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Neural Networks

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Project 2 Proposal

Object detection is an advanced form of image classification where a neural network predicts objects in an image and points them out in bounding boxes. Object detection thus refers to the detection and localization of objects in an image that belongs to a predefined set of classes. Tasks like detection, recognition, or localization find widespread applicability in real-world scenarios such as autonomous driving, robotics, product quality assurance, etc., making object detection (also referred to as object recognition) a very important subdomain of Computer Vision. [2] We call Real-Time object detection when the objects in images can be recognized in mere milliseconds allowing for in-time reactions based on the detection.

Our project will aim to build a real-time object detector to find and track objects of defined classes in images or video feeds. This objective combines object classification and localization (bounding box regression task). To process images and capture the features, we will leverage convolutional neural networks and capture local pixel structures. We will comment on how our model performs in real-time object detection. To train our model, we will use the MS COCO dataset [1]. This dataset contains more than 200,000 labeled color images of 1.5 million object instances and 80 object categories. Each image is 640 x 480 pixels and includes various forms of annotations such as key points, captions, segmentations, and bounding boxes (which interest us). The model will take an image or batch of images and outputs the classes and bounding boxes of all objects detected in that image. The final architecture and hyperparameters of the model will be determined during the experimentation phase.

I will work solo on this project and handle the dataset, research, and development myself. Any other updates and additional datasets used will be mentioned in the report.

References:

- [1] <https://cocodataset.org/#home>
- [2] <https://www.v7labs.com/blog/yolo-object-detection>