```
# Update CUDA for TF 2.5
!wget https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2004/x86_64/libcudnn8_8.1.0.77-1+cuda11.2_amd64.deb
!dpkg -i libcudnn8_8.1.0.77-1+cuda11.2_amd64.deb
# Check if package has been installed
!ls -l /usr/lib/x86_64-linux-gnu/libcudnn.so.*
# Upgrade Tensorflow
!pip install --upgrade tensorflow==2.5.0
```

```
    Found existing installation: typing_extensions 4.5.0
    Uninstalling typing_extensions-4.5.0:
      Successfully uninstalled typing_extensions-4.5.0
  Attempting uninstall: termcolor
    Found existing installation: termcolor 2.2.0
    Uninstalling termcolor-2.2.0:
      Successfully uninstalled termcolor-2.2.0
  Attempting uninstall: tensorflow-estimator
    Found existing installation: tensorflow-estimator 2.12.0
    Uninstalling tensorflow-estimator-2.12.0:
      Successfully uninstalled tensorflow-estimator-2.12.0
  Attempting uninstall: flatbuffers
    Found existing installation: flatbuffers 23.3.3
    Uninstalling flatbuffers-23.3.3:
      Successfully uninstalled flatbuffers-23.3.3
  Attempting uninstall: tensorboard-data-server
    Found existing installation: tensorboard-data-server 0.7.0
    Uninstalling tensorboard-data-server-0.7.0:
      Successfully uninstalled tensorboard-data-server-0.7.0
  Attempting uninstall: six
    Found existing installation: six 1.16.0
    Uninstalling six-1.16.0:
      Successfully uninstalled six-1.16.0
  Attempting uninstall: numpy
    Found existing installation: numpy 1.22.4
    Uninstalling numpy-1.22.4:
      Successfully uninstalled numpy-1.22.4
  Attempting uninstall: h5py
    Found existing installation: h5py 3.8.0
    Uninstalling h5py-3.8.0:
      Successfully uninstalled h5py-3.8.0
  Attempting uninstall: grpcio
    Found existing installation: grpcio 1.53.0
    Uninstalling grpcio-1.53.0:
      Successfully uninstalled grpcio-1.53.0
  Attempting uninstall: absl-py
    Found existing installation: absl-py 1.4.0
    Uninstalling absl-py-1.4.0:
      Successfully uninstalled absl-py-1.4.0
  Attempting uninstall: tensorboard
    Found existing installation: tensorboard 2.12.0
    Uninstalling tensorboard-2.12.0:
      Successfully uninstalled tensorboard-2.12.0
  Attempting uninstall: tensorflow
    Found existing installation: tensorflow 2.12.0
    Uninstalling tensorflow-2.12.0:
      Successfully uninstalled tensorflow-2.12.0
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the sour
xarray 2022.12.0 requires numpy>=1.20, but you have numpy 1.19.5 which is incompatible.
xarray-einstats 0.5.1 requires numpy>=1.20, but you have numpy 1.19.5 which is incompatible.
pydantic 1.10.7 requires typing-extensions>=4.2.0, but you have typing-extensions 3.7.4.3 which is incompatible.
optax 0.1.4 requires typing-extensions>=3.10.0, but you have typing-extensions 3.7.4.3 which is incompatible.
ml-dtypes 0.0.4 requires numpy>1.20, but you have numpy 1.19.5 which is incompatible.
matplotlib 3.7.1 requires numpy>=1.20, but you have numpy 1.19.5 which is incompatible.
librosa 0.10.0.post2 requires numpy!=1.22.0,!=1.22.1,!=1.22.2,>=1.20.3, but you have numpy 1.19.5 which is incompatible.
librosa 0.10.0.post2 requires typing-extensions>=4.1.1, but you have typing-extensions 3.7.4.3 which is incompatible.
jaxlib 0.4.7+cuda11.cudnn86 requires numpy>=1.21, but you have numpy 1.19.5 which is incompatible.
jax 0.4.7 requires numpy>=1.21, but you have numpy 1.19.5 which is incompatible.
```

```
!wget https://psfiles.link/project/mask_rcnn_colab/mrcnn_demo_PIBVGJTEFX.zip
!unzip mrcnn_demo_PIBVGJTEFX.zip
import sys
sys.path.append("/content/maskrcnn_colab/mrcnn_demo")
from m_rcnn import *
%matplotlib inline
```

```
--2023-04-04 03:22:13--  https://psfiles.link/project/mask_rcnn_colab/mrcnn_demo_PIBVGJTEFX.zip
Resolving psfiles.link (psfiles.link)... 34.90.26.83
Connecting to psfiles.link (psfiles.link)|34.90.26.83|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 59799 (58K) [application/zip]
Saving to: ‘mrcnn_demo_PIBVGJTEFX.zip’
```

```
mrcnn_demo_PIBVGJTE 100%[===================>]  58.40K  --.-KB/s    in 0.1s

2023-04-04 03:22:14 (574 KB/s) - ‘mrcnn_demo_PIBVGJTEFX.zip’ saved [59799/59799]

Archive:  mrcnn_demo_PIBVGJTEFX.zip
   creating: maskrcnn_colab/
   creating: maskrcnn_colab/mrcnn_demo/
  inflating: maskrcnn_colab/mrcnn_demo/config.py
  inflating: maskrcnn_colab/mrcnn_demo/model.py
  inflating: maskrcnn_colab/mrcnn_demo/m_rcnn.py
  inflating: maskrcnn_colab/mrcnn_demo/parallel_model.py
  inflating: maskrcnn_colab/mrcnn_demo/utils.py
  inflating: maskrcnn_colab/mrcnn_demo/visualize.py
VERS 0.5 - updated 11/03/2023
/content/maskrcnn_colab/mrcnn_demo/model.py:2378: SyntaxWarning: "is" with a literal. Did you mean "=="?
  if os.name is 'nt':
Downloading pretrained model to /content/maskrcnn_colab/mask_rcnn_coco.h5 ...
... done downloading pretrained model!
```

```
from google.colab import files
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
# Extract Images
images_path = "/content/drive/MyDrive/Colab Notebooks/Lane Detection/Lane and Object Detection/Untitled folder/dataset.zip"
annotations_path = "/content/drive/MyDrive/Colab Notebooks/Lane Detection/Lane and Object Detection/Untitled folder/annotations.json"

extract_images(os.path.join("/content/",images_path), "/content/dataset")
```

```
Extracted: 91 images
```

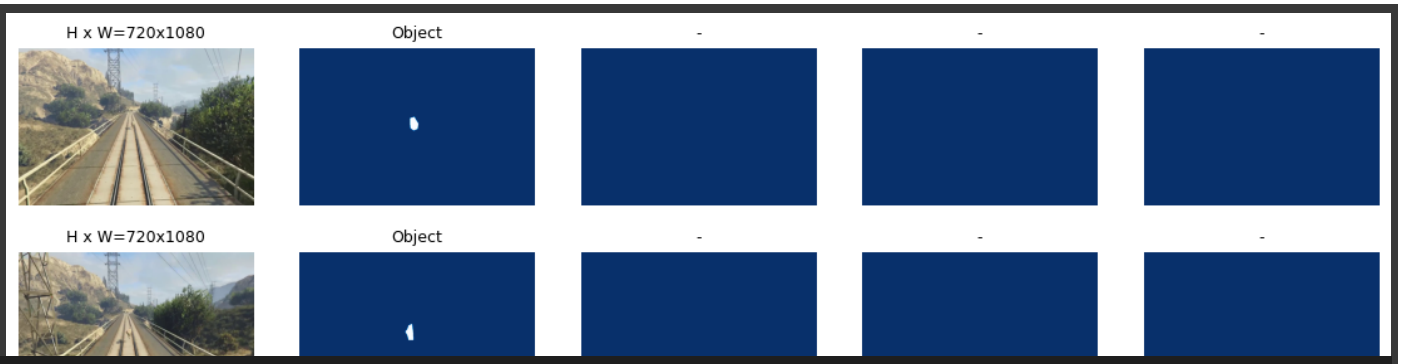
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

```
dataset_train = load_image_dataset(os.path.join("/content/", annotations_path), "/content/dataset", "train")
dataset_val = load_image_dataset(os.path.join("/content/", annotations_path), "/content/dataset", "val")
class_number = dataset_train.count_classes()
print('Train: %d' % len(dataset_train.image_ids))
print('Validation: %d' % len(dataset_val.image_ids))
print("Classes: {}".format(class_number))
```

```
Annotation json path:  /content/drive/MyDrive/Colab Notebooks/Lane Detection/Lane and Object Detection/Untitled folder/annotations.json
Annotation json path:  /content/drive/MyDrive/Colab Notebooks/Lane Detection/Lane and Object Detection/Untitled folder/annotations.json
Train: 81
Validation: 10
Classes: 1
```

```
# Load image samples
display_image_samples(dataset_train)
```




```
# Load Configuration
import tensorflow as tf

tb_callback = tf.keras.callbacks.TensorBoard(log_dir="logs/", histogram_freq=1)

config = CustomConfig(class_number)
# config.display()
model = load_training_model(config)
# model.fit(model, callbacks=[tb_callback])
```

```
WARNING:tensorflow:From /usr/local/lib/python3.9/dist-packages/tensorflow/python/ops/array_ops.py:5043: calling gather (from tensorflow
Instructions for updating:
The `validate_indices` argument has no effect. Indices are always validated on CPU and never validated on GPU.
/content/maskrcnn_colab/mask_rcnn_coco.h5
```

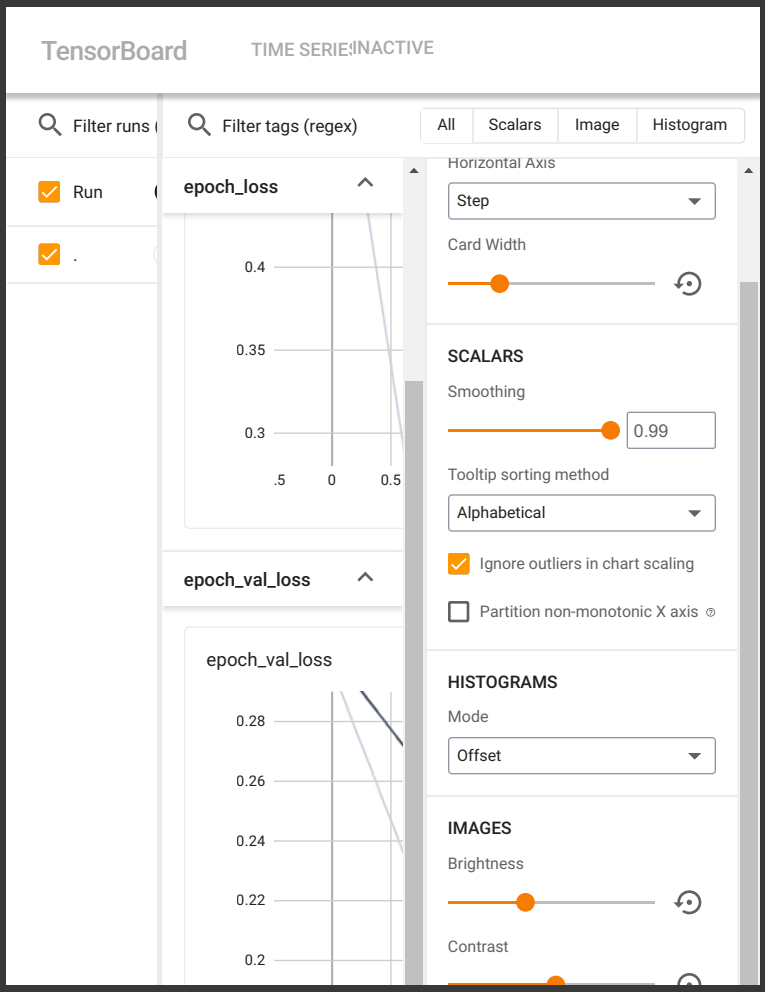
```
# !pip install scikit-image==0.16.2
# !1pip install -U scikit-image==0.16.2
# img_resized = skimage.util.img_as_bool(skimage.transform.resize(
#     image.astype(np.uint32), output_shape,
#     order=order, mode=mode, cval=cval, clip=clip,
#     preserve_range=preserve_range, anti_aliasing=anti_aliasing,
#     anti_aliasing_sigma=anti_aliasing_sigma))
# return img_resized
# Start Training
# This operation might take a long time.
train_head(model, dataset_train, dataset_train, config)
# plot_precision_recall(AP, precisions, recalls)
```

```
Starting at epoch 0. LR=0.001

Checkpoint Path: /content/maskrcnn_colab/logs/object20230404T0327/mask_rcnn_object_{epoch:04d}.h5
Selecting layers to train
fpn_c5p5               (Conv2D)
fpn_c4p4               (Conv2D)
fpn_c3p3               (Conv2D)
fpn_c2p2               (Conv2D)
fpn_p5                 (Conv2D)
fpn_p2                 (Conv2D)
fpn_p3                 (Conv2D)
fpn_p4                 (Conv2D)
rpn_model              (Functional)
mrcnn_mask_conv1       (TimeDistributed)
mrcnn_mask_bn1         (TimeDistributed)
mrcnn_class_conv1      (TimeDistributed)
mrcnn_class_bn1        (TimeDistributed)
mrcnn_mask_conv2       (TimeDistributed)
mrcnn_mask_bn2         (TimeDistributed)
mrcnn_class_conv2      (TimeDistributed)
mrcnn_class_bn2        (TimeDistributed)
mrcnn_mask_conv3       (TimeDistributed)
mrcnn_mask_bn3         (TimeDistributed)
mrcnn_bbox_fc          (TimeDistributed)
mrcnn_mask_conv4       (TimeDistributed)
mrcnn_mask_bn4         (TimeDistributed)
mrcnn_mask_deconv      (TimeDistributed)
mrcnn_class_logits     (TimeDistributed)
mrcnn_mask             (TimeDistributed)
Epoch 1/5
500/500 [==============================] - 514s 957ms/step - batch: 249.5000 - size: 4.0000 - loss: 0.6200 - val_loss: 0.3079
Epoch 2/5
500/500 [==============================] - 449s 898ms/step - batch: 249.5000 - size: 4.0000 - loss: 0.2521 - val_loss: 0.2273
Epoch 3/5
500/500 [==============================] - 448s 897ms/step - batch: 249.5000 - size: 4.0000 - loss: 0.1817 - val_loss: 0.1472
```

```
Epoch 4/5
500/500 [==============================] - 448s 896ms/step - batch: 249.5000 - size: 4.0000 - loss: 0.1329 - val_loss: 0.1085
Epoch 5/5
500/500 [==============================] - 447s 895ms/step - batch: 249.5000 - size: 4.0000 - loss: 0.1076 - val_loss: 0.0964
```

```
%load_ext tensorboard
%tensorboard --logdir /content/maskrcnn_colab/logs/object20230404T0327
```

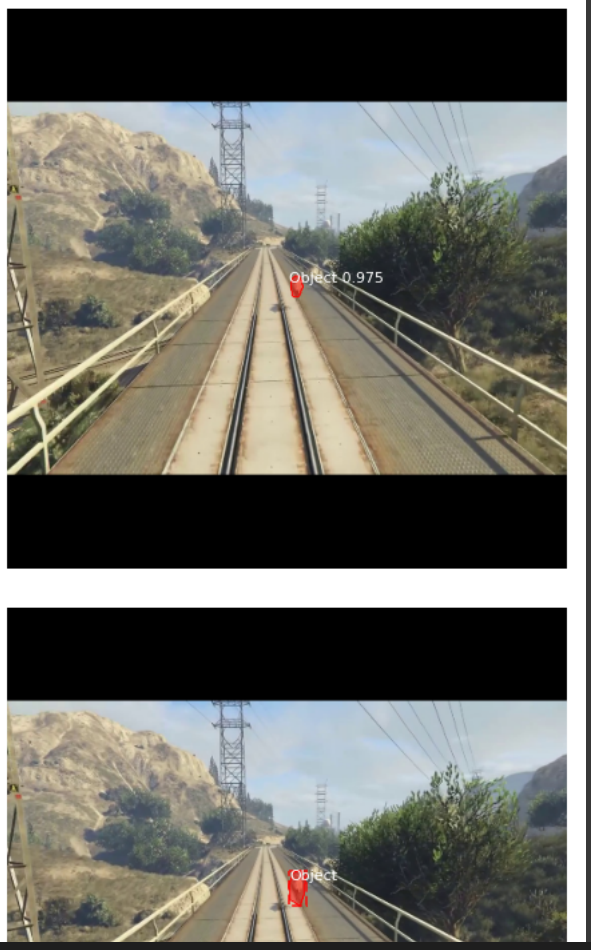



```
# Load Test Model
# The latest trained model will be loaded
test_model, inference_config = load_test_model(class_number)
```

```
WARNING:tensorflow:From /usr/local/lib/python3.8/dist-packages/tensorflow/python/util/deprecation.py:602: calling map_fn_v2 (from tenso
Instructions for updating:
Use fn_output_signature instead
Loading weights from  /content/maskrcnn_colab/logs/object20230109T0852/mask_rcnn_object_0005.h5
Re-starting from epoch 5
```

```
# Test on a random image
test_random_image(test_model, dataset_val, inference_config)
```

```
original_image           shape: (512, 512, 3)         min:    0.00000  m
Trained model result
Processing 1 images
image                    shape: (512, 512, 3)         min:    0.00000  m
molded_images            shape: (1, 512, 512, 3)      min: -123.70000  m
image_metas              shape: (1, 14)               min:    0.00000  m
anchors                  shape: (1, 65472, 4)         min:   -0.70849  m
Annotation
```



✓ 5s completed at 10:12 AM