MMDetection: Open MMLab Detection Toolbox and Benchmark

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Abstract

We present MMDetection, an object detection toolbox that contains a rich set of object detection and instance segmentation methods as well as related components and modules. The toolbox started from a codebase of MMDet team who won the detection track of COCO Challenge 2018. It gradually evolves into a unified platform that covers many popular detection methods and contemporary modules. It not only includes training and inference codes, but also provides weights for more than 200 network models. We believe this toolbox is by far the most complete detection toolbox. In this paper, we introduce the various features of this toolbox. In addition, we also conduct a benchmarking study on different methods, components, and their hyper-parameters. We wish that the toolbox and benchmark could serve the growing research community by providing a flexible toolkit to reimplement existing methods and develop their own new detectors. Code and models are available at https://github.com/open-mmlab/mmdetection. The project is under active development and we will keep this document updated.

1. Introduction

Object detection and instance segmentation are both fundamental computer vision tasks. The pipeline of detection frameworks is usually more complicated than classification-like tasks, and different implementation settings can lead to very different results. Towards the goal of providing a high-quality codebase and unified benchmark, we build MMDetection, an object detection and instance segmentation codebase with PyTorch [24].

Major features of MMDetection are: (1) **Modular design.** We decompose the detection framework into different components and one can easily construct a customized object detection framework by combining different modules. (2) **Support of multiple frameworks out of box.** The toolbox supports popular and contempoary detection frameworks, see Section 2 for the full list. (3) **High efficiency.** All basic bbox and mask operations run on GPUs. The training speed is faster than or comparable to other codebases, including Detectron [10] , maskrcnn-benchmark [21] and SimpleDet [6]. (4) **State of the art.** The toolbox stems from the codebase developed by the MMDet team, who won COCO Detection Challenge in 2018, and we keep pushing it forward.

Apart from introducing the codebase and benchmarking results, we also report our experience and best practice for training object detectors. Ablation experiments on hyper-parameters, architectures, training strategies are performed and discussed. We hope that the study can benefit future research and facilitate comparisons between different methods.

The remaining sections are organized as follows. We first introduce various supported methods and highlight important features of MMDetection, and then present the benchmark results. Lastly, we show some ablation studies on some chosen baselines.

2. Supported Frameworks

MMDetection contains high-quality implementations of popular object detection and instance segmentation methods. A summary of supported frameworks and features compared with other codebases is provided in Table 1. MMDetection supports more methods and features than

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