IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 7.047 ⁜ Vol. 10, Issue 7, July 2022

DOI: 10.17148/IJIREEICE.2022.10734

Recognition of fish categories using deep learning

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Abstract: The two most critical components of fisheries nowadays are fish classification and fish location. Due to problems with segmentation, noise, and shifting environmental circumstances, it is challenging to categorise the images accurately. However, there is a big market for more precise object recognition. Neural Convolutional Network,VGG16, It enhances the accuracy of classifying and locating the photos of 97 percent, is utilised in order to tackle this challenge. The dataset was used to train a fish classification algorithm, and many activation functions have improved accuracy. Finally, after numerous comparisons, a better strategy has been discovered. The accuracy has improved. The successful creation of class labels and region recommendations is aided by localization.. Lastly, localisation and classification of images with better accuracy.

Keywords: Image processing, Fish Category detection, CNN, VGG16.

I. INTRODUCTION

The classification and recognition of photographs have been the subject of extensive research in recent years. It becomes a challenging process as a result of problems including incorrect segmentation, distortion, noise, image overlapping, and so forth. The ability of a computer model to classify data from text, images, audio, video, and other sources other sources is advantageous.It enhances performance while also assisting in achieving a high level of precision. Fish categorization can be accomplished in a variety of methods, including by examining the fishes' behaviour as well as their texture, form, and colour. The biggest challenge, however, is to accurately classify fish.

For greater understanding of a marine ecological system, it is crucial to observe the behaviour of several fish species[1]. The number and distribution of the different fish species can provide important information on the condition a measure ecological system as well as a tool for keeping track of environmental changes.Fish can be visually classified to help track their movements and reveal patterns and trends in their behaviour. The world's fish population totals more than 30,000 different species. [1], and it is nearly impossible to tell which one you are looking at by looking at it physically alone because most of them have similar shapes. There are instances where people pass away as a result of a lack of knowledge to distinguish between the Every day, non-poisonous and poisonous fish are caught [1-3]. Many scientists have been drawn to the field of science in recent years by the advancement of image recognition and classification systems.

For many professions and sectors, being able to identify fish by their features is essential[2]. Environmental pressures including global warming, marine responses to climate change, and pollution, as well as cultural pressures such unrestricted overfishing and sustainable exploitation of marine natural resources, are having an increasing impact on fish populations. Using manual techniques to identify fish can be challenging because they can be expensive, time-consuming, and necessitate considerable sample. efforts that could harm the marine environment, and produce limited data due to a lack of fish specialists who could lead to inaccurate and subjective identification.

Although deep learning methods have been used in this field, the classification performance is generally subpar, mostly because of the poor image quality and the sparse data collection[3]. This research suggests a fish classification system based on Inception-V3 in response to this problem. The first step in data augmentation is to scale, flip, and pan the source photos. The accuracy of the predictions is then increased using the transfer learning method. The proposed strategy can successfully increase classification accuracy, reaching roughly 89 percent for fish species, according to experimental data. However, the majority of the present work is created for the identification of saltwater fish species and is employed for a specific group of users, despite the fish detection and classification via image processing approach.

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II. LITERATURE REVIEW

Jiya Das Gupta et.al [4] This essay recognises the shape and curve of the fish category. The set of training fish photographs must be fed before they are preprocessed to give them a fish's shape and fed with the features. To extract the test fish's attributes and give it a shape or contour, the image was preprocessed. A suitable linear multi class SVM classifier then determines its category. It is necessary to have a collection of fish images divided into six different fish species. Future displays the contour curvature and shape at the pixel level. of the fish. The accuracy of our algorithm is 94 percent.

Ziqiang Zheng et.al [5] In this paper, To classify different fi sh images obtained from vessel camera. If the fish is small and cover small region in picture or image we use CNN for classification task if not mightly be wrongly classified as no fish images. To avoid over fitting we use a data augmentation technique based on elastic rotation.

We used the Kaggle dataset for our work.. When the image captured we use apply rotation based data augmentation then CNN for classification. If there is no fish, it is NOF and if there is fish it shows fish classification.
Peiqin Zhuang et.al [6] Wildfish++ is a comprehensive vision language it consists of 2348 fish categories with 103,034 images. It contains the most data for a certain species. and 213858 words worth of 3817 fish descriptions provides details about morphology diagnosis and biological information about various fishes. If there is a high congestion between species we use fine grained recognition. It points out slight difference between two species. If there is a fish of unknown class, it takes intra class variation. To integrate Text to image, text to text, and image to image we use cross model retrival.

Chenchen qiu et.al [7] This research uses the transfer learning technique with a bilinear convolutional neural network to classify fish images on a limited dataset. With the help of insufficient training data, we classify the image using this method. It causes problems if we can't use CNN on small datasets. For fine-grained fish picture categorization on short datasets, we employ the bilinear convolutional neural network technique. We simply use 10 sample categories for the Bilinear neural network, which can be trained from beginning to end and integrated with post-localization into deep learning framework.

Trio Adiono et.al [8] The wireless communication amongst fishermen is made possible by this system. Because it consumes more power and is more expensive, we are unable to use wifi or Bluetooth. As a result, We employ long-range radio technology, which can operate at little power and vast distances. a server application, an Android app gateway, and an end node make up this system. A server-connected e-nelayan hardware LORA network is used by Fisherman 1's Android app. Fisherman 2 additionally makes advantage of a few connections, including servers connected to monitoring devices and networks connected to servers. It can be useful for real-time fishermen position detection.

Hongchun Yuan et.al [9] This approach diagnoses fish disease and suggests treatments based on the cause. Fuzzy reasoning is nothing more than imprecise reasoning; exact reasoning is accurate. In this strategy, the distributed network architecture is built up as supporting technology and the knowledge of fish disease diagnostics is fed into the database. To lessen fuzziness in the diagnostic process, we use a more accurate fuzzy reasoning model. We employ the XF6.2 architecture when the input is ambiguous, which occasionally triggers certainty reasoning and occasionally fuzzy reasoning.
Yi-Hao Hsiao et.al [10] This process shows how and why we use OAOMP to recognise and identify fish. Signals from distant fever samples of measurement beyond half sampling rate were reconstructed using a sampling technique based on few fish dispersed over a vast area. OAOMP contains two techniques, the first of which can accurately reconstruct sparse signals.It solves curvature minimal problem by linear programming. Matching persuit also reconstruct sparse selecting over atoms using greedy search, OAOMP vector projection, and weighted coefficient accumulation.

Md Jahidul Islam et.al [11] emantic segmentation, a technique used in digital image processing, involves giving a name to every pixel in the image and treating several objects of the identical class to a single entity. A computer vision task is to group together similar visual elements that belong to the same class.This is how we depict eight different object categories, including marine life, coral reefs, aquatic vegetation, divers, robots, and the ocean floor,that have been discovered by both robot and human investigation. This will be very beneficial for future research on the use of underwater human robots.

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Oguzhan Ulucan et.al [12] This is used in the food sector to determine quality. The large problem of seafood rotting leads to health issues. To solve the recognition of seafood spoiling issue, we must utilise machine learning and image processing. We must make use of the dataset, which includes images of fish and other eatable marine fare. For our analysis, We used a dataset of various seafood varieties. that are often consumed in the Turkish region. To the image of the test object, we partition it. in order to determine its classification and determine if the seafood is fresh or rotten.
Ahmed Waleed et.al [13] Fish is valued widely and is a major economic resource in various nations. Fish are susceptible to a number of illnesses, which poses a serious challenge because diseased fish cannot be eaten as food. To identify the diseased fishes and to automatically diagnose fish diseases, we apply image processing and computer vision techniques. The image must first be extracted from the movie and preprocessed before being segmented. The database will classify the ailment when you extract the feature. If in the future we find a fish that is infected, it must be destroyed to stop the infection of other fish.

III. PROPOSED WORK METHODOLOGY

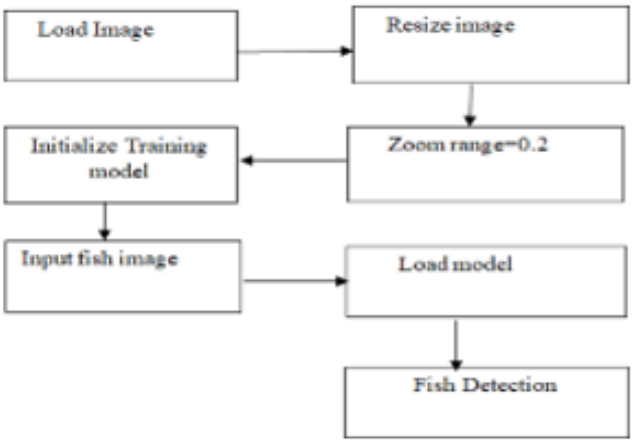

Fig1 Block diagram of proposed system

In Fig 1 explains that the project is carried out in a modular manner, with each module being coded in accordance with the specifications, tested, and the process repeated until each module has been fully implemented.User will upload the Fish image and that image will be resized and set the zoom range=0.2 in that image and initialize the training model using VGG16 again user give a input fish image then model will be loaded from the dataset in the end system will detect the fish category and the output will be viewed by the user.

A. VGG16

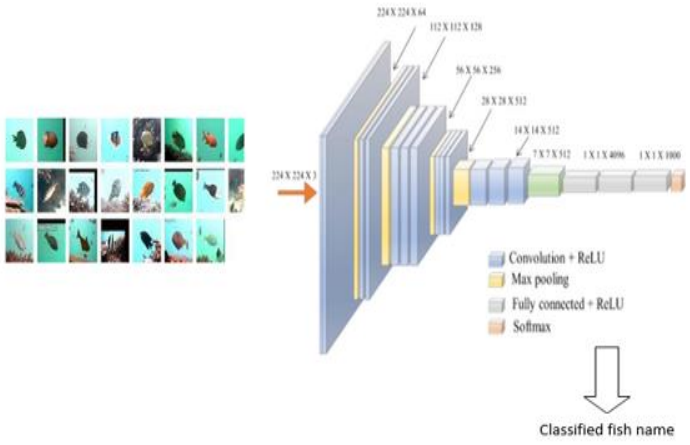

Fig 2. Architecture of Fish category identification

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In Figure 2 explains the working of VGG16, In the first layer, use the raw pixel data to find edges. To find shapes (also known as "blobs") in the second layer, use these edges. In the top layers of the network, use these shapes to find higher-level elements like face structures, automotive parts, etc. The last layer of a VGG16 forecasts the image's contents using these higher-level attributes.

B. Data Acquisition(Dataset Collection)

For Fish category detection, I obtained the data from the Kagglewebsite. (https://www.kaggle.com/datasets/sripaadsri nivasan/fish-species-image-data) In this website I have taken 10 fish categories images .Every 10 category of fishes I have taken 30 images total 300 images taken.

ImageName	*Sample*
Acanthistius_cintus,	*30*
Auxis_rochei ,	*30*
Bodians_diana,,	*30*
Thalasomma_ lutescens	*30*
Trachinotus_blochi	*30*
Thalasomma_ purpureum	*30*
Variola_albimarginata	*30*
Wetmorella_albofasciata	*30*
Bothus_pantharenius	*30*
Thalasomma_lunare	*30*
Total	*300*

IV EXPERIMENTAL RESULTS AND DISCUSSION

We have to identify the 10 classes such as Acanthistius_ cintus, Auxis_rochei, Bodians_diana, Thalasomma_lutescens, Trachinotus_blochi, Thalasomma purpureum, Variola_albimarginata,Wetmorella_albofasciata, Bothus pantharenius, Thalasomma lunare. By extracting the features like greyscale conversion ,size conversion,zoom,flip.

Figure 4 Prediction of Auxis_rochei image

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In Figure 4 , We have to give a input image from the dataset.that dataset taken from the Kaggle website , Then pre-process steps taken and model will be trained by using deep learning algorithm like VGG16 . then model will be deploy and finally classify the which category that image belongs to.

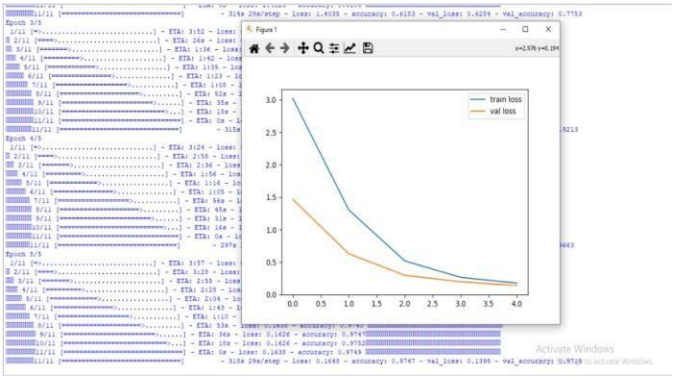

Figure 5 Accuracy shown

In Figure 5, Accuray will be shown for the given dataset.And the graph also shown.The Accuracy achieves 97%. First give a epochs=5 in the algorithm that epochs train the model and then give a accuracy 97% .

IV. CONCLUSION

"Fish image classification has been taken into consideration in the aforementioned work, and better results for both picture classification classes were obtained. The classification process uses the VGG16 technique, thus an image is detected effectively and with a good score.Our proposed framework VGG16 gives better accuracy 97%.There is still scope to improve the performance by preprocessing the image and collecting more dataset. In future The proposed work performs a decent job of being improved, but adding more features would be preferable, such as training new categories, adding fish category detection from movies, and improving accuracy and efficiency.

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