IJCSPUB.ORG ISSN : 2250-1770
INTERNATIONAL JOURNAL OF CURRENT SCIENCE (IJCSPUB)
IJCS PUBLICATION (IJCSPUB.ORG) An International Open Access, Peer-reviewed, Refereed Journal

Fish Detection For species Recognition using Python

Pradnya Narvekar[1], Prachi Shinde[2],Prasan Kamble[3]
Assistant Professor, Dept.of Electronics Engg.,Sanjay Ghodawat University,Kolhapur[1]
Assistant Professor, Dept.of Electronics Engg.,Sanjay Ghodawat University,Kolhapur[2]
Assistant Professor, Dept.of Electronics Engg.,Sanjay Ghodawat University,Kolhapur[3]

ABSTRACT

A broad range of applications in marine ecology uses underwater cameras. Still, to efficiently process the vast amount of knowledge generated, we'd like to develop tools which will automatically detect and recognize species captured on film. Classifying fish species from videos and pictures in natural environments is often challenging tasks to noise and variation in illumination and thus the encompassing habitat. In this paper, we present a two-step deep learning approach for the detection and classification of temperate water fishes without pre filtering. We apply transfer learning to beat the limited training samples of temperate fishes and to enhance the accuracy of the classification. This is done by instructing the detection model with Image Net and thus the fish classifier via a public dataset (Fish4Knowledge), whereupon both the image detection and classifier are updated with temperate fishes of interest. The weights obtained from pre-training are applied to the post-training as an inferred. Our solution attains the accuracy of 99.27% on the pre-training .The percentage values for precision on the post-training are good; 83.68% and 87.74% with and without image accretion, respectively, indicating that the solution is feasible with a more extensive dataset.

Keywords: *Biometric Fish Classification, Temperate Species, DeepLearning, CNN*

1.INTRODUCTION

Recognizing fish species may be a difficult task for many people. Because aquatic life is never seen by many people and it is very much unknown for many of us .It is very important to have such a system which will detect the fish species. It will be very useful for those who want to study fish species. Here we can use the openCV platform for that using Python as a programming language. To achieve this, we can take help from the HAAR-Cascade algorithm. In this method we can store sample images of different species and train the system accordingly. Then it can detect the species on its own. The system gets better andbetter as it is used more and more. To release the burden of manual processing, and to enhance the classification accuracy, computer technology is used in marine ecology analysis. For instance,a commercial product, Catch Meter, composed of a light box with a camera, offers classification of fish and length estimates. Here, fish are classified by evaluating a threshold supporting a contour detection within the images with a really high classification accuracy of 98.8%.However, the fish are photographed during a pre-determined and controlled environment, which hinders applying the approach within the wild. The Catch Meter version described does not make use of any AI or machine learning techniques. In natural underwater

environments, aclassification task is challenged by diversity in background complexity, turbidity and light propagation as the water deepens. In fisheries survey applications underwater fish recognition plays a crucial role.

2.LITERATURE SURVEY

The aim of this research is to introduce neural network methodology to realize fish identification in blurry ocean water. As a result, the approach improved computer technology.

A) Computer Vision. Computer vision uses computers with imaging sensors to imitate human visual functions that extract features from obtained data sets, analyze and classify them to help in deciding. It usually involves many fields of data like high-level programming, image processing, AI (AI), and so on. For example, the manufacturing industry uses it to check the defection or improve the quality from large quantities of products [3].There are mature applications on face detection and emotion observation at the airport and other security checking points [2]. Medical doctors' use certain diagnose software to assist in identifying tumors and other abnormal tissues from medical imaging [5].The agricultural industry adopts the computer vision to decision making system for predicting the yield fromthe sector [8]Google is designing its own self-driving car with a visible range of about 328 feet and therefore the car can recognize traffic signs and avoid stroller[10].Many state-of-the-art examples indicate that computer vision is changing our daily lives. To improve the performance, old traditional image processing skills, neural network algorithms which imitate our brain are widely adopted.

B) Deep Learning. The ideas of deep learning with neural networks arose decades past. It was developed by man of science LeCun et al. in 1998 [10].He designed a five- layer classifier named LeNet5 employing a Convolutional Neural Network (CNN). Because of the dramatic improvement in computing power and therefore the explosion of massive knowledge, deep learning has been able to create tremendous achievements within the past many years. Deep learning relies on vast knowledge collected in a very sure field. Learning resources from vast knowledge areas is extraordinarily vital. Deep means a neural network has millions of layers for imitating our brain. With the advantage of superior GPU, ASIC accelerators, cloud storage, and powerful computing facility, it's currently potential to gather, manage, and analise huge knowledge sets. Because Only with knowledge sets massive enough, will over fitting issues be resolved in deep learning. and also the increased computing power will accelerate the speed of the time- intense coaching method.

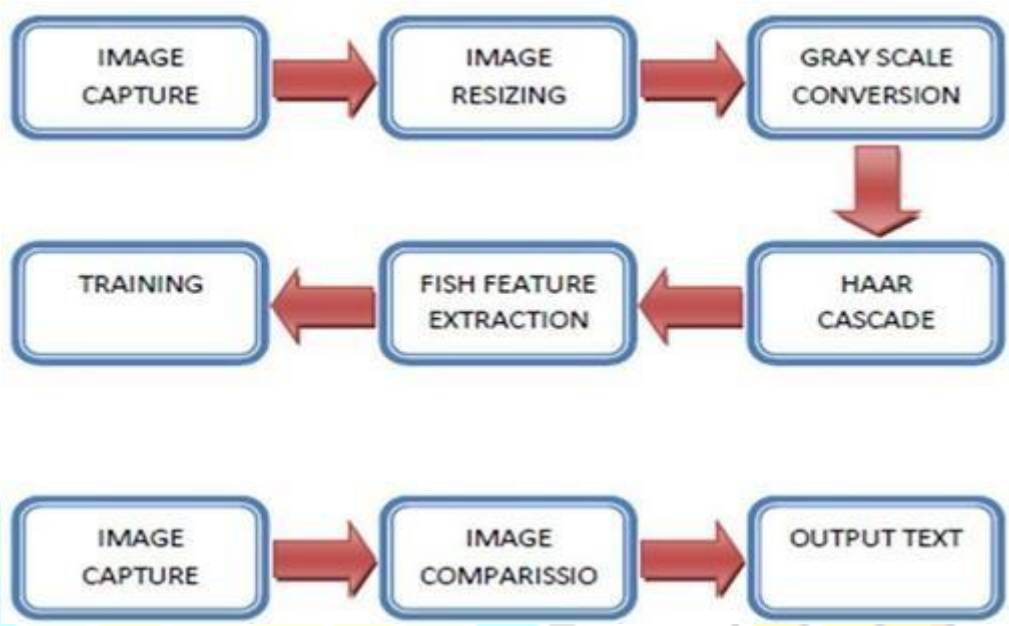
Deep learning primarily based approaches are more and more applied in several fields, and have vital blessings over ancient algorithms in laptop vision and object detection. The per- formance of the many artificial intelligence systems has been improved by incorporating deep learning. Take Google's AlphaGo as Associate in Nursing example, it studied human's learning behavior and reciprocally competed with the far-famed Go player [6].

To be ready to foster deep learning in laptop vision, enough examples from pictures collected beforehand is essential. Image Net could be an example. One contribution of this analysis includes developing info of fish in ocean water to support coaching and testing. Still, a learning algo- rithm is very important in addition. ancient laptop vision and image process approaches suffer from theaccuracy of feature extraction, whereas deep learning ways are often utilised to boost the technique through neural networks.

C) Neural Network. Over the past few years, neural networks in deep learning wereobtaining progressively in style. In 2012, investigator Krizh evsky et al. adopted CNN to accomplish image classification within the Image Net massive ScaleVisual Recognition Challenge [8] and therefore the take a look at accuracy was considerably more than ancient algorithms. because of this accomplishment, the interest in deep learning with neural network has been raised [1].In 2014, Ross etal. planned associate rule referred to as quick R-CNN that aims to convert object identification into a regression drawback [7].The mean average exactness was improved by virtually half-hour compared to the previous best result fifty three.3%on Image Net massive

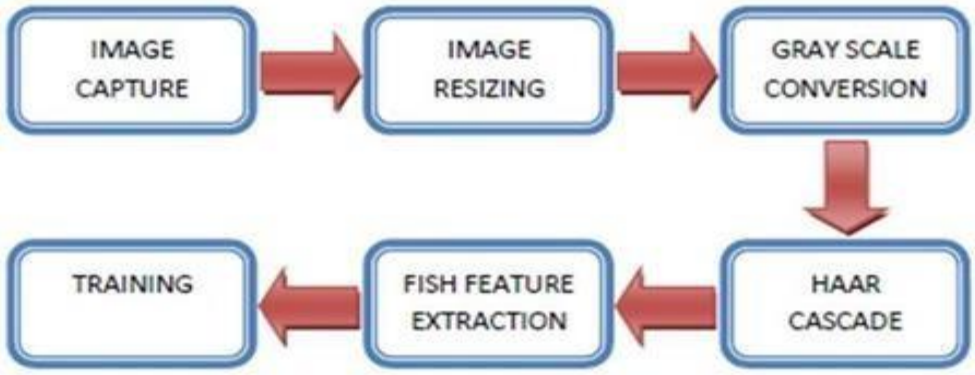
Scale Visual Recognition Challenge in 2012. The quantityof calculation was huge as a result of options from totally different sizes ofthousands of proposals in every image would be extracted. Since quicker R- CNN reduced the procedure burden dramatically, it's been wide adopted recently in pc vision that involves target detection, image classification, and object identification
.Proposed in Facebook is additionally a milestone for corresponding research[4]

3. Block Diagram



First we capture the image or use the stored image. All the captured images are not in the same size so, they are resized by using the image resizer. To resize an image it is essential to change the file size. Because sometimes, size does matter. Resizing can help your photo fit into a particular space on a screen. Then we use the gray scale conversion to detect the shape and some important features. Gray scale images are entirely sufficient for several tasks. then there's no need to use more complicated and harder to process color images. Now this image is applied to HAAR-cascade, it will detect the feature/size of the image, to differentiate the species of fishes. This requires a HAAR-Cascade Classifier which is effective for object detection. To get the exact features of the fishes the image is applied to feature extraction. Now training will train the image using open CV. Open CV is nothing but a library mainly aimed toward real-time computer network? Now, finally we capture the image. The captured image who's fish species is to be recognize compared with the database. After comparison, the output text will show the result of nothing but the species of fish.

3.1 Transmitter section



- In the transmitter section stored image or captured image from database is resized to a standard image.
- This image is then converted into gray-scale for precise information about fish species.
- Now this image is applied to the HAAR-Cascade algorithm where it differs or sorts the fish as per the feature and size.
- From the fish extraction, we get the exact features of the fish.
- Through programming we will train the system and the .xml file is created.In that .xml file we have exact information about fish species.
- Training is done on the basis of the features extraction and creation of the .xtml file to program a system.

3.2 Receiver section

- Now, here we capture an image whose species we need to recognize.
- After capturing the image, the receiver section will compare this image withthe .xml file.
- .xtml file is created on the basis of the previous image stored as the database and current image.
- Compression is based on the features, length of the fish.
- Gray scale image is beneficial here in recognizing the species.
- The detailed information is extracted and used in comparison for differentiation and recognition of fish.
- Output will be shown on display in the form of text i.e. name of species

4.TESTING AND OBSERVATION

Original Image

Image with recognized fish species

Original Image

Image with recognized fish species

Original Image

Image with recognized fish species

5.Conclusion

This report has presented a picture set-based approach for fish species identification in unconstrained environments. The overall classification accuracy for a different type of species studied in this work was 95%,which shows strong potential for application of fish species recognition.Accordingly, the presented method shows huge potential for fish species identification from routinely captured picture data where fish tracking provides a natural mechanism to construct image sets. Once we train the system , this technique can provide avery high level of automation of species recognition in picture sequences acquired to monitor species abundance or bio- mass. The results of the classification can be used as an efficient and accurate tool to supply decision support to fisheries and in marine industries for stock assessment and species conservation.

REFERENCES

1. Z.Q.Zhao,P. Zheng,S.T.Xu, and X. Wu,"Object detection with deep learning: a review," IEEE Transactions on Neural Networks and Learning Systems, vol. 30, no. 11, pp. 3212–3232, 2019

2. S. Biswas, Y. Wang, and S. Cui, "Surgically altered face detection using log- gabor wavelet," in Proceedings of the 12th International Computer Conference on Wavelet Active Media Technology and Information Processing (ICCWAMTIP),pp.154-157,IEEE,Chengdu,China, 2015. AndS.Cui, Y.Wang, and O.Ekwonnah, "Keystroke Dynamics On User authentication," in 4th International Conference onCybernetics (CYBCONF), pp. 5–7, Beijing, China, 2019.

3. C.-F. Chien, Y.-J. Chen, Y.-T. Han et al., "AI and big data analytics for wafer fab energy saving and chiller optimization to empower intelligent manufacturing,"inProceedingsof2018 e-Manufacturing & Design Collaboration Symposium (eMDC), pp. 1–4, IEEE, Hsinchu, Taiwan, 2018.

4. J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You only look once : unified, real-time object detection," in Proceedings of 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 779–788, IEEE,Las Vegas, NV, USA, 2016.

5. BBC News, "Artificial intelligence: Google's AlphaGo beats Go master Lee Se-dol," 2016.

6. Eman Abdel-Maksoud, Mohammed Elmogy, and Rashid Al- Awadi, "Braintumor segmentation based on a hybrid clustering technique,"Egyptian Informatics Journal, vol. 16, no. 1, pp. 71–81, Cairo University, 2015.

7. R.Girshick,"Fast R-CNN," in 2015 IEEE International ConferenceonComputer Vision (ICCV), pp. 1440–1448, IEEE, Santiago, Chile, 2015

8. A. Krizhevsky, I. Sutskever, and G. E. Hinton, "ImageNet classification withdeep convolutional neural networks," Advances in Neural Information Processing Systems, vol. 25, pp. 1106–1114, 2012.

9. B.Marr,"KeymilestonesofWaymo–Google'sself-drivingcars," https://www.forbes.com/sites/bernardmarr key-milestones-of-waymo- googles- self-dring-cars/#38316536

10. Y. LeCun, L. Bottou, Y. Bengio, and P. Haffner, "Gradient-based learning applied to document recognition," Proceedings of the IEEE, vol.86, no. 11, pp. 2278–2324, 1998.