YOLOv3 Realtime Sign Detection & Classification

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I. Results and How We Got Them

Fig. 1. Stop sign images on a monitor (left), and the processed video feed (right).

II. Easy. Detect Signs Then Classify.

No. This is how object detection[1] algorithms started (e.g. R-CNN), but they can be too slow for real-time (and embedded) object detection. Those looking for speed, use algorithms that extract classified objects from the frame in a single pass, as opposed to two passes. YOLOv3 is an algorithm that detects in a single pass.

There are multiple versions of YOLOv3. We are using YOLOv3-tiny-prn, which has the highest frames per second (FPS) compared to other commonly used algorithms (see figure 2). The sacrifice to speed is accuracy, as YOLOv3-tiny-prn borders around 35% average precision. Since we implemented sign detection on a Raspberry Pi as a proof-of-concept, this accuracy is acceptable.

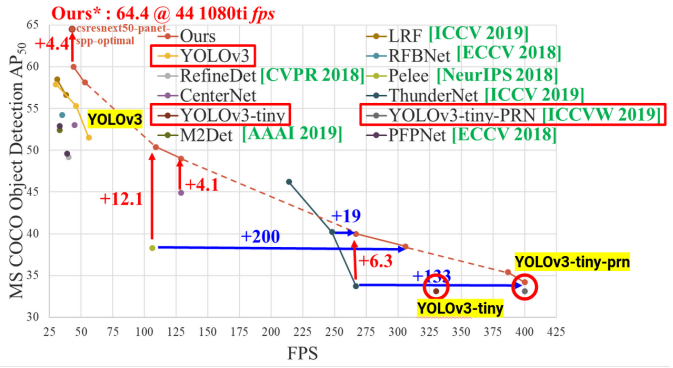

Fig. 2. YOLOv3-tiny-prn has the highest FPS, with an acceptable 35% average precision.

[1]Classification is not detection. Objects first need to be detected before they can be classified. But, for briefness, we say "object detection" when we really mean "object detection and classification."