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SOFTWARE DEVELOPMENT FOR OBJECT DETECTION IN REAL-TIME USING YOLO

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Artificial intelligence (AI) has become more popular today than ever, thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage. AI allows software to automatically learn from patterns or data functions by combining large amounts of data with fast iterative processing and intelligent algorithms. This area of research includes various methods and technologies, as well as areas such as machine learning, deep learning, cognitive computing, computer vision.

Many researchers have developed an image tagging model using various approaches like hand crafted features e.g. Scale-Invariant Feature Transform (SIFT) [1], GIST [2], Histogram of Oriented Gradients (HOG) [3], and so on. Based on these low-level feature descriptors, visual representation algorithms (bag-of-word features [4] or spatial pyramid features [5]) have been proposed to describe image content. However, these hand-crafted feature descriptors are designed to capture low-level visual patterns by predefined feature types (e.g. color, shape, or texture). Although promising results have been achieved by combining multi-type feature representations, these features are still inadequate to detect and describe high-level semantic concepts. Therefore, Deep learning and Machine learning algorithms are used for image recognition, classification and segmentation to extract the appropriate content from the image.

The purpose of this research work is to develop a software or model using machine learning techniques which can identify the objects in the image and tag them according to their class which represents the image in a more accurate way. Therefore, I have used YOLO (You Only Look Once) [6] real-time object detection algorithm, which is one of the most effective object detection algorithms in my research work.

YOLO [6] is a clever convolutional neural network (CNN) (fig. 1) for real-time object detection. The algorithm applies a single neural network to the full image, and then divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities. The algorithm “only looks once” it only needs one feedforward pass through the neural network to make predictions. After non-max suppression (which makes sure the object detection algorithm only detects each object once), it outputs recognized objects together with the bounding boxes (fig. 2).

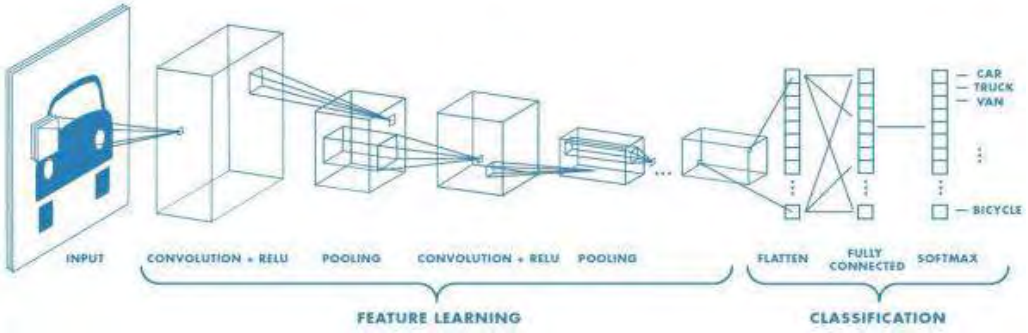

Fig.1 – Architecture of CNN

Fig. 2 – Software results

In conclusion, YOLO algorithm is actively developed for finding better solutions in Computer Vision problems. There are different versions of YOLO which are helpful to improve the functionality of object detection in image or video in real time.

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