Amenity Detection

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Project Idea

- The Idea is that Airbnb A Few Years ago create an Object Detection Model to Detect Amenities or like objects in an image so they can give better search results to their customer.
- So what I am trying to do is since it has been a few years later I am going to try and get a better model and overall better than Airbnb Model

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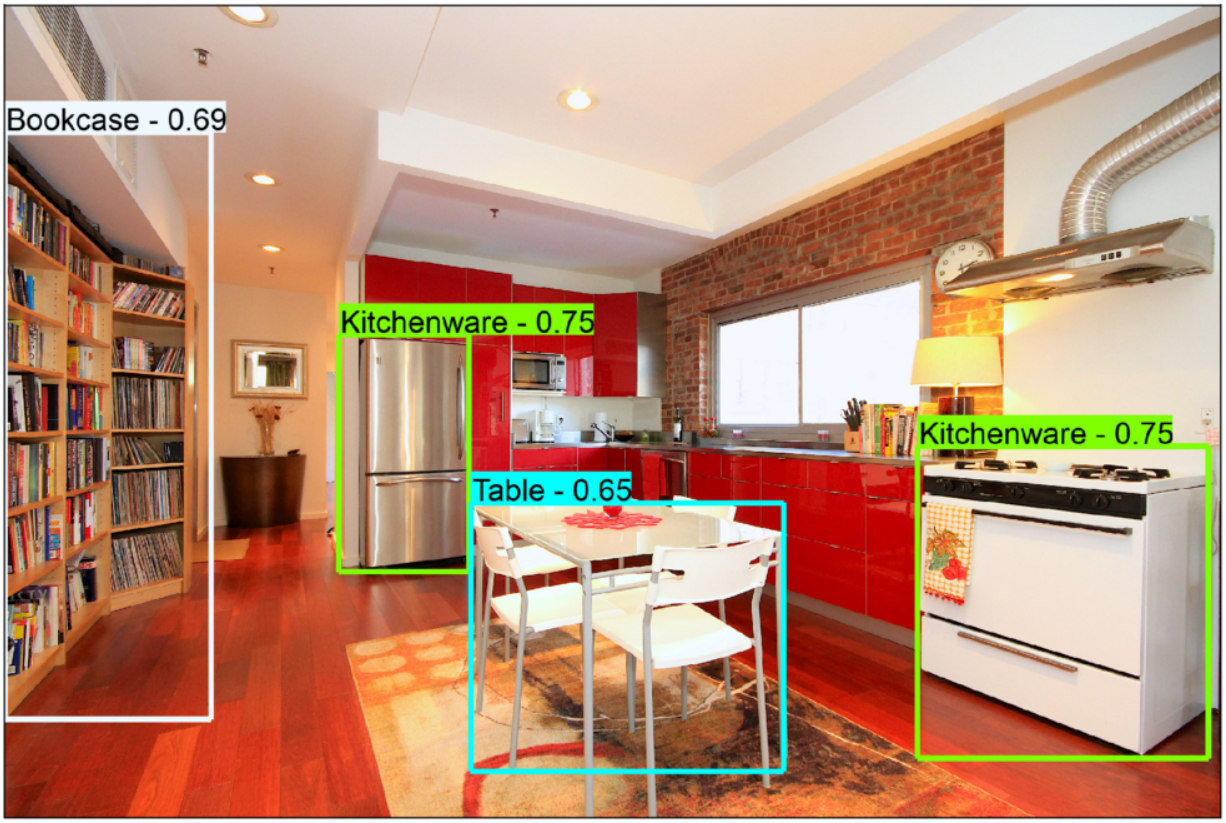
Why am I doing this Project?

- I want to do a long project so I am going to do data analytics more because I don't do any of that so I want to learn about data analytics and other stuff that section is below
- And Just for Fun, I haven't done something like this ever so I am excited.

Article Summary



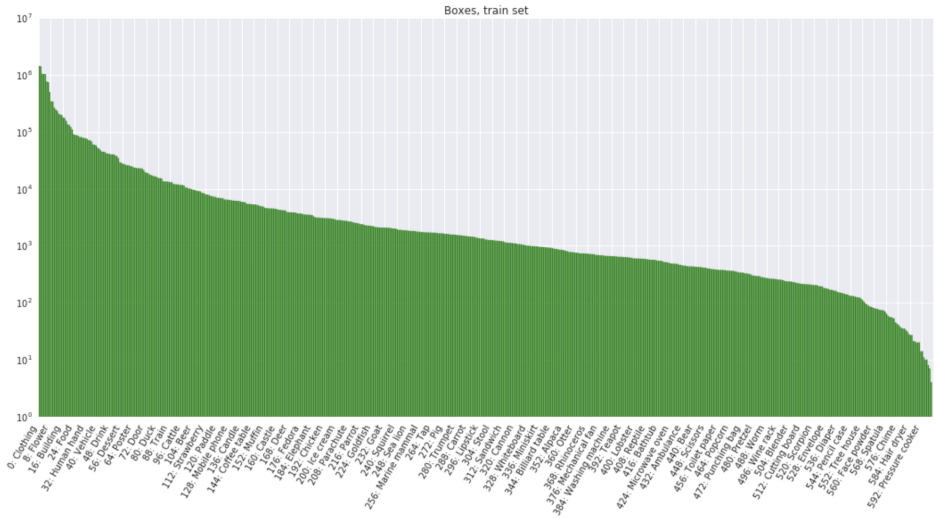
- The above is an example image that they tell that their models predicted.
  - So for the above Image, I want my model to get much better performance than it 🙂
- What Airbnb Tried
  - TensorFlow Detection Model Zoo

> models/research/object_detection at master · tensorflow/models
> Creating accurate machine learning models capable of localizing and identifying multiple objects in a single image remains a core challenge in computer vision. The TensorFlow Object Detection API is an open source
> https://github.com/tensorflow/models/tree/master/research/object_detection
>
> tensorflow/**models**
> Models and examples built with TensorFlow
> 739 Contributors · 1k Used by · 72k Stars · 45k Forks

  - Detectron Model Zoo

> Detectron/MODEL_ZOO.md at main · facebookresearch/Detectron
> This file documents a large collection of baselines trained with Detectron, primarily in late December 2017. We refer to these results as the 12_2017_baselines. All configurations for these baselines are located in the
> https://github.com/facebookresearch/Detectron/blob/main/MODEL_ZOO.md
>
> facebookresearch/**Detectron**
> FAIR's research platform for object detection research, implementing popular algorithms like Mask R-CNN and RetinaNet.
> 34 Contributors · 7 Used by · 25k Stars · 5k Forks

  - Small Note - They didn't use Detectron2 Which is the newer and the better version of detectron
  - Small Note - None of The Models Satisfied their Requirements
- Data Used



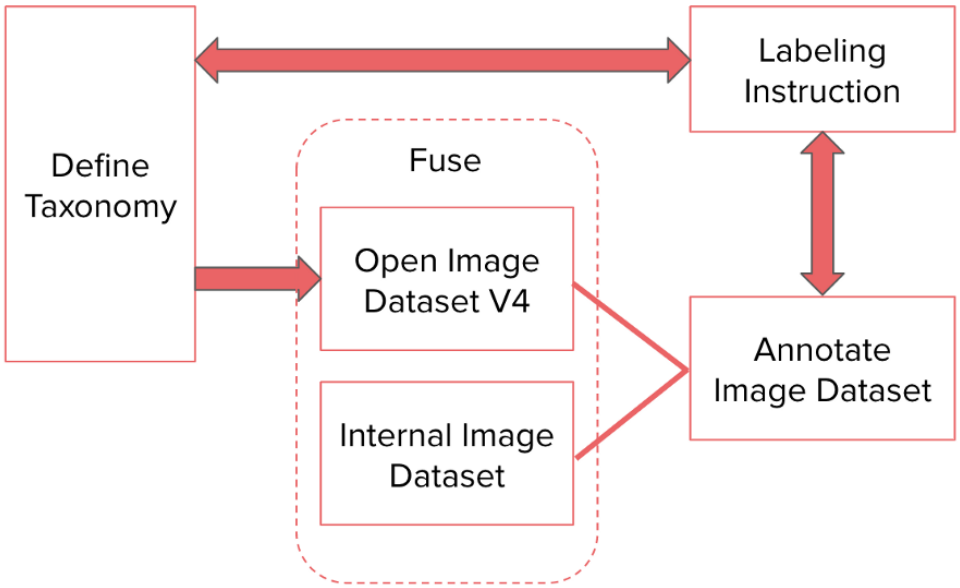
- Classes or Labels that they used (They mean Airbnb)
- They used Open Image V4

> Open Images V6
>
> 15,851,536 boxes on 600 categories 2,785,498 instance segmentations on 350 categories 3,284,280 relationship annotations on 1,466 relationships 675,155 localized narratives 59,919,574 image-level labels on 19,957 categories Extension - 478,000 crowdsourced images with 6,000+ categories
>
> https://storage.googleapis.com/openimages/web/index.html

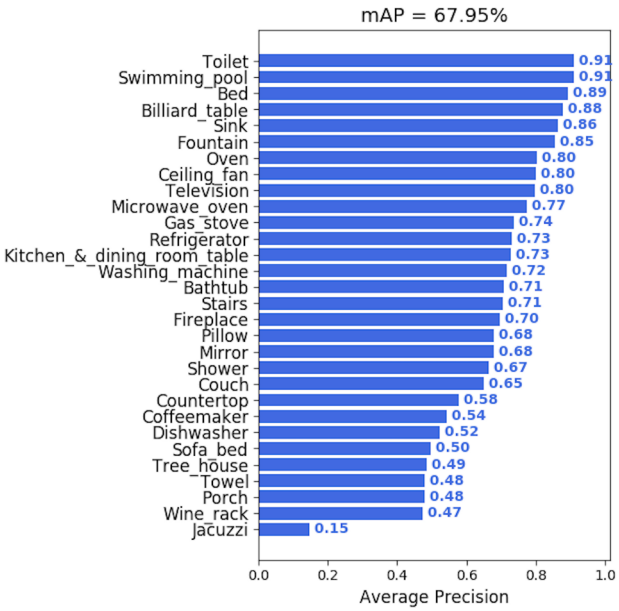
  - Structure of Open Images

> Flare Dendrogram
>
> https://storage.googleapis.com/openimages/2018_04/bbox_labels_600_hierarchy_visualizer/circle.html

- They used 40 classes
- They had a total of 100K images !!
  - And 50K was from Open Images or They annotated the data
- Average of 1.2K of Images Per Class or Label
- They used google data labeling service
  1. It supports up to 100 Labels for Labelling
  2. A Clean and Good UI



    - How Airbnb Created their DataSet
    - 43K Internal 32K Public
- Model Training
    - faster_rcnn_inception_resnet_v2 *and ssd_mobilenet_v2 was the fastest but accuracy*
    - The Metric They Care about is mAP or mean Average Precision
        - *ssd_mobilenet_v2 got over 54% map*
    - They did some feature extraction
    - The target of mAP was at least 50%
    - Because all of the custom models was not working they had to use Google AutoML
        - In which they cant download the data
        - They got 68% mAP in 7.5K test images

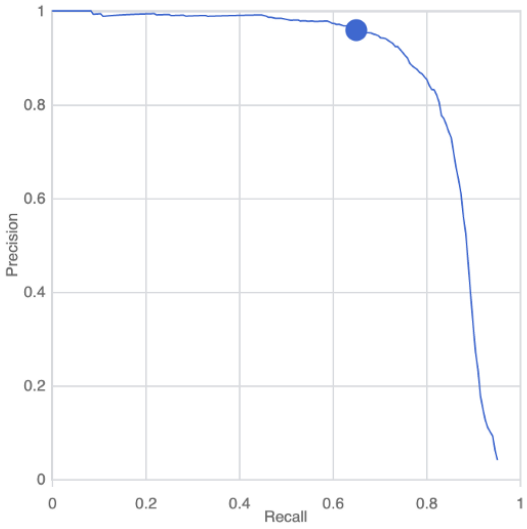


Bed

Score threshold 0.90

IoU threshold 0.50

Total images	1,369
Total objects	1,538
Object to image avg	1.123
Precision	95.9%
Recall	65.1%



The target of this Project (Goals)

- Not Spend Money
  - Run all of the models and everything locally
    - GPU - RTX 3060
    - RAM - 32GB
    - CPU = Ryzen 5 3600
    - Motherboard - MSI B450

- Get over 50% mAP at least or get more performance than 68% mAP which is what Airbnb Got in their Google Auto-ml
- Host the App
- Create an API
- Cost-Effective and Better Performance than Airbnb

What I want to learn

- Streamlit
- Detectron2
- Ray Tune
- Debugging
- Metrics
- More In-depth
- PyTorch Object Detection Maybe
- Data Analytics
  - Seaborn
  - Matplotlib
- preprocessing Methods
  - Normalization
  - Taxonomy
- File Structure
- Take more Time for the Data Analytics

To-do List

- [ ] Download the Open Images dataset
- [ ] Data Analytics

  First Create Sub-samples of the data

  Then Train a model then check its performance

  Then Try another Way

    And I need to try all of the preprocessing methods I can find
- [ ] Creating the Final Data Set with the best methods I could find
- [ ] Parameter Tuning of the Models
- [ ] Repeat until the results are good
- [ ] Conclusion

Resources

Name	Tags	Url
Airbnb Original Article	post tutorial	https://medium.com/airbnb-engineering/amenity-detection-and-beyond-new-frontiers-o 144a4441b72e
Open Images	data	https://storage.googleapis.com/openimages/web/index.html
Detectron2 Tutorial	tutorial	
Detectron2 Models	tutorial	https://github.com/facebookresearch/detectron2/tree/main/configs/COCO-Detection
Streamlit	hosting	https://streamlit.io/
Hosting Streamlit	hosting	https://www.heroku.com/
Flask	hosting	https://flask.palletsprojects.com/en/2.0.x/
How to speed up detection in Detectron2	tutorial	https://medium.com/analytics-vidhya/how-to-speed-up-detection-in-detectron2-263e9e
Training on Detectron2 with a Validation set, and plot loss on it to avoid overfitting	tutorial	https://ortegatron.medium.com/training-on-detectron2-with-a-validation-set-and-plo 6449418fbf4e
Active Learning using Detectron2	tutorial	https://towardsdatascience.com/active-learning-using-detectron2-922a13982564
Yolo	other tutorial	https://pytorch.org/hub/ultralytics_yolov5/
Gluon	tutorial	https://cv.gluon.ai/
imageai	other tutorial	https://imageai.readthedocs.io/en/latest/#:~:text=ImageAI%20is%20a%20python%20libr
Metrics	tutorial	https://analyticsindiamag.com/5-object-detection-evaluation-metrics-that-data-scie
Metrics	tutorial	https://towardsdatascience.com/on-object-detection-metrics-with-worked-example-216
Metrics	tutorial	https://knowledge.dataiku.com/latest/courses/intro-to-ml/predictive-modeling/model
Detectron2 Docs	data tutorial	https://detectron2.readthedocs.io/en/latest/
Models	tutorial	https://github.com/facebookresearch/detectron2/blob/main/MODEL_ZOO.md
Models	tutorial	https://github.com/facebookresearch/detectron2/tree/main/detectron2
PreProccessing	tutorial	https://prince-canuma.medium.com/image-pre-processing-c1aec0be3edf
PreProccessing	tutorial	https://towardsdatascience.com/how-to-prepare-data-for-object-detection-34750c4d00

Blog / Tracking

Oct 26 2021