilized navigable rivers are 10000 kilometers long, accounting for all rivers. The overall level of inland waterway is very low, mostly in a natural state, with many shoals, serious silting, large river regime change, and low grade. There are more than enough channels in the main channel of inland navigation in China that have not met the planning standards, and several water systems cannot communicate with each other. The channel grades of trunk and tributaries in the water system are quite different, it is difficult to develop direct transportation of large tonnage ships, and the trunk, network, and systematization have not been realized. Due to the low channel grade and low ship tonnage, it is difficult to form economies of scale and attract foreign investment. The port facilities required for inland river shipping are also relatively backward, which restrict the development of the port area in the direction of large-scale, intensive, and modernization. In the inland waterway shipping system, the relationship between the three elements of channel, port, and ship is complementary. Once the imbalance makes the inland waterway shipping form a vicious circle, resulting in its advantages and potential, it cannot be brought into full play. Therefore, strengthening the research and development of the inland shipping system is of great significance to promote economic and social development. Inland shipping in developed foreign countries has been developing rapidly, and inland shipping has entered the development stage of digitization, networking, and intelligence.

Tayan analyzed the uncertainty and potential risks in American inland shipping by using the characteristics of random distribution and studied and designed a shipping management decision-making system [8]. At the same time, Murugesan also carried out similar research and analysis and proposed an inland river shipping management decision-making system, developed and designed by GIS [9]. Xu mainly studied the automatic shipping identification system and put forward the traffic simulation model for the automatic identification system [10]. Based on the above, Jin further studied GIS and GPS [11]. Skarga Bandurowa focused on the theory of automatic control during shipping [12]. Hoque used the knowledge management system and functional system to analyze the shipping decision system [13]. Sovetov used a spatial decision system to solve the problems of shipping route and shipping information management [14]. Amiri zarandi introduced the construction and application of GIS in inland water transportation in Germany [15]. Liu introduced the application of modern information technology in European inland river transport traffic management [16].

In short, due to the introduction of advanced new technologies such as modern communication technology, global positioning system, geographic information system, electronic data exchange technology, automatic identification system, electronic chart, and display system, inland navigation has made a qualitative leap. Other relevant research results are basically based on the above contents. So far, there is no complete inland waterway intelligent transportation system in the world. It can really promote the organic connection between the major elements of the shipping system composed of shipping facilities, shipping tools, and shipping environment. However, the research shows that the intellectualization of the inland waterway shipping system is the future development direction of the inland waterway shipping industry, which helps to fundamentally improve the safety and transportation efficiency of the inland waterway shipping system, make the best use of the time and space resources of the inland waterway shipping system, and reduce the environmental pollution of the shipping system, so as to provide the possibility to solve the shipping problems.
3. Methods

3.1. Darknet Network. The operating system always follows the integration of AIS systems and radar. Improvements have been made to improve algorithms such as multidisciplinary learning and sparse imaging (STMS)-based ship monitoring, multimonitor learning-based Kalman filters and sparse learning mechanisms, and particle filters, and intermediates change negative. It is not possible to use a good combination of control and accountability to control the movement of the oceans [17]. Based on the Darknet network and YOLOv3 algorithm, this article creates real-time tracking and tracing vessels and balances speeds and accuracy. The ship tracking and analysis model provided in this document includes the ship’s specialized mining network (Darknet network) and the distribution and analysis of the YOLOv3 algorithm, which are the key links in boat tracking and analysis. Therefore, this study focuses on the learning process of network decomposition specialization and YOLOv3 algorithm [18]. The operation of the algorithm is shown in Figure 2.

Feature unpacking networks is the key to open ship features, performance capability management, and inventory types. Darknet network modeling of the deep training base brought the concept of residual network connection and introduced the remaining models that can be combined when the network model is very deep. However, in the process of obtaining the characteristics of the ship, the ship location exists in a complex area of high maritime conditions with dynamic changes, so that some of the characteristics of the ship type provided by its primary network structure are low-level boat. There are no significant differences in the characteristics of these vessels, and they directly affect the counting speed and accuracy of various vessels [19]. Through the process of network rotation, the main components of the ship are derived from the previous deep process to learn about special equipment and nonspecific equipment of the ship received. The parallel matrix for the different depths of the vessel in a rotating layer is

$$S'_n = f \left( \sum_{m} S^r_{m} \cdot P_{mn} + W'_n \right),$$

where $S'_n$ is the feature map of the nth output of the convolution network of layer $r$; the function $f$ represents the activation function of the neurons of the $r$th layer convolution neural network; $S^r_{m}$ is the ship feature mapping of the $m$th input of the R–1 network layer; $P_{mn}$ is the connection weight of the ship feature map of the $m$th network output layer and the $m$th input feature map; the parameter $W'_n$ is the offset of the $n$th feature map of the $r$th layer convolutional neural network.

The expression of pooling characteristic diagram is

$$\text{Pool}_{u,v} = \text{Max}_{\epsilon \{1,k\}} \{1,k\} S'_n,$$

where $k$ is the dimension of pool core; $S'_n$ is the nth ship characteristic map generated by the convolution layer, and $d$ represents the pool step size; pool $u$, $v$ are the features obtained by pooling the feature map $S'_n$ by the pooling layer, and the parameters $u$ and $v$ are the dimensions of pool $u$, $v$. To improve the speed of the study of specific traits, localized neuronal function was reported and localized response normalization (LRN) layer was added to generate the stimulus. This increases the value with relatively large responses, inhibits other neurons with smaller responses, and improves the ability to assemble structures. The responses of the diagram showing the characteristics of the LRN layer are as follows.

$$\phi_i' = \Gamma_r' \left[ a + \gamma \sum_{j=\max(0,1-v/2)}^{\min(\alpha-1,\alpha+v/2)} \Gamma_j^2 \phi_j \right],$$

and

$$X(k) = X_1(k) + W_{X_1} X_1(k), k = 0, 1, \ldots, N - 1,$$

3.2. YOLOv3 Algorithm. The YOLOv3 algorithm directly extracts the features of the input image through the feature extraction network, using the regression idea to obtain the feature map of a certain size, then divides the input image into grids of corresponding size, directly matches and locates the bounding box predicted by the grid with the central coordinates of the target object in the real frame, and classifies and recognizes the target object on this basis [20].

For the space environment, where the ship located has background similarity and the overlap of ship movement, the frame regression is directly used to predict the coordinates of the ship target, so as to match the positioning and track the ship, which will result in the loss of the ship boundary frame. Students know how to identify these features and achieve their goals by designing procedures to optimize materials with the same foundation, prevent displacement, and improve performance and product designs to have a positive impact on the movement of the target, the purpose of video surveillance of the ship. In order to achieve better management, the integration needs have been reported as cost-effective. The fine mechanism is as follows.

$$\text{Min} \sum_{K=1}^{N} f_{l} (D^{K}U^{K} - V^{K}) + \lambda_{1} \| \cdot \|_{1,2}^{1,2} + \lambda_{2} \| \cdot \|_{1,2}^{1,2},$$

where
For each special $k$ in the model, $D^K$ is used to represent the order, in which the ship image is tracked, $V^K$ is the ship face map matrix, and the $U^K$ is represented by the $D^K$ line, ke matrix; $f_i$ is the operating cost and is used to estimate the difference between the $i$th characteristics of the ship’s purpose and the ship’s characteristics map matrix. The lower value indicates that the model has better control. $U^K$ matrix is broken into $P^K$ and $Q^K$ coefficient matrices. $P^K$ is a matrix representing the $k$th property. The earth imaging matrix $P$ is obtained by writing a horizontal $P^K$, which is similar to the earth coefficient $Q$ matrix. The parameters $\|P\|$ 1 and 2 represent the independence of each model, i.e., the higher the porosity of the P-line, the greater the difference between the different properties of the earth coefficient matrix. $\|QT\|$ 1 and 2 represent the difference. The result of the control model [21] parameter $\lambda_1$ is the fault level of the earth coefficient matrix $P$, and parameter $\lambda_2$ is the fault coefficient of the earth coefficient matrix $Q$.

To determine the type of marine vessel, the spatial distribution of the vessel has the effect of overlap, and the discovery of the same box is made for two different vessels. In this way, only one type of vessel can be identified, which reduces the warranty. This application uses multiple applications to estimate distribution objectives and adds multiple labels and multiple categories of logistic regression processes to network models. The sigmoid function is used as a logistic regression unit to divide each class. The instructions are as follows:

$$y = \frac{1}{1 + e^{-x}},$$

and

$$X^{(k + \frac{N}{2})} = X_1(k) + W_N^kX_2(k), k = 0, 1, \ldots, \frac{N}{2} - 1.$$  

Thus, when the output of one of the images after characterization is limited by the sigmoid function $[0, 1]$ in a variety of wings [22], the value of the transverse entropy function is used to measure the difference between the estimated value and the actual value of the neural network to find out the difference in the similarity of the characteristics of the vessel and improve the experience true. For M-ship models, the total loss is

$$J(\theta) = -\frac{1}{m} \sum_{i=1}^{m} \left[ T^i \log(f(x^i)) + (1 + T^i)\log(1 - f(x^i)) \right],$$

where $f(x)$ represents the predicted output, as shown in Figure 4.

### 4. Experimental Results and Discussion

To measure the performance and reliability of the research, it was found that the result of the average loss of work after 400 training iterations was significantly unchanged and stable, following the average falling curve of the number of returns in the training process. The increasing number of iterations shows that the algorithm integrates very quickly into the study [22]. The actual return curve is used to measure a classifier’s index. As an example of a heavy vessel, the measurement data consist of a container, vessel B has been inspected by the training standards, vessel C has been...
inspected, and the recovery level is determined as follows: return C/A; the correct is C/b. 85% recovery can be performed without error; when the return rate reaches 80%, the accuracy can reach 80%, as shown in Figures 5 and 6.

The YOLOv3 algorithm proposed in this study is used to detect ships in video sequences; in addition, the Kalman algorithm and mean shift tracking algorithm, based on traditional algorithms and the ship tracking operator (STMs) model based on the multiview learning and sparse learning mechanism, are also used to detect the ships of the video sequence, respectively, so as to compare the detection performance of different algorithms in different scenes [18]. Based on the traditional algorithm, it shows a good tracking effect in the early ship tracking process; however, in frames 168 and 372, the tracking frame is far from the real target ship, and even in frame 450, the target ship is not tracked correctly. Moreover, the above algorithm can only mark a class of ship targets, cannot track multiple targets, and has no recognition function [23]. The YOLOv3 algorithm proposed
in this study can track and identify almost all ships in the frame and can detect ships in real time. In the case of large marine traffic flow, the detection performance of the algorithm remains basically unchanged, while the traditional algorithm has a certain false detection rate, as shown in Figure 7.

5. Conclusion

Design and implementation of Internet-based Internet traffic management described in this study use the Darknet network and YOLOv3 algorithm to track, monitor, and identify vessels. The intelligent navigation light system works well to overcome a variety of lighting, weather, wind, wave, and manual interference issues in managing, tracking, and locating the ship. Compared with traditional algorithms, experiments have shown that algorithms can capture ships quickly and in real time, with real accuracy and robustness.

In the future ship monitoring system based on Internet of things technology, the test results have achieved the expected results. Due to the limited time relationship and capacity, there are still areas that need to be further improved, mainly in the following aspects: the monitoring platform only tests the function in the test and tests the performance of the platform in the next work. In the original system design, although the function of video monitoring is considered, the cost is too high because video needs to spend a lot of traffic. However, it is very necessary in practical application. In the next step, the research and development of video monitoring function will be the focus of the ship monitoring system. At present, only the internal environment of the cabin and the position of the ship are monitored. In reality, the monitoring of speed, heading, fuel consumption, and other states should also be realized. The monitoring of other states of the ship will be further considered.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that they have no conflicts of interest.

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References


