

Amrutvahini College of Engineering, Sangamner 422608

Department of Computer Engineering

Seminar Synopsis

Seminar Title: "YOLO Object Detection"

Presented by: Sagar Siddharth Waghmare

Class: TE (B)

Roll Number: 3265

Guide: Prof. P.D. Walunj

Area/Domain: Deep Learning and Image Processing

Keywords: Computer vision; YOLO v3; Faster RCNN; Deep learning; YOLO v3-Tiny; Object detection; image processing; Convolutional Neural Networks.

Abstract

Object detection based on the deep learning has achieved very well performances. However, there are many problems with images in real-world shooting such as noise, blurring and rotating jitter, etc. These problems have an important impact on object detection. In YOLO network we combined the traditional image processing methods to simulate the problems existing in real-world shooting. After establishing the different degradation models, we compared the effects of different degradation models on object detection. We used the YOLO network to train a robust model to improve the average accuracy of real world problems. Earlier research on object detection repurposes classifiers to perform detection. Instead, we frame object detection as a regression problem to spatially separated bounding boxes and associated class probabilities.

Introduction

Object detection is a computer vision task that involves both localizing one or more objects within an image and classifying each object in the image. YOLO is a clever convolutional neural network (CNN) for doing object detection in real-time. YOLO works completely different than most other object detection architectures. Most methods the model to an image at multiple locations and scales. High scoring regions of the image are considered detections. Yolo, on the other hand, applies a single neural network to the full image. The network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the

predicted probabilities. Image classification is one of the many exciting applications of convolutional neural networks. Aside from simple image classification, there are plenty of fascinating problems in computer vision, with object detection being one of the most interesting. The YOLO framework (You Only Look Once) on the other hand, deals with object detection in a different way. The biggest advantage of using YOLO is its superb speed. It is commonly associated with self-driving cars where systems blend computer vision, LIDAR and other technologies to generate a multidimensional representation of the road with all its participants. Object detection is also commonly used in video surveillance, especially in crowd monitoring to prevent terrorist attacks, we need to go beyond locating just one object but rather multiple objects in one image. For example, a self-driving car has to find the location of other cars, traffic lights, signs, humans and to take appropriate action based on this information.

Motivation

In 30 or so years ago attention was an obvious topic for those in computer vision or image processing. One had to go to great lengths to process only the most relevant parts of images because computers had so little power. But now, computer power abounds and is cheap. It is the era of the large database and machine learning and brute force solutions. And results are impressive and only promise to become more so with computer power increases and declining costs.

Objective

- To learn and understand the basic concept of Image Processing and Deep Learning.
- To learn the basics of object detection.
- To learn the algorithms of image processing and Deep Learning to solve real world problems.

Applications

- Machine/Robot Vision
- Pattern Recognition
- Defense and Security
- Health Care Diagnostic

References

- [1] Pranav Adarsh, Pratibha Rathi, Manoj Kumar, "YOLO v3-Tiny: Object Detection and Recognition using one stage improved model", 6th International Conference on Advanced Computing and Communication Systems 2020 (ICACCS) DOI: 10.1109/ICACCS48705.2020.9074315
- [2] Z. Chen, R. Khemmar, B. Decoux, A. Atahouet, and J. Y. Ertaud, "Real time object detection, tracking, and distance and motion estimation based on deep learning: Application to smart mobility," 8th Int. Conf. Emerg. Secur. Technol. EST, pp. 1–6, 2019, doi: 10.1109/EST.2019.8806222.
- [3] R. L. Galvez, A. A. Bandala, E. P. Dadios, R. R. P. Vicerra, and J. M. Z. Maningo, "Object Detection Using Convolutional Neural Networks," IEEE Reg. 10 Annu. Int. Conf. Proceedings/TENCON, vol. 2018- October, no. October, pp. 2023–2027, 2019, doi: 10.1109/TENCON.2018.8650517.
- [4] B. Benjdira, T. Khursheed, A. Koubaa, A. Ammar, and K. Ouni, "Car Detection using Unmanned Aerial Vehicles: Comparison between Faster R-CNN and YOLOv3," 1st Int. Conf. Unmanned Veh. Syst., pp. 1–6, 2019, doi: 10.1109/UVS.2019.8658300.

Prof. P.D. Walunj
Seminar Guide

Prof. V.K. Abhang
Seminar Coordinator

Prof. R. L. Paikrao
Head of Department