Centernet

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Centernet builds upon CornerNet, an anchor-free model for object detection.

Many other models, such as YOLO and RetinaNet, use anchor boxes. These anchor boxes are predefined to be close to the aspect ratios and scales of the objects in the training dataset. Anchor-based models do not predict the bounding boxes of objects directly. They instead predict the location and size/shape refinements to a predefined anchor box. The detection generator then computes the final confidences, positions, and size of the detection.

CornerNet eliminates the need for anchor boxes. RetinaNet needs thousands of anchor boxes in order to cover the most common ground truth boxes. This adds unnecessary complexity to the model which slow down training and create imbalances in positive and negative anchor boxes. Instead, CornerNet creates heatmaps for each of the corners and pools them together in order to get the final detection boxes for the objects. CenterNet removes even more complexity by using the center instead of the corners, meaning that only one set of heatmaps (one heatmap for each class) is needed to predict the object. CenterNet proves that this can be done without a significant difference in accuracy.

Enviroment setup

The code can be run on multiple GPUs or TPUs with different distribution strategies. See the TensorFlow distributed training guide for an overview of `tf.distribute`.

The code is compatible with TensorFlow 2.5+. See requirements.txt for all prerequisites, and you can also install them using the following command. `pip install -r ./official/requirements.txt`

Training

To train the model on Coco, try the following command:

```
python3 -m official.vision.beta.projects.centernet.train \
  --mode=train_and_eval \
  --experiment=centernet_hourglass_coco \
  --model_dir={MODEL_DIR} \
  --config_file={CONFIG_FILE}
```

Configurations

In the following table, we report the mAP measured on the `coco-val2017` set.

Backbone	Config name	mAP
Hourglass-104	`coco-centernet-hourglass-gpu.yaml`	40.01
Hourglass-104	`coco-centernet-hourglass-tpu.yaml`	40.5

Note: `float16` (`bfloat16` for TPU) is used in the provided configurations.

Cite

Centernet:

```
@article{Zhou2019ObjectsAP,
  title={Objects as Points},
  author={Xingyi Zhou and Dequan Wang and Philipp Kr{\"a}henb{\"u}hl},
  journal={ArXiv},
  year={2019},
  volume={abs/1904.07850}
}
```

CornerNet:

```
@article{Law2019CornerNetDO,
  title={CornerNet: Detecting Objects as Paired Keypoints},
  author={Hei Law and J. Deng},
  journal={International Journal of Computer Vision},
  year={2019},
  volume={128},
  pages={642-656}
}
```