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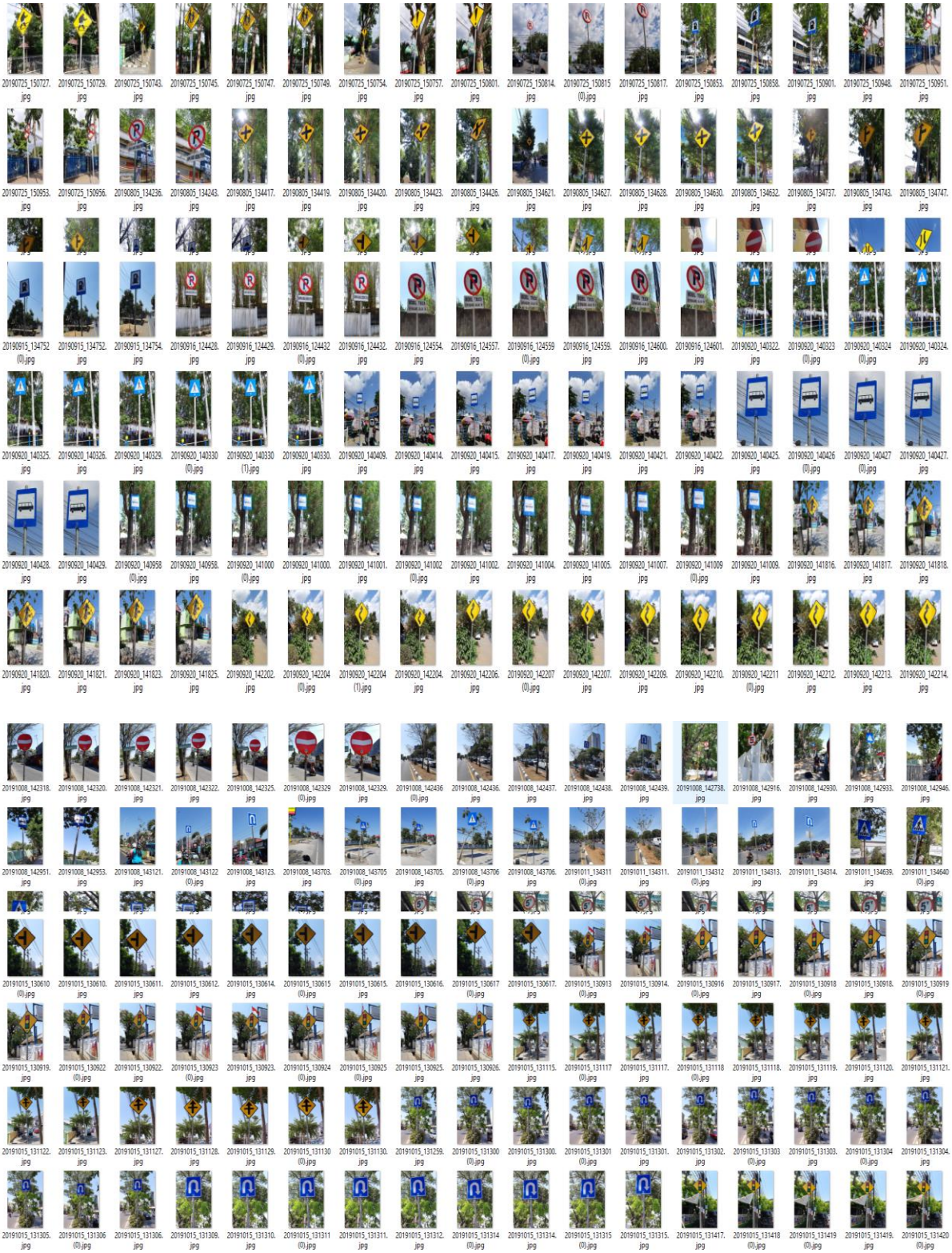
LAMPIRAN

Data Latih



Script Training (yolov4(1).ipynb)

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

!ln -s /content/gdrive/My\ Drive/ /mydrive
!ls /mydrive

!cp /mydrive/darknet.zip ../

!unzip ../darknet.zip

%cd darknet
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile

!make

!cp /mydrive/yolov4/obj.zip ../

!unzip ../obj.zip -d data/

!cp /mydrive/yolov4/yolov4_custom.cfg ./cfg

!cp /mydrive/yolov4/obj.names ./data
!cp /mydrive/yolov4/obj.data  ./data

!cp /mydrive/yolov4/generate_train.py ./
!cp /mydrive/yolov4/generate_test.py ./

def download(path):
  from google.colab import files
  files.download(path)

!python generate_train.py
!python generate_test.py

!./darknet detector train data/obj.data cfg/yolov4_custom.cfg yolov4.conv.137 -
dont_show
```

Script deteksi video (YOLOv_detect_Video.ipynb)

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

!ln -s /content/gdrive/My\ Drive/ /mydrive
!ls /mydrive

!cp /mydrive/darknet.zip ../

!unzip ../darknet.zip

!ls /mydrive/yolov4

%cd darknet
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile

!/usr/local/cuda/bin/nvcc --version

!make

def download(path):
  from google.colab import files
  files.download(path)

!cp /mydrive/videos/4.mp4 ./

!cp /mydrive/yolov4/backup/yolov4_custom_last.weights ./

!cp /mydrive/yolov4/obj.names ./cfg
!cp /mydrive/yolov4/obj.data  ./cfg

!cp /mydrive/yolov4/obj.names ./data
!cp /mydrive/yolov4/obj.data  ./data

!cp /mydrive/yolov4/yolov4_detect_videos.cfg  ./cfg

!./darknet detector demo cfg/obj.data cfg/yolov4_detect_videos.cfg yolov4_custom_la
st.weights -dont_show 4.mp4 -i 0 -out_filename 2Khasil4.mp4

!cp -r 2Khasil4.mp4 "/content/gdrive/My Drive/"
```

Script menghitung *mean Average Precision* (mAP) (YOLOv_detect_Tutorial_measure_map (2).ipynb)

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

!ln -s /content/gdrive/My\ Drive/ /mydrive
!ls /mydrive

!cp /mydrive/darknet.zip ../

!unzip ../darknet.zip

!ls /mydrive/yolov4

%cd darknet
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile

!/usr/local/cuda/bin/nvcc --version

!make

def download(path):
  from google.colab import files
  files.download(path)

# define helper functions
def imShow(path):
  import cv2
  import matplotlib.pyplot as plt
  %matplotlib inline

  image = cv2.imread(path)
  height, width = image.shape[:2]
  resized_image = cv2.resize(image,(3*width, 3*height), interpolation = cv2.INTER_C
UBIC)

  fig = plt.gcf()
  fig.set_size_inches(18, 10)
  plt.axis("off")
  plt.imshow(cv2.cvtColor(resized_image, cv2.COLOR_BGR2RGB))
  plt.show()
```

```
!cp /mydrive/yolov4/backup/yolov4_custom_last.weights ./

!cp /mydrive/yolov4/obj.zip ../
!unzip ../obj.zip -d data/
!cp /mydrive/yolov4/obj.names ./cfg
!cp /mydrive/yolov4/obj.data  ./cfg

!cp /mydrive/yolov4/obj.names ./data
!cp /mydrive/yolov4/obj.data  ./data

!cp /mydrive/yolov4/yolov4_detect_videos.cfg  ./cfg
!cp /mydrive/yolov4/generate_test.py ./

!python generate_test.py

!./darknet detector map data/obj.data cfg/yolov4_detect_videos.cfg yolov4_custo
m_last.weights -dont_show -ext_output < /mydrive/images.txt > result.csv
download("result.csv")
```

File obj.names

```
Peringatan Simpang Empat Prioritas (Minor)
Larangan Berhenti
Petunjuk Lokasi Putar Balik
Petunjuk Lokasi Fasilitas Pemberhentian Mobil Bus Umum
Petunjuk Lokasi Fasilitas Penyebrangan Pejalan Kaki
Larangan Parkir
Petunjuk Lokasi Balai Kesehatan, Puskesmas, Balai Pertolongan Pertama dan sejenis
Petunjuk Lokasi Masjid
Peringatan Alat Pemberi Isyarat Lalu Lintas
Peringatan Banyak Lalu Lintas Pejalan Kaki Anak Anak
Peringatan,(ditegaskan penjelasan jenis peringatan dengan papan tambahan)
Peringatan Banyak Lalu Lintas Pejalan Kaki
Larangan Memutar Balik
Petunjuk Lokasi SPBU
Larangan Masuk bagi Becak
Peringatan Persimpangan Tiga Sisi Kanan
Peringatan Persimpangan Tiga Sisi Kiri (Minor)
Larangan Masuk Bagi Kendaraan Bermotor dan Tidak Bermotor
Peringatan Jembatan, Penyempitan Bagan Jalinan Jalan Tertentu
Peringatan Persimpangan Tiga Serong Kiri (Minor)
Peringatan Persimpangan Tiga Sisi Kiri
Peringatan Persimpangan Tiga Serong Kiri
Peringatan Persimpangan Tiga Sisi Kanan (Minor)
Peringatan Tikungan Ke Kiri
Peringatan Tikungan Ke Kanan
Peringatan Persimpangan Tiga Serong Kanan (Minor)
Larangan Masuk bagi Kendaraan bermotor lebih dari 5 ton
Larangan Belok Kanan
Peringatan Simpang Empat Prioritas (Mayor)
Perintah Mengikuti ke Arah Kiri
Perintah Memasuki Jalur atau jalur yang ditunjuk
Petunjuk Lokasi Gereja
Larangan Masuk bagi Kendaraan Bermotor Roda Tunggal dengan MST sama atau lebih 8 Ton
Peringatan Banyak Tikungan dengan Tikungan Pertaama Ke Kiri
Petunjuk Lokasi Rumah Sakit
```

File obj.data

```
classes =35
train = data/train.txt
valid = data/test.txt
names = data/obj.names
backup = /mydrive/yolov4/backup/
```

Generate_train.py

```
import os

image_files = []
os.chdir(os.path.join("data", "obj"))
for filename in os.listdir(os.getcwd()):
    if filename.endswith(".jpg"):
        image_files.append("data/obj/" + filename)
os.chdir("..")
with open("train.txt", "w") as outfile:
    for image in image_files:
        outfile.write(image)
        outfile.write("\n")
    outfile.close()
os.chdir("..")
```

Generate_test.py

```
import os

image_files = []
os.chdir(os.path.join("data", "obj"))
for filename in os.listdir(os.getcwd()):
    if filename.endswith(".jpg"):
        image_files.append("data/obj/" + filename)
os.chdir("..")
with open("test.txt", "w") as outfile:
    for image in image_files:
        outfile.write(image)
        outfile.write("\n")
    outfile.close()
os.chdir("..")
```

Script *realtime* (detect_video.py)

```
import time
import tensorflow as tf
physical_devices = tf.config.experimental.list_physical_devices('GPU')
if len(physical_devices) > 0:
    tf.config.experimental.set_memory_growth(physical_devices[0], True)
from absl import app, flags, logging
from absl.flags import FLAGS
import core.utils as utils
from core.yolov4 import filter_boxes
from tensorflow.python.saved_model import tag_constants
from PIL import Image
import cv2
import numpy as np
from tensorflow.compat.v1 import ConfigProto
from tensorflow.compat.v1 import InteractiveSession

flags.DEFINE_string('framework', 'tf', '(tf, tflite, trt')
flags.DEFINE_string('weights', './checkpoints/yolov4-416',
                    'path to weights file')
flags.DEFINE_integer('size', 416, 'resize images to')
flags.DEFINE_boolean('tiny', False, 'yolo or yolo-tiny')
flags.DEFINE_string('model', 'yolov4', 'yolov3 or yolov4')
flags.DEFINE_string('video', './data/video/video.mp4', 'path to input video or set to 0 for webcam')
flags.DEFINE_string('output', None, 'path to output video')
flags.DEFINE_string('output_format', 'XVID', 'codec used in VideoWriter when saving video to file')
flags.DEFINE_float('iou', 0.45, 'iou threshold')
flags.DEFINE_float('score', 0.25, 'score threshold')
flags.DEFINE_boolean('dont_show', False, 'dont show video output')

def main(_argv):
    config = ConfigProto()
    config.gpu_options.allow_growth = True
    session = InteractiveSession(config=config)
    STRIDES, ANCHORS, NUM_CLASS, XYSCALE = utils.load_config(FLAGS)
    input_size = FLAGS.size
    video_path = FLAGS.video

    if FLAGS.framework == 'tflite':
        interpreter = tf.lite.Interpreter(model_path=FLAGS.weights)
        interpreter.allocate_tensors()
        input_details = interpreter.get_input_details()
        output_details = interpreter.get_output_details()
        print(input_details)
        print(output_details)
    else:
        saved_model_loaded = tf.saved_model.load(FLAGS.weights,tags=[tag_constants.SERVING])
        infer = saved_model_loaded.signatures['serving_default']

# begin video capture
    try:
        vid = cv2.VideoCapture(int(video_path))
    except:
        vid = cv2.VideoCapture(video_path)

    out = None

    if FLAGS.output:
        # by default VideoCapture returns float instead of int
        width = int(vid.get(cv2.CAP_PROP_FRAME_WIDTH))
        height = int(vid.get(cv2.CAP_PROP_FRAME_HEIGHT))
        fps = int(vid.get(cv2.CAP_PROP_FPS))
        codec = cv2.VideoWriter_fourcc(*FLAGS.output_format)
        out = cv2.VideoWriter(FLAGS.output, codec, fps, (width, height))

    while True:
        return_value, frame = vid.read()
```

```
if return_value:
            frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)
            image = Image.fromarray(frame)
        else:
            print('Video has ended or failed, try a different video format!')
            break

        frame_size = frame.shape[:2]
        image_data = cv2.resize(frame, (input_size, input_size))
        image_data = image_data / 255.
        image_data = image_data[np.newaxis, ...].astype(np.float32)
        start_time = time.time()

        if FLAGS.framework == 'tflite':
            interpreter.set_tensor(input_details[0]['index'], image_data)
            interpreter.invoke()
            pred = [interpreter.get_tensor(output_details[i]['index']) for i in range(len(output_details))]
            if FLAGS.model == 'yolov3' and FLAGS.tiny == True:
                boxes, pred_conf = filter_boxes(pred[1], pred[0], score_threshold=0.25,
                                                input_shape=tf.constant([input_size, input_size]))
            else:
                boxes, pred_conf = filter_boxes(pred[0], pred[1], score_threshold=0.25,
                                                input_shape=tf.constant([input_size, input_size]))
        else:
            batch_data = tf.constant(image_data)
            pred_bbox = infer(batch_data)
            for key, value in pred_bbox.items():
                boxes = value[:, :, 0:4]
                pred_conf = value[:, :, 4:]

        boxes, scores, classes, valid_detections = tf.image.combined_non_max_suppression(
            boxes=tf.reshape(boxes, (tf.shape(boxes)[0], -1, 1, 4)),
            scores=tf.reshape(
                pred_conf, (tf.shape(pred_conf)[0], -1, tf.shape(pred_conf)[-1])),
            max_output_size_per_class=50,
            max_total_size=50,
            iou_threshold=FLAGS.iou,
            score_threshold=FLAGS.score
        )
        pred_bbox = [boxes.numpy(), scores.numpy(), classes.numpy(), valid_detections.numpy()]
        image = utils.draw_bbox(frame, pred_bbox)
        fps = 1.0 / (time.time() - start_time)
        print("FPS: %.2f" % fps)
        result = np.asarray(image)
        cv2.namedWindow("result", cv2.WINDOW_AUTOSIZE)
        result = cv2.cvtColor(image, cv2.COLOR_RGB2BGR)

        if not FLAGS.dont_show:
            cv2.imshow("result", result)

        if FLAGS.output:
            out.write(result)
        if cv2.waitKey(1) & 0xFF == ord('q'): break
    cv2.destroyAllWindows()

if __name__ == '__main__':
    try:
        app.run(main)
    except SystemExit:
        pass
```