Object Detection

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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

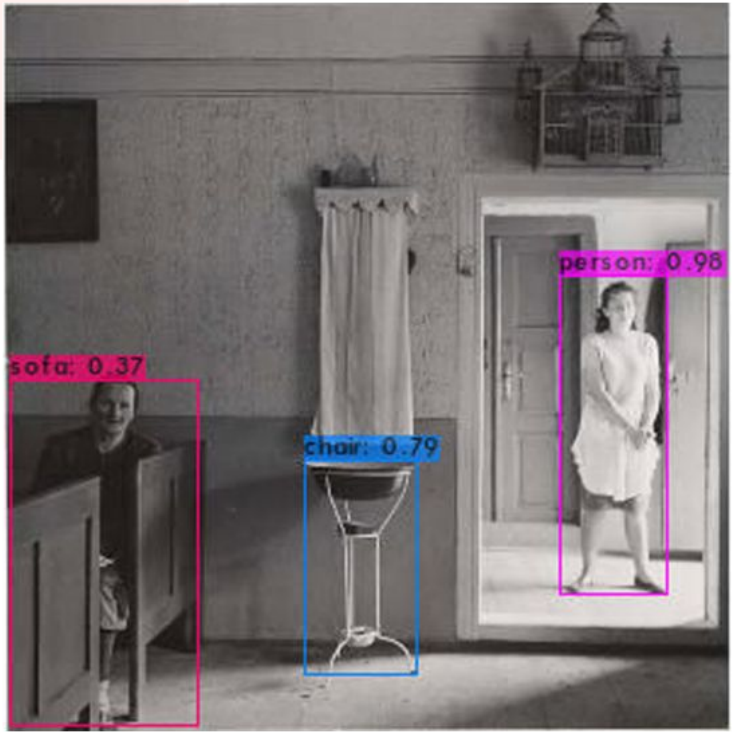
bottle
book
car
car
car

File List | Box Labels

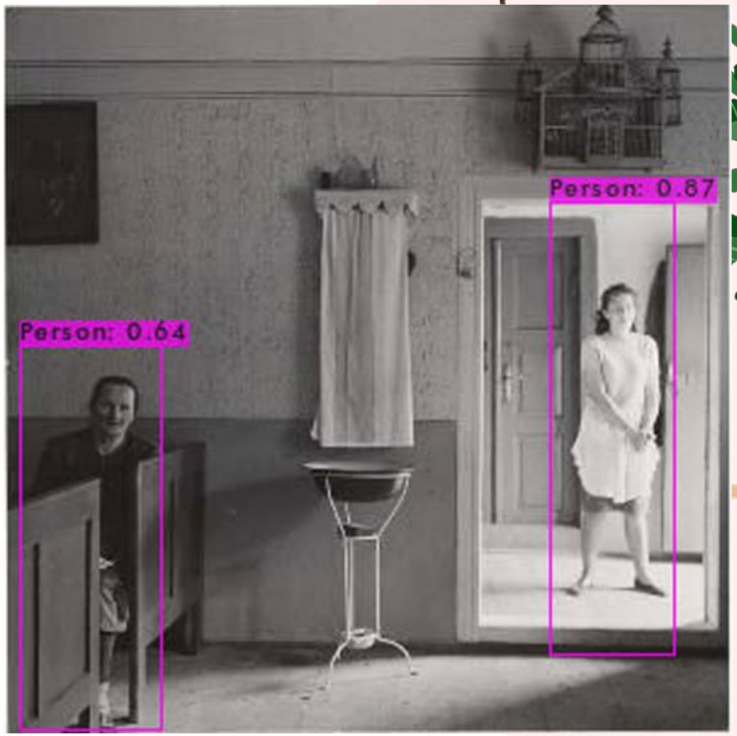
Click & drag to move shape 'book'

X: -162; Y: 20

Results



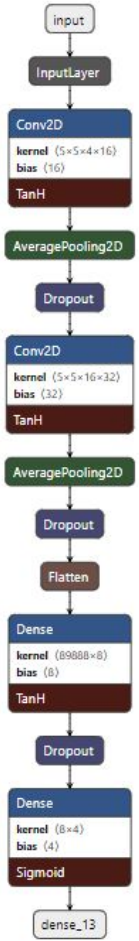
Prediction from baseline model
labeled a person as a sofa



Prediction from newly trained model
correctly identified the person

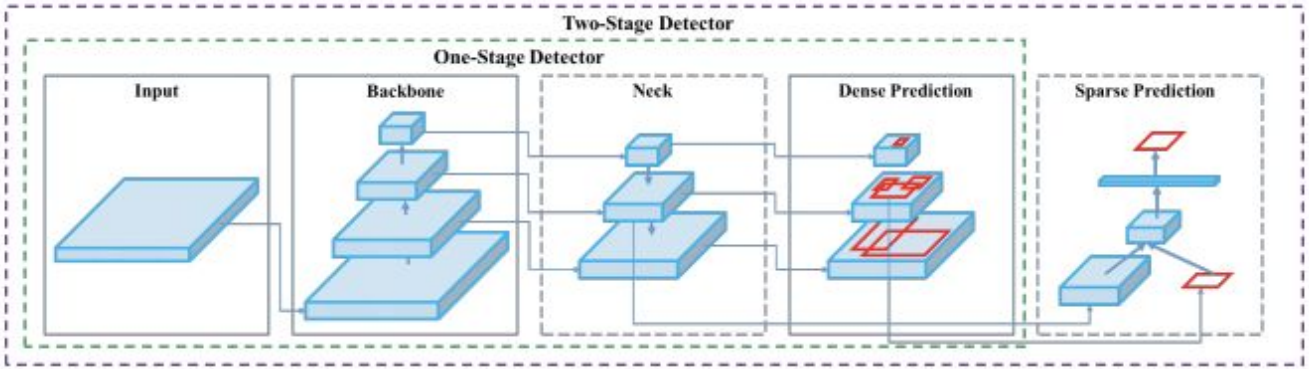
Results

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



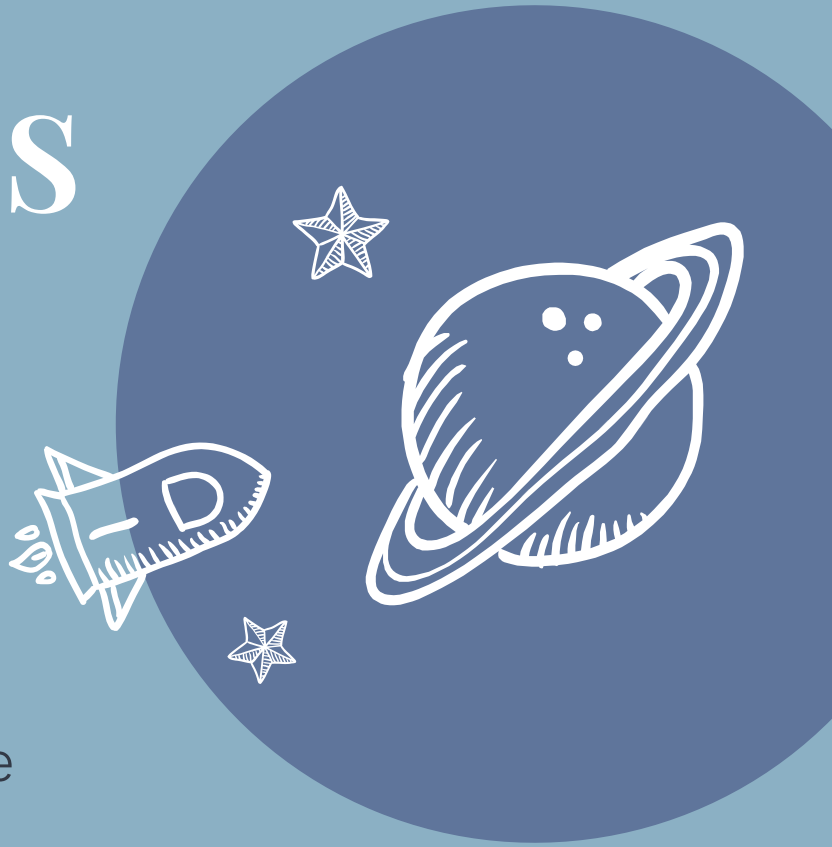
LeNet-5

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