Object Detection

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AIT Deep Learning | Spring 2021

Motivation

- Interested in the applications of object detection
- Generalized existing models
    - Wanted to provide more training data to make models specific

Process

LeNet-5

Detectron (Facebook)

YOLOv4

LeNet-5

- Started as binary image classifier
- Improved to multilabel classifier
- Balanced sample of 1200
- Predicting 4 classes:
  - “Car,” “Chair,” “Bottle,” “Book”
  - Very common in COCO dataset
    - Ample data to train on
- Fine tuning

YOLOv4

- Weights pretrained on COCO dataset
- Include more images from Google's Open Images Dataset for training
  - Classes: "Person," "Book," "Bottle," "Car," "Chair" (2500 images per class)
- Draw bounding boxes on new images to add to testing set
- Transfer learning
- Predict on our own images

	Car	Chair	Book	Bottle
GT	1	1	0	0
Sigm	0.42	0.35	0.2	0.17
Preds	1	0	0	0

$$Accuracy = \frac{TP + TN}{FP + FN + TP + TN}$$

$$Precision = \frac{TP}{FP + TP}$$

$$Recall = \frac{TP}{FN + TP}$$

$$F_1 = 2 \times \frac{Precision \times Recall}{Precision + Recall}$$

labelImg C:\Users\hampe\Desktop\Peti\AIT Deep Learning\custom dataset\IMG_0331.JPG

File Edit View Help

Open
Open Dir
Change Save Dir
Next Image
Prev Image
Save
PascalVOC
Create RectBox
Edit RectBox

Box Labels

difficult

Use default label

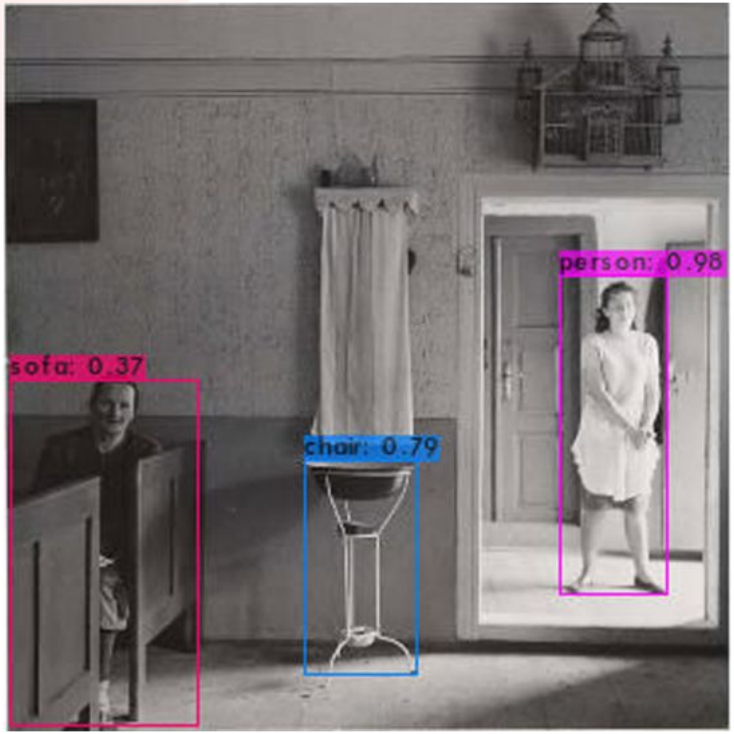
- bottle
- book
- car
- car
- car

File List | Box Labels

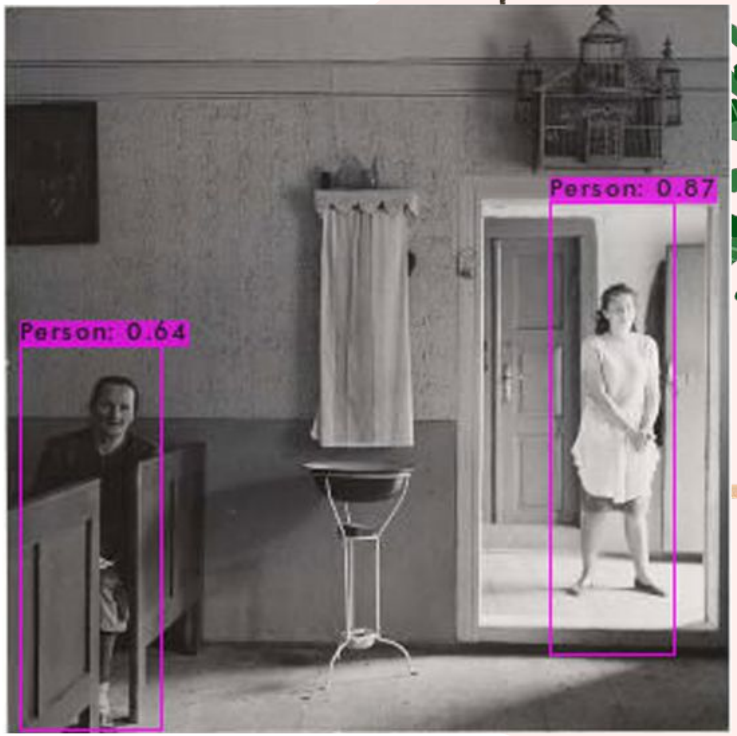
Click & drag to move shape 'book'

X: -162; Y: 20

Results



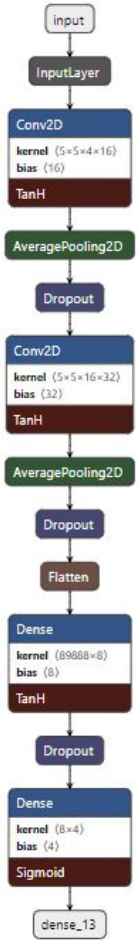
Prediction from baseline model
labeled a person as a sofa



Prediction from newly trained model
correctly identified the person

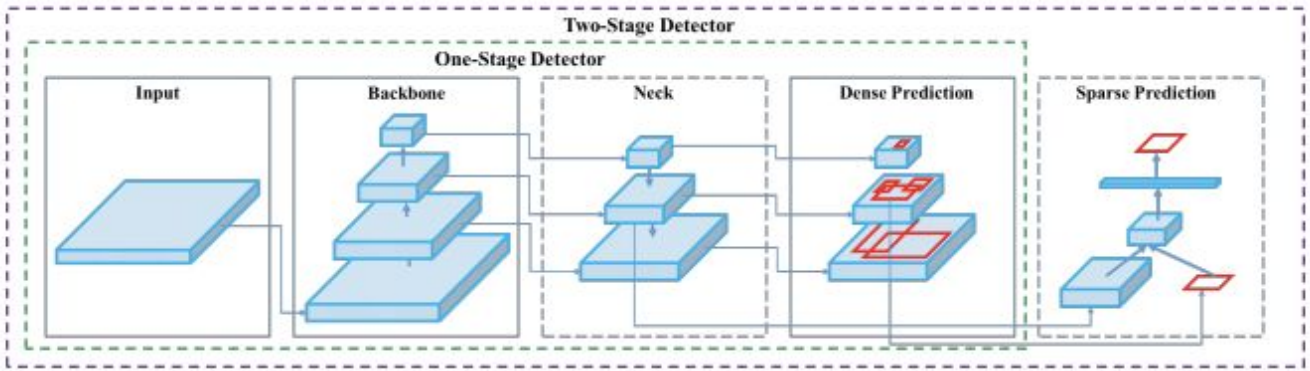
Results

	LeNet-5 (COCO)	**YOLOv4** (COCO + Open Images)
Accuracy	**0.32**	**0.41** (mAP@0.50)
Precision	0.26	0.38
Recall	0.26	0.62
F1	0.21	0.47



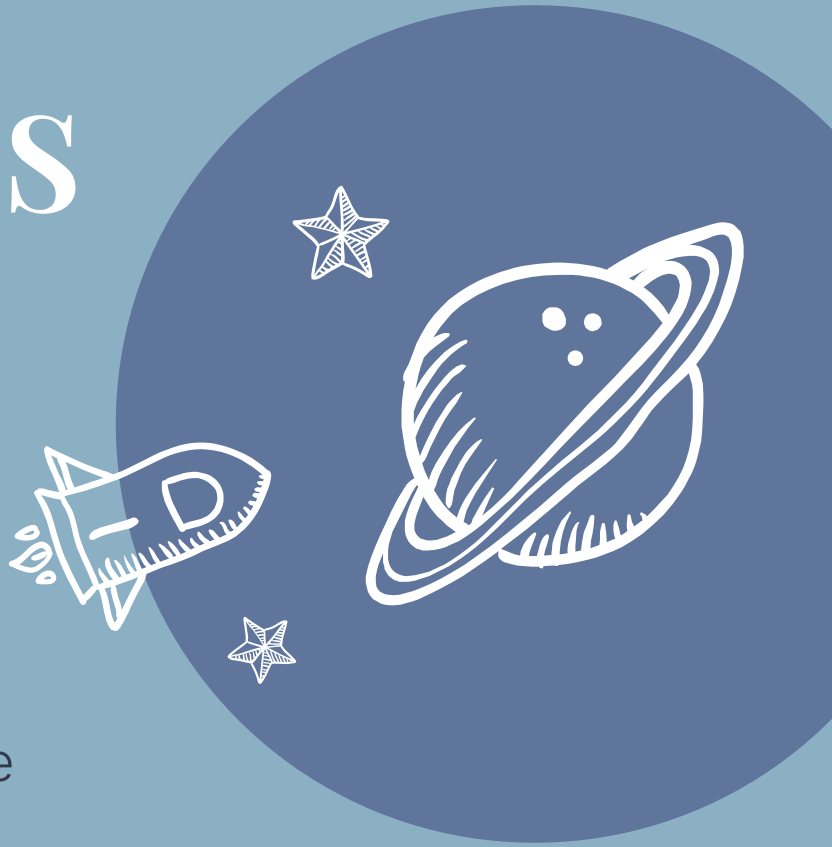
LeNet-5

YOLOv4



Applications

- Inventory
- Documentation for museum catalogues
- Population counting
- Extend to image segmentation
  - Cut out specific parts of image



AIT-BUDAPEST

Köszönöm!

Any questions?

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Credits

Special thanks to all the people who made and released these awesome resources for free:

- Fresh Folk illustrations by Leni Kauffman
- Presentation template by SlidesCarnival
- Photographs by Unsplash