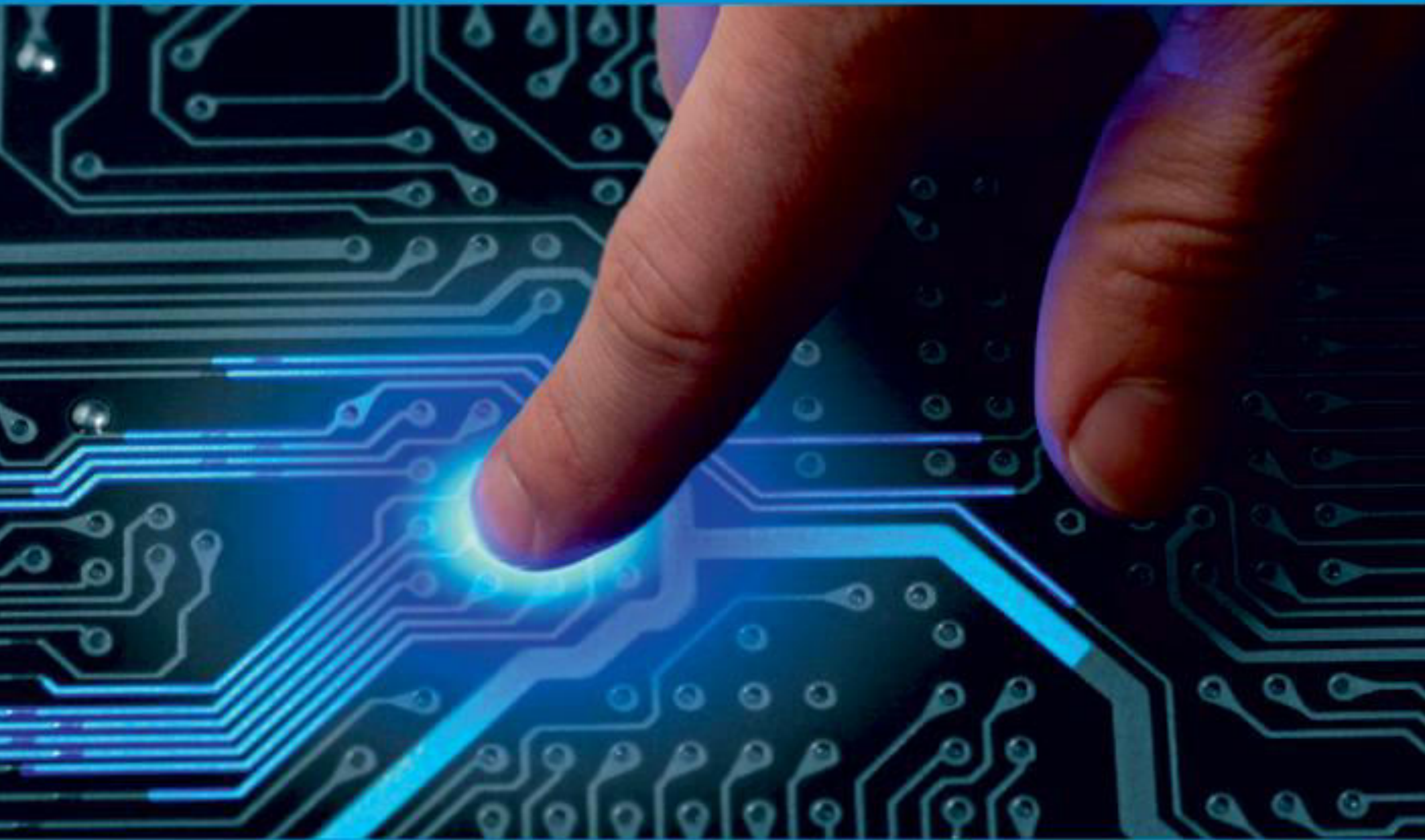
e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 5, May 2022

Impact Factor: 8.165

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005331 |

# Satellite Image Processing using YOLO and Darknet Framework

**Adithya Acharya, Venkata Aditya Achanta**

PG Student, Dept. of CS&E., Manipal Institute of Technology, Manipal, Karnataka, India

PG Student, Dept. of CS&E., Manipal Institute of Technology, Manipal, Karnataka, India

**ABSTRACT:** Object Detection is an application of deep learning where the program takes an initial set of object detections and develops a completely unique identification for all of the initial detections then tracks the detected objects as they move around frames in a stored or real time video or an image. The paper explores detection inside the area of classifying different satellite Images to use object detection wherever moving objects are settled at intervals to extract meaningful information. The paper explains the utilization of visual detection algorithms to estimate the long position of multiple visual targets that were initialized. This paper offers insights into how the YOLO model by means of darknet neural network framework and images were annotated by means labelImg python script and gives insights of our findings along the process.

**KEYWORDS**: Object Detection; Deep Learning; YOLO; Darknet; labelImg; Neural Network

## I. INTRODUCTION

Deep Learning and Machine Learning is one among the fastest growing technologies within the booming world. It uses neural networks functions that imitate the workings of the human brain in method into associate degreed creating patterns to be employed in decision making .There the employment of deep learning looks to track the objects within the amount of your time applications. Object Detection and tracking System makes a trial to detect, track, and acknowledge objects of interest from multiple videos, and extra typically to interpret object behaviours and actions. A Convolutional Neural Network (CNN) could also be a Deep Learning algorithmic rule that takes in an input image, assign importance (learnable weights associated biases) to varied aspects/objects at intervals the image and be able to differentiate one from another. YOLO uses Convolution Neural Networks (CNN) for object detection and it creates a singular ID for each initial detection. the ensuing step once object detection, is to chase each of the objects as they move round the frames in an extraordinary video, maintaining the assignment of distinctive ID' showcased in [2]

YOLO became ordinarily used due to velocity with which a set of rules improves the rate of detection due to the fact it could be expecting gadgets in real-time. High accuracy insured through YOLO that's a predictive method that offers correct consequences with minimum history mistakes and has incredible gaining knowledge of competencies that permit it to research the representations of gadgets and practice them in item detection.

The images of the information set from specific categories including likes of sheep, goat, bird, and cow were used for training the model. Within the data preprocessing step, the utilization data augmentation technique augmented the range of coaching set virtually. The model was annotated by LabelImg script. YOLO was trained to pass means that of darknet framework as cited in [1].

Previous detection systems use locators or classifiers to keep the detection process going. The model is then applied to an image in completely different scales and positions. Areas of the image with a high rating are considered for detection. The YOLO rule takes a very different approach. The algorithm applies a neural network to the entire picture. This network then partitions this image into regions provided by the bounding boxes and further predicts possibilities

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005331 |

## II. Related work

YOLO was first introduced by Joseph Redmon in his 2015 research paper titled You Only Look Once. In 2016, Joseph Redmon described the second version of YOLO as better, faster, and stronger. Two years after the second YOLO update, Joseph appeared with another network update, which can be traced in detail in [4] using which the model regarding this paper was created.

In the year 2016, a team of three engineers designed the fourth version of YOLO, even faster and more precise than before. Their results are described in "YOLOv4: Optimal Object Detection Speed and Accuracy". Two months after the release of the fourth version, an independent developer, Glenn Jocher, announced the fifth version of YOLO.No research article was published this time. The network was provided on Jocher's GitHub page as a PyTorch implementation. The fifth version had almost the same accuracy as the fourth version but was faster.

. In July 2020 we received another big update from YOLO. In an article titled PPYOLO: An Effective and Efficient Object Detector Implementation, Xiang Long and his team introduced a new version of YOLO. This iteration of YOLO was based on the third version of the model and surpassed YOLO v4 which was utilized in this project along with darknet neural network framework.

## III. Proposed algorithm

A. *Design Considerations:*

- CMake> 3.8.
- CUDA 10.0 for GPU..
- OpenCV>= 2.4 for CPU and GPU.
- cuDNN>= 7.0 for CUDA 10.0 for GPU.
- OpenMP for CPU.

B. *Description of the Proposed Algorithm:*

The network structure of YOLOv4 is shown in Fig 1. Its network structure consists of three parts, the main feature extraction network CSPDarknet-53, the enhanced feature extraction network and the prediction part. The enhanced feature extraction network includes SPP structure and PANet structure. The input images were used to obtain 13×13, 26×26 and 52×52 scale feature maps. In order to better learn the features in the images, the 52×52 feature images were pooled in three different sizes through SPP structure, and then they were fused with the 26×26 and 13×13 feature images by up-sampling and down-sampling. Finally, the prediction part is to transform the extracted feature map into prediction results, in which scales 1, 2 and 3 are respectively responsible for the prediction of large, medium and small objects.

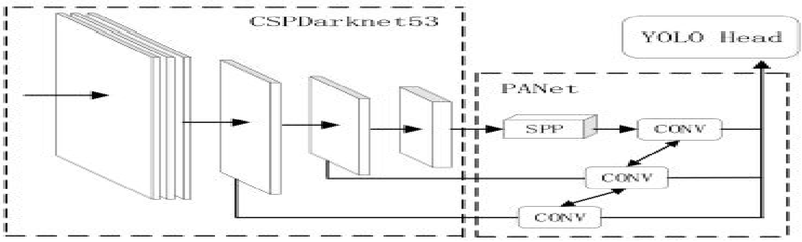



Fig 1Yolo network flow diagram

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005331 |

## IV. PSEUDO CODE

Step 1: Data Collection of 200 images for training and 20 images for testing for each of class out of 10 total class.
Step 2: Annotate all the images from step 1 by use of image annotation tool labelImg in YOLO format.
Step 3: Train the darknet neural network by giving the input from step 2.
Step 4: Save the model weights for each 1000$^{th}$ iteration till 20000 iteration.
Step 5: Calculate the mean average precision value of each of the stored weights.
Step 6: Select the weight that gives maximum value from step 5.
Step 7: Implement in real world application whose architecture is shown in Fig.2.
Step 8: End.

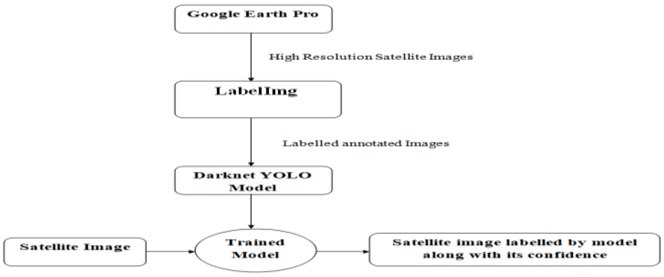



Fig 2 Application Flow diagram

## V. SIMULATION RESULTS

The weight with maximum mean average precision was chosen. Fig 4 shows the graph which depicts the mean average precision value obtained for individual weight ranging from 15000 to 20000. The weight with 17000 was found to give maximum precision on test samples collected in the data collection phase. On using Opencv package provided by python we detected the image with bonded box with its confidence as shown in Fig3


Fig.3.Simulation result 1

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005331 |

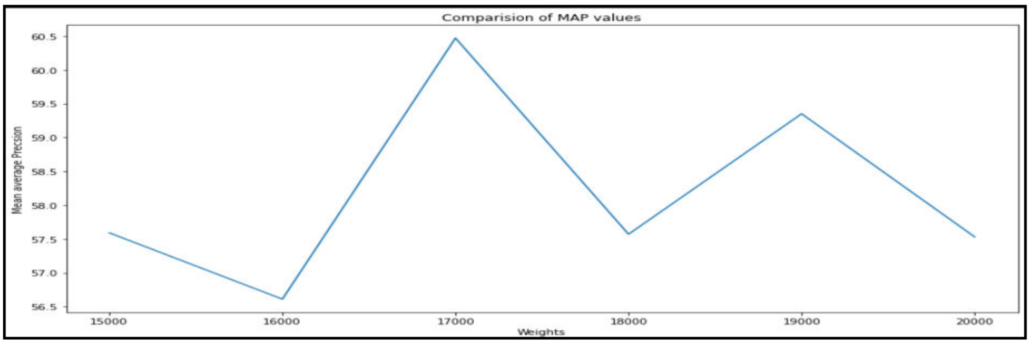



Fig 4. MAP value simulation results

## VI. CONCLUSION AND FUTURE WORK

In this work, the explores Multiple Object pursuit system mistreatment yolov3 which will discover objects that were trained, and conjointly they will track and take count of objects in every frame. This MOT system has numerous time period applications like police investigation particular objects from object jammed environments, tracking a selected kind of object or detecting a collection of object categories, or enumeration a particular object. The MOT is economical enough to detect objects even on electronic equipment GPU. This MOT needs a neighborhood system with GPU which can not be reasonable to any or all systems however with the assistance of free cloud sources like Google Colab we are able to use GPU and conjointly build an operating

Nice progress has been ascertained within the last years, and a few existing techniques are currently a part of several client physical sciences or are integrated into assistant driving technologies, we tend to are still far away from achieving human-level performance, particularly in terms of open-world learning. the longer term scope would be to enhance the accuracy of the model by means that image mistake with pure mathematics preserved alignment, mistreatment cos learning rate scheduler, synchronic batch normalization, knowledge augmentation, and label smoothing and model are often improved more by use of average exactitude explicit in [3].

## REFERENCES

1. N. M. Krishna, R. Y. Reddy, M. S. C. Reddy, K. P. Madhav, and G. Sudham, "Object Detection and Tracking Using Yolo," 2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA), 2021, pp. 1-7, DOI: 10.1109/ICIRCA51532.2021.9544598.

2. J. Redmon, S. Divvala, R. Girshick and A. Farhadi, "You Only Look Once: Unified, Real-Time Object Detection," 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016, pp. 779-788, DOI: 10.1109/CVPR.2016.91.

3. C. Liu, Y. Tao, J. Liang, K. Li and Y. Chen, "Object Detection Based on YOLO Network," 2018 IEEE 4th Information Technology and Mechatronics Engineering Conference (ITOEC), 2018, pp. 799-803, DOI: 10.1109/ITOEC.2018.8740604.

4. A. P. Jana, A. Biswas and Mohana, "YOLO based Detection and Classification of Objects in video records," 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), 2018, pp. 2448-2452, doi: 10.1109/RTEICT42901.2018.9012375

5. G. Chandan, A. Jain, H. Jain and Mohana, "Real Time Object Detection and Tracking Using Deep Learning and OpenCV," 2018 International Conference on Inventive Research in Computing Applications (ICIRCA), 2018, pp. 1305-1308, doi: 10.1109/ICIRCA.2018.8597266.

6. R. K. Megalingam, D. H. T. A. Babu, G. Sriram, and V. S. YashwanthAvvari, "Concurrent Detection and Identification of Multiple Objects using YOLO Algorithm," 2021 XXIII Symposium on Image, Signal Processing and Artificial Vision (STSIVA), 2021, pp. 1-6, DOI: 10.1109/STSIVA53688.2021.9592012.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005331 |

7. S. Prasad and S. Sinha, "Real-time object detection and tracking in an unknown environment," 2011 World Congress on Information and Communication Technologies, 2011, pp. 1056-1061, DOI: 10.1109/WICT.2011.6141394.

8. Wang, Juan & Wang, Nan & Li, Lihua & Ren, Zhenhui. (2020). Real-time behavior detection and judgment of egg breeders based on YOLO v3. Neural Computing and Applications. 32. 10.1007/s00521-019-04645-4.

9. Uday Modha, Preeti Dave, " Image Inpainting-Automatic Detection and Removal of Text From Images", International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622 Vol. 2, Issue 2, 2012.

10. Jintao Wang, Mingxia Shen, Longshen Liu, Yi Xu, Cedric Okinda, "Recognition and Classification of Broiler Droppings Based on Deep Convolutional Neural Network", Journal of Sensors, vol. 2019, Article ID 3823515, 10 pages, 2019. https://doi.org/10.1155/2019/3823515.

11. Redmon, Joseph & Divvala, Santosh & Girshick, Ross & Farhadi, Ali. (2016). You Only Look Once: Unified, Real-Time Object Detection. 779-788. 10.1109/CVPR.2016.91.


INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.165

INTERNATIONAL STANDARD SERIAL NUMBER INDIA


# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING