

Jupyter-Image-Segmentation- MaskRCNN-Keras

Inheriting the algorithm MaskRCNN of FasterRCNN, it improves the original architecture and adds the part of Semantic Segmentation, which can segment, detect and classify objects. It is a classic Segmentation algorithm.

Version 20221116

How to use

The main process is:

Annotate images -> Prepare files for training -> Training -> Inference

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Name

📁 data

📁 src

📄 1_annotation_via_json.ipynb

📄 2_delete_log.ipynb

📄 3_kill_tensorboard.ipynb

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1_annotation_via_json.ipynb

Open the webpage for image annotation.

ipynb parameter:

- “port” is the port used by the webpage. If the port is occupied by the user, please change another port value by yourself.
- “image_folder” is the image path.
- “annotation_path” is the path to the annotation archive.

See Annotation.pdf for how to use annotation pages.



2_delete_log.ipynb

Delete the log files left over from previous training.

3_kill_tensorboard.ipynb

Close a TensorBoard that was not closed before.

4_train.ipynb

Start training.

ipynb parameter description:

- --dataset is the training dataset path.
- --weights_path is the pretrained model model path.
- --weights_dir is the path to store the model generated by training
- --image is the path of the inferred image, which can be a single image path or an image folder path.
- --predefined_classes_txt is a txt file of class names used during training.
- --logs is the path to store the log files generated by training.

```
100/100 [=====] - ETA: 0s - batch: 49.5000 - size: 1.0000 - loss: 1.6889 - rpn_class_loss: 0.0305 - rpn_bbox_loss: 0.7189 - mrcnn_class_loss: 0.0621 - mrcnn_bbox_loss: 0.4348 - mrcnn_mask_loss: 0.4426
```

```
C:\Users\ai\Desktop\App4AI-2225\gpu\python\lib\site-packages\keras\engine\training_v1.py:2045: UserWarning: `Model.state_updates` will be removed in a future version. This property should not be used in TensorFlow 2.0, as `updates` are applied automatically.
```

```
updates = self.state_updates
```

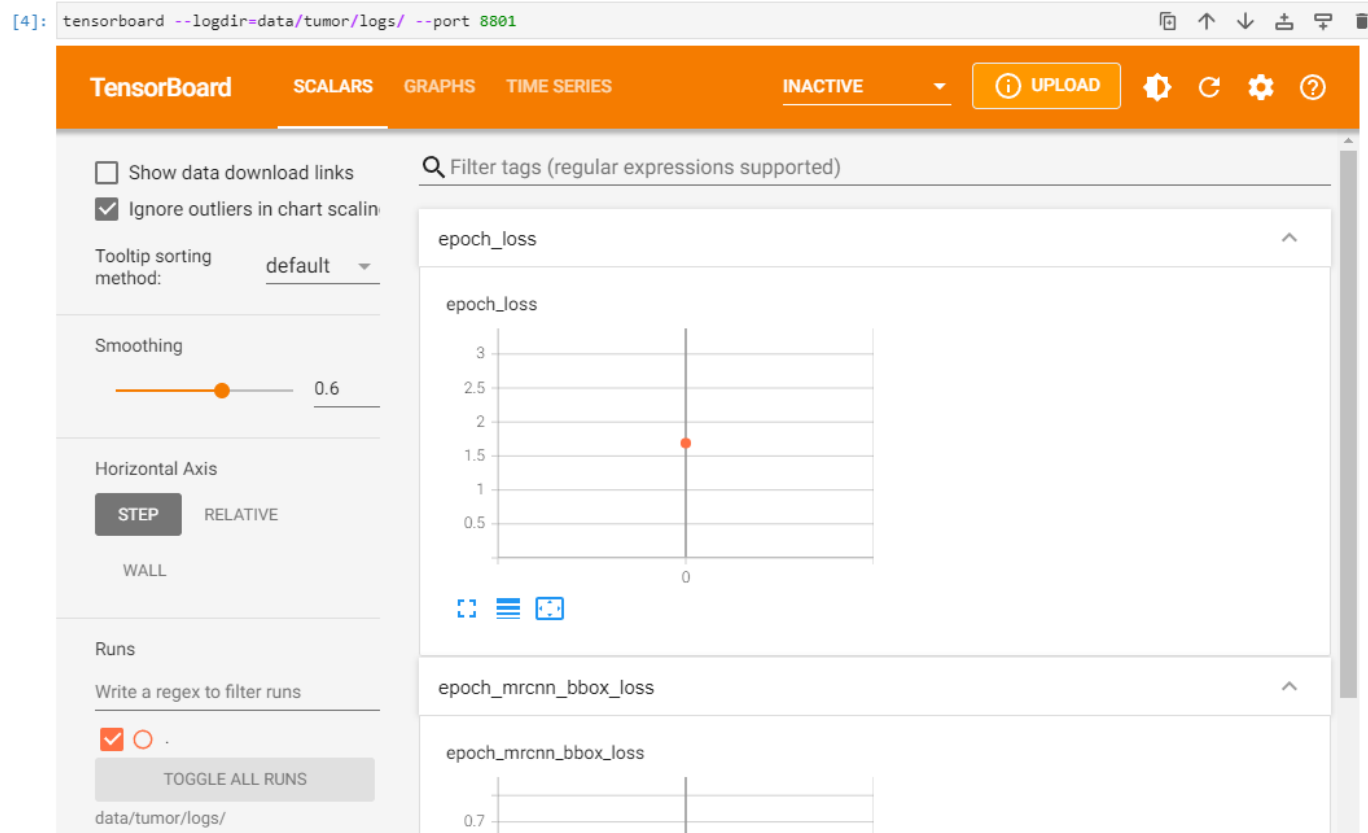
```
100/100 [=====] - 142s 1s/step - batch: 49.5000 - size: 1.0000 - loss: 1.6889 - rpn_class_loss: 0.0305 - rpn_bbox_loss: 0.7189 - mrcnn_class_loss: 0.0621 - mrcnn_bbox_loss: 0.4348 - mrcnn_mask_loss: 0.4426 - val_loss: 1.0373 - val_rpn_class_loss: 0.0194 - val_rpn_bbox_loss: 0.2847 - val_mrcnn_class_loss: 0.0729 - val_mrcnn_bbox_loss: 0.3683 - val_mrcnn_mask_loss: 0.2921
```

```
Epoch 2/60
```

```
45/100 [=====>.....] - ETA: 44s - batch: 22.0000 - size: 1.0000 - loss: 0.9220 - rpn_class_loss: 0.0200 - rpn_bbox_loss: 0.2563 - mrcnn_class_loss: 0.0486 - mrcnn_bbox_loss: 0.2815 - mrcnn_mask_loss: 0.3157
```

5_tensorboard.ipynb

You can view the training loss curve and other related information through TensorBoard.



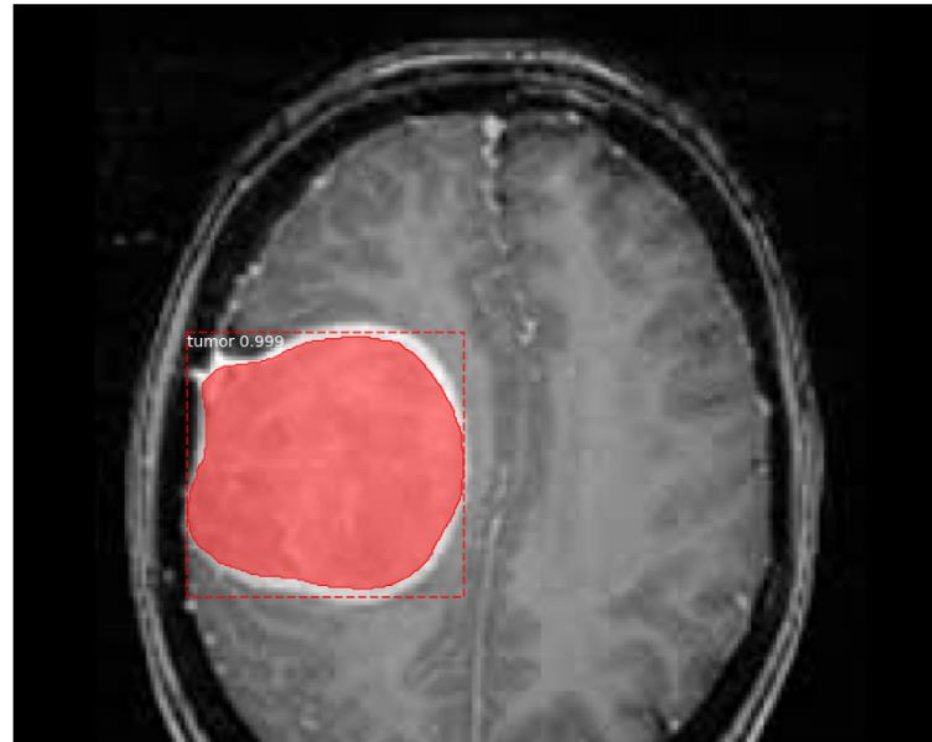
6_inference.ipynb

Infer a single image or all images in a folder.

ipynb parameter description:

- --weights is the inference model path.
- --image is the path of the inferred image, which can be a single image path or an image folder path.
- --predefined_classes_txt is a txt file of class names used during training.

```
Instructions for updating:
Use fn_output_signature instead
Loading weights data/tumor/model/mask_rcnn_mask.h5
Running on data/tumor/train/image/tumor-1.jpg
Processing 1 images
image           shape: (512, 512, 3)    min:  0.00000  max: 255.00000  uint8
molded_images   shape: (1, 512, 512, 3) min: -123.70000 max: 151.10000  float64
image_metas     shape: (1, 14)         min:  0.00000  max: 512.00000  int32
anchors         shape: (1, 65472, 4)   min: -0.70849  max:  1.58325   float32
C:\Users\ai\Desktop\App4AI-2225\gpu\python\lib\site-packages\keras\engine\training_v1.py:2067: UserWarning: `Model.state_updates` will be removed in a future version. This property should not be used in TensorFlow 2.0, as `updates` are applied automatically.
  updates=self.state_updates,
```



7_evaluation_mAP.ipynb

Calculate mAP for each class in the image folder.

ipynb parameter description:

- --weights is the model path used to compute mAP.
- --DATA_DIR is the dataset path.
- --PREDEFINED_CLASSES_PATH is the class name txt file to use when training.
- --Inference_DATA_DIR is the specified folder in the dataset for mAP calculation, such as train, val.

```
LEARNING_RATE          0.001
LOSS_WEIGHTS           {'rpn_class_loss': 1.0, 'rpn_bbox_loss': 1.0, 'mrcnn_class_loss': 1.0, 'mrcnn_bbox_loss': 1.0, 'mrcnn_mask_loss': 1.0}
MASK_POOL_SIZE         14
MASK_SHAPE              [28, 28]
MAX_GT_INSTANCES       100
MEAN_PIXEL              [123.7 116.8 103.9]
MINI_MASK_SHAPE        (56, 56)
NAME                   mask
NUM_CLASSES             2
POOL_SIZE              7
POST_NMS_ROIS_INFERENCE 1000
POST_NMS_ROIS_TRAINING 2000
ROI_POSITIVE_RATIO     0.33
RPN_ANCHOR_RATIOS      [0.5, 1, 2]
RPN_ANCHOR_SCALES      (32, 64, 128, 256, 512)
RPN_ANCHOR_STRIDE      1
RPN_BBOX_STD_DEV       [0.1 0.1 0.2 0.2]
RPN_NMS_THRESHOLD      0.7
RPN_TRAIN_ANCHORS_PER_IMAGE 256
STEPS_PER_EPOCH        100
TRAIN_BN               False
TRAIN_ROIS_PER_IMAGE   200
USE_MINI_MASK          False
USE_RPN_ROIS           True
VALIDATION_STEPS       30
WEIGHT_DECAY           0.01
```

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```
WARNING:tensorflow:From C:\Users\ai\Desktop\App4AI-2225\gpu\python\lib\site-packages\tensorflow\python\util\deprecation.py:629: calling map_fn_v2 (from tensorflow.python.ops.map_fn) with dtype is deprecated and will be removed in a future version.
```

```
Instructions for updating:
```

```
Use fn_output_signature instead
```

```
Loading weights data/tumor/model/mask_rcnn_mask.h5
```

```
C:\Users\ai\Desktop\App4AI-2225\gpu\python\lib\site-packages\keras\engine\training_v1.py:2067: UserWarning: `Model.state_updates` will be removed in a future version. This property should not be used in TensorFlow 2.0, as `updates` are applied automatically.
```

```
updates=self.state_updates,
```

```
85.36% = tumor AP
```

```
mAP = 85.36%
```

Reference

- Please refer to the readme.txt in the SDK folder.
- LEADERG Sdk4AI: <https://www.leaderg.com/sdk4ai>
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