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Tensorflow Machine Learning for Object Detection

Sandhiya. M

Department of Computer Science, Sri Krishna Arts and Science College, Coimbatore

ABSTRACT

The objective of this briefing is to give an overview of the object detection using the tensorflow machine learning. Tensorflow is an open-source and end-to-end platform for creating machine learning applications. This software is developed by using the programming languages such as Python or C++, the most popular language for the deep learning researchers. The object detection using tensorflow is a computer vision technique which helps in identifying, detection, locating and tracing an object form an image or a video. This can be done by training, testing and matching the objects with a lot of images and videos, and then extracting the expected output as the result by prediction.

KEYWORDS: Tensorflow, Object Detection, Machine Learning, Training, Result Analysis, YOLO, R-CNN Python.

INTRODUCTION

Humans can very easily detect and identify objects that are present in images . The visual system of human beings are very fast and accurate and they are able to perform many complex tasks like identifying multiples objects and detect the obstacles with even a little amount of conscious thought .This is not in the case of machines . With a large amount of which is available , faster Graphics Processing Units , and good algorithms, we can easily train the computers to detetct , identify and classify multiple objects within an image with a very high accuracy . Object detection is a profound computer vision technique which is used for locating instances of objects that are present in images and videos, automated vehicle systems ,and more. It is really hard for us to define a feature of different object detectors, each case of real life can have many types of solutions to reach a decision concerning the accuracy and speed, it is important and really needed to know other factors that affect performance; the type of feature extractor, steps out of the extractor, income resolutions images, strategy coincidence and threshold .Tensorflow is an open source platform which is end-to-end use in machine learning . Tensorflow provides a collection of workflows to develop and train using programming languages like Python or Javascript , and to easily deploy it in the cloud ,onprem,in the browser ,in the browser, or on – device no matter what language you use .The tensorflow data API enables you to build complex input pipelines. So , in this article we are about to learn about the object detection techniques and methods that are involved which makes the concept easier to understand and implement .

OBJECT DETECTION

Object detection is a method or process used in the computer technology which is related to the computer vision and image processing that deals with detecting instances of the semantic objects of a certain class in the digital images and videos .In other words , the object detection is a method used to identify and locate the one or more effective targets from still image or video data .The Tensorflow Object detection is an open source framework built on top of TensorFlow that makes it easy to construct , train and deploy object detection models. Real – time object is the task of detecting objects in real-time with a fast interface while maintaining its base level of accuracy .It can be used to count objects in a scene and determine and track their precise locations , all while accurately labeling them . The small segments are generated for an image in the given input image , then the feature extraction is carried out for each rectangular area which is segmented to predict if the rectangle consists of a valid object , and at last the overlapping boxes are combined into a single bounding rectangle.

R-CNN

A deep convolutional neural network used for object detection called the Faster R-CNN , which is helpful is accurately detecting and classifying the objects in the image . It is a single – stage model that is trained end-to-end. It uses a novel region proposal network (RPN) for generating the region proposals , which helps to save the time compared to other traditional algorithms like the selective search . It uses the ROI Pooling layer to extract a fixed – length feature vector from each region proposal . the main modules of R-CNN consists of generation of 2000 region proposals using the selective search algorithm , extracting a feature vector of the length 4096 from region proposal , usage of pre-defined i.e. pre-trained Support Vector machine algorithm convolution operation is done only once per image , and a feature map is generated from it. V

YOLO

'You Only Look Once 'is an algorithm that detects and recognizes various objects in a picture. Object detection in YOLO is done as a regression problem and provides the class probabilities of the detected images. This algorithm employs convolutional neural networks (CNN) to detect objects in the real-time. This means that the prediction of the entire image is done in a single algorithm run. The CNN is used to predict various class probabilities and bounding boxes simultaneously. The speed of the detection is fast, it provides high accuracy in the identification with minimum errors, it has great learning capabilities

API

The TensorFlow object detection Application Process Interface (API) is the open source framework for the creation of a deep learning network that solves the object detection problems. There are some pretrained models in their framework which they refer to as Model Zoo. It is used for easy construction and execution in a TensorFlow graph.

CONCLUSION

Object detection is a used in the field of computer and robot vision system. It helps us in assisting us to understand , analyse and detect the scenes in videos and images. Nowadays , many real-world use cases are implemented in the market of object detection which make a tremendous impact on different industries. It has various applications in the platforms such as traffic control , interaction between human and machine , digital forensics , gesture recognisation , augmented reality , virtual reality and visual surveillance.

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