

Embedded Machine Learning Lab

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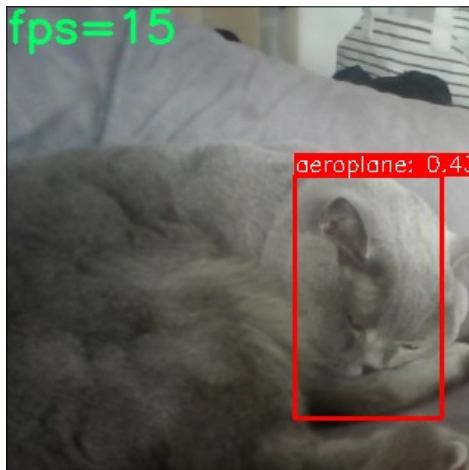
Data
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Data

More data

- Human Dataset ^a (17,300 images)
- Tiktok Dancing ^b (2615 images)

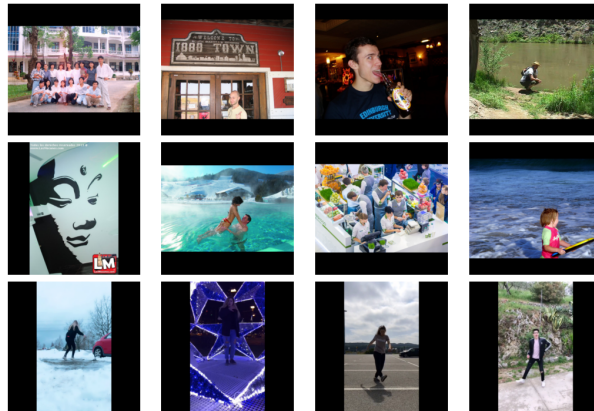
Data augmentation

- Albumentations^c library
- Rotation, flipping, contrast

^a<https://www.kaggle.com/datasets/fareselmenshawii/human-dataset>

^b<https://www.kaggle.com/datasets/tapakah68/segmentation-full-body-tiktok-dancing-dataset>

^c<https://albumentations.ai/>



Data

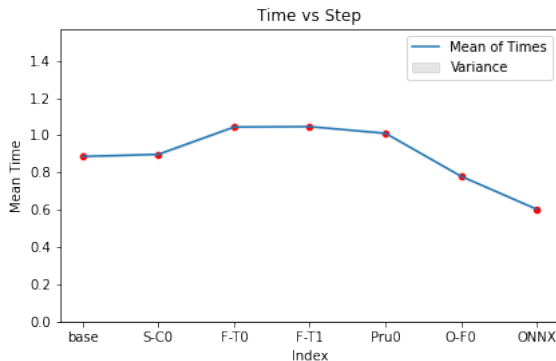
Adaptation and optimization

Integration and pipeline

Live demo

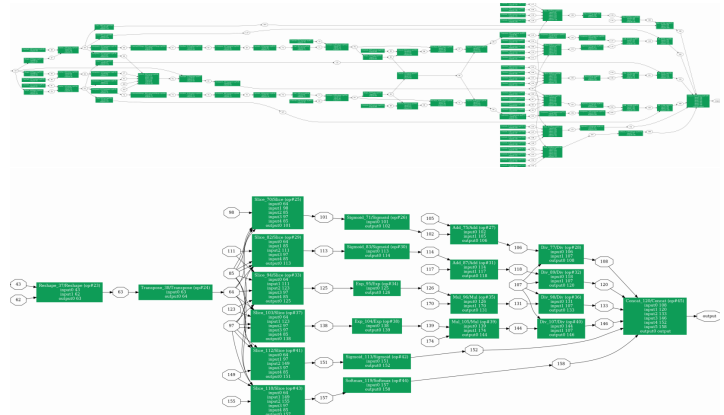
Adaptation and optimization

- Person-only-detection, fine-tuning
- Iterative pruning
- Batch norm optimization
- Inference



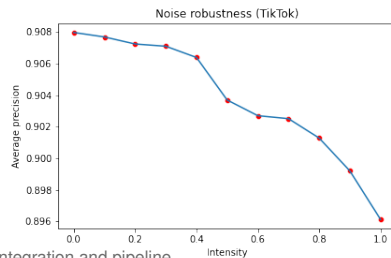
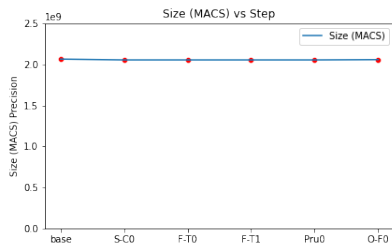
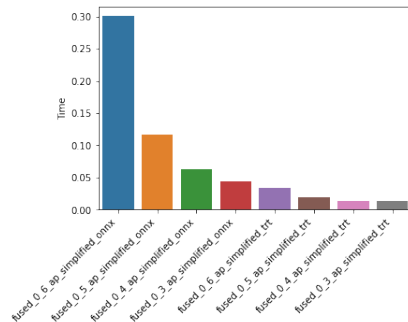
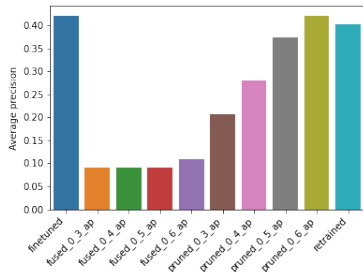
Inference

- ONNX
- TensorRT
 - TensorRT supports only a subset of ONNX spec
 - ReflectivePad → ConstantPad
 - Simplification of graph with `onnx-simplifier`^a



^a<https://github.com/daquexian/onnx-simplifier>

<https://github.com/daquexian/onnx-simplifier>



Adaptation and optimization

Integration and pipeline

Live demo

Detections



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Integration and pipeline

■ Configuration

- File containing steps and parameters
- Reproducibility
- Version control

■ Camera loop

- TensorRT for faster inference
- Avg. 20fps

```
1 --- !experiment
2 start_weights_path: "./weights/voc_pretrained.pt"
3 augment: True
4
5 steps:
6 - !strip_classes
7   finetune: true
8   finetune_epochs: 15
9 - !pruning
10   target_acc: 0.3
11   prune_ratio: 0.05
12   batch_size: 64
13   num_train_epochs: 10
14   num_eval_batches: 10
15 - !operator_fusion {}
16
```

Live Demo

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