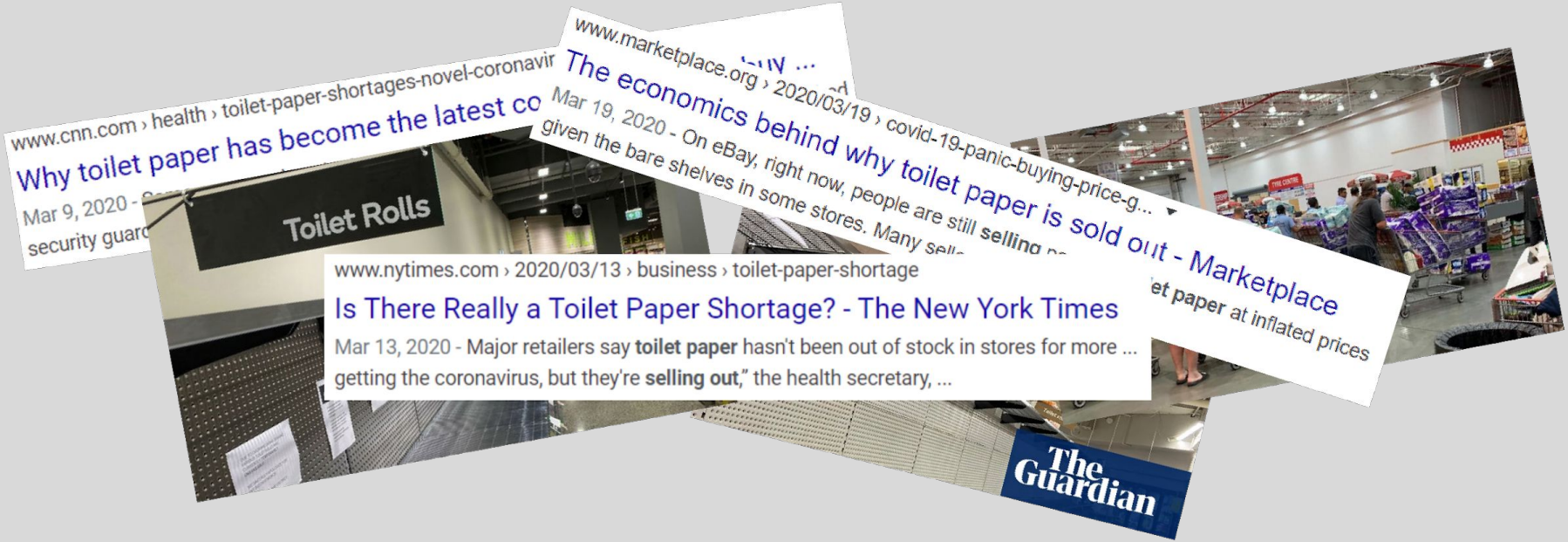
Finding Toilet Paper

Goal

- Find location of toilet paper in a picture



Data

- Images of toilet paper from Google images
- LabelImg for bounding boxes for each image

Image Augmentation

- Rotate
- Shift
- Zoom
- Flip

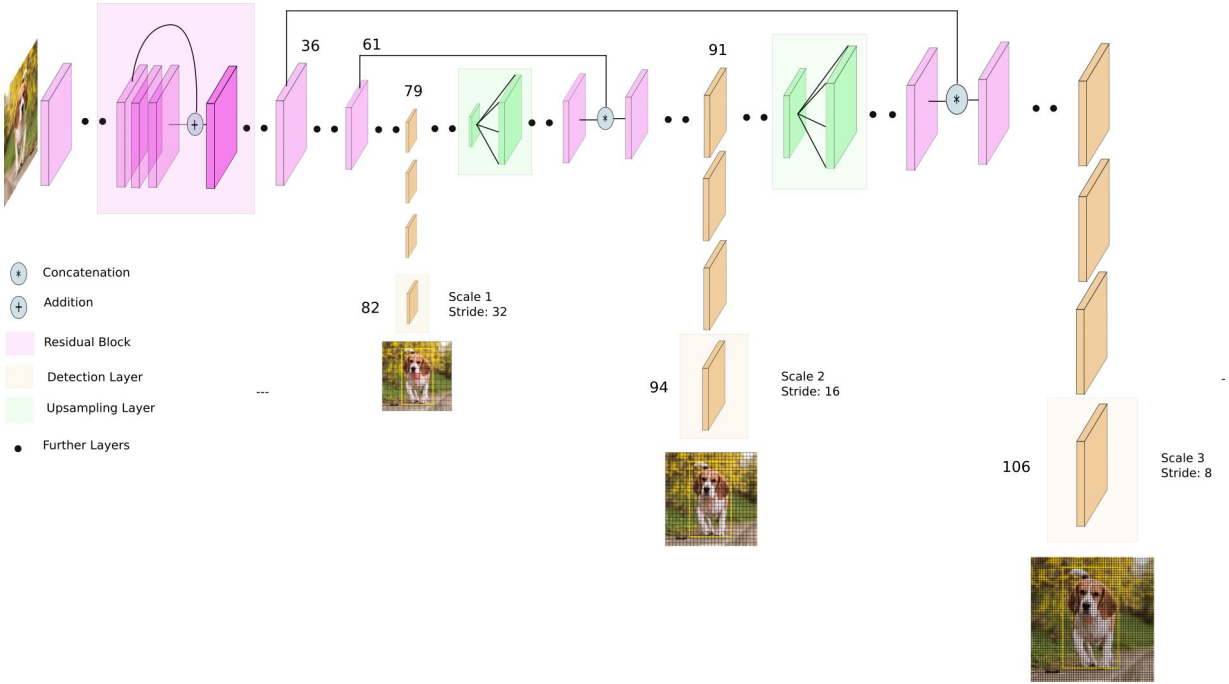
Tools

Architecture	Image Libraries	Programs
• YOLOv3 Architecture	• OpenCV • ImageAI	• LabelImg

The Model

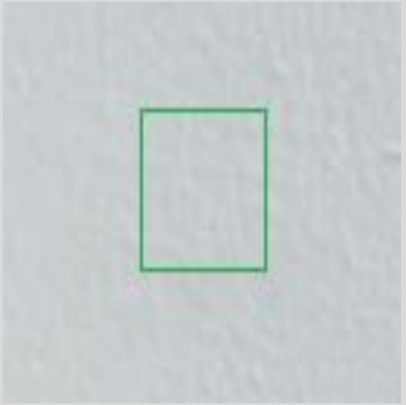
- 106 Layer Fully Convolutional Network

- Useful Outputs:
  - Bounding box values
  - Toilet paper probability



Evaluation

True Positive

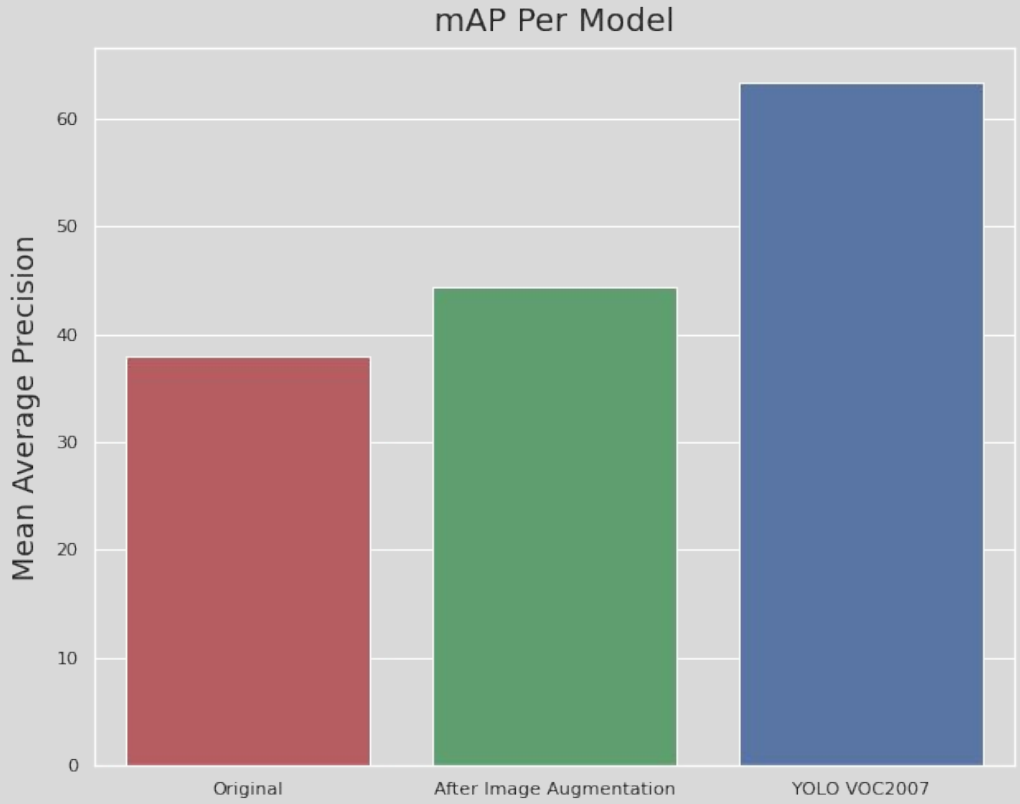


False Positive

False Negative

Evaluation

mAP = 38.01 → 44.35



Value from PASCAL Visual Object Classes Challenge 2007 (VOC 2007)

Test Examples

Test Examples With Image Augmentation

Conclusions & Improvements

- Can usually detect toilet paper
- May start overfitting

- Would improve with more data
- Can use higher resolution images

References

- https://towardsdatascience.com/yolo-v3-object-detection-53fb7d3bfe6b

- https://arxiv.org/pdf/1612.08242.pdf