YANGON TECHNOLOGICAL UNIVERSITY
Department of Mechatronic Engineering

# Efficient foreground analysis for real-time surveillance & self driving cars using Transfer Learning

**Coding Report Presentation**

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# Coding Aspects

- Dataset Preparation & Adjustments
- Model configuration & Training
- Evaluation & Testing
- Additional Functions

# Dataset Preparation & Adjustments

| Version | Classes | Dataset Used | Number of Images |
|---|---|---|---|
| 1 | Person | Google's Open Images v4 | 4000 |
| 1 | Car | Google's Open Images v4 | 4000 |
| 2 | Person, Car | Google's Open Images v4 | 8000 |
| 3 | Person, Car, Bus | Ms Coco | 68338 |
| 4 | Person, Car, Bus, Truck, Bicycle, Motorcycle, Trishaw | Hybrid (Ms Coco + Custom) | 70948 |

Table 1 : Datasets used for different versions

# Dataset Preparation & Adjustments (Continued)

**Google OpenImages dataset v6 -**
https://storage.googleapis.com/openimages/web/index.html

**OIDv4 toolkit -**
https://github.com/EscVM/OIDv4_ToolKit

**Convert annotations -**
https://github.com/theAIGuysCode/OIDv4_ToolKit

# Dataset Preparation & Adjustments (Continued)

**MS COCO Dataset -**
https://cocodataset.org/#download

**YOLO Utils Github -**
https://github.com/holger-prause/yolo_utils

**Download bulk images from Google Images -**
https://www.pyimagesearch.com/2017/12/04/how-to-create-a-deep-learning-dataset-using-google-images/

**LabelImg -**
https://github.com/tzutalin/labelImg

# Model Configuration & Training

**Darknet Framework -**
https://github.com/AlexeyAB/darknet

**Colab Notebook Reference -**
https://colab.research.google.com/drive/1_GdoqCJWXsChrOiY8sZMr_zbr_fH-0Fg?usp=sharing

**Google Colab Notebook -**
https://colab.research.google.com/drive/18M_7jwlYi01yl6z8kHmI5OGASiY9l1JD?usp=sharing

**Mounted Google Drive -**
https://drive.google.com/drive/folders/1coAKIAE85UOPIqNcA6rq6A2f-Q-auFqs?usp=sharing

# Model Configuration & Training (Continued)

| Version | Number of classes | Number of Images | Number of max batches | Approximate Training Time |
|---|---|---|---|---|
| 1 | Person | 4000 | 4000 | 12 hours |
| 1 | Car | 4000 | 4000 | 12 hours |
| 2 | Person, Car | 8000 | 4000 | 24 hours |
| 3 | Person, Car, Bus | 68338 | 6000 | 48 hours |
| 4 | Person, Car, Bus, Truck, Bicycle, Motorcycle, Trishaw | 70948 | 14000 | 72 hours |

Table 2 :Training time for different versions

# Model Configuration & Training (Continued)

| Configuration parameter | Setting |
|---|---|
| Classes | 7 |
| Batches | 64 |
| Subdivisions | 32 |
| Max batches | 14000 |
| Augmentation type | mosaic |
| Learning rate | 0.001 |
| Randomize image size | True |
| Filters for Conv layers 138,149 & 160 | 36 |

Table 3 :Training configuration for final version

# Evaluation & Testing

| Class | Mean Average Precision (mAP) | TP | FP |
|---|---|---|---|
| Person | 69.31% | 117 | 40 |
| Car | 72.17% | 89 | 34 |
| Bus | 93.78% | 74 | 8 |
| Average | 78.42% | | |

Table 4 : Evaluation results for three class detector

# Evaluation & Testing (Continued)

| Class | Mean Average Precision (mAP) | TP | FP |
|---|---|---|---|
| Person | 79.00% | 20344 | 6846 |
| Car | 70.76% | 3050 | 1318 |
| Bus | 85.58% | 491 | 74 |
| Truck | 65.47% | 607 | 367 |
| Bicycle | 60.03% | 464 | 222 |
| Motorcycle | 75.05% | 587 | 164 |
| Trishaw | 72.64% | 88 | 26 |
| Average | 72.65% | | |

Table 5 : Evaluation results for seven class detector

# Evaluation & Testing (Continued)

Converting to tensorflow model for real time testing -
https://github.com/theAIGuysCode/tensorflow-yolov4-tflite

# Additional Functions

Counting Objects -
https://github.com/theAIGuysCode/yolov4-custom-functions

Object Tracking -
https://github.com/theAIGuysCode/yolov4-deepsort

# End

**Thank You For Your Attention.**