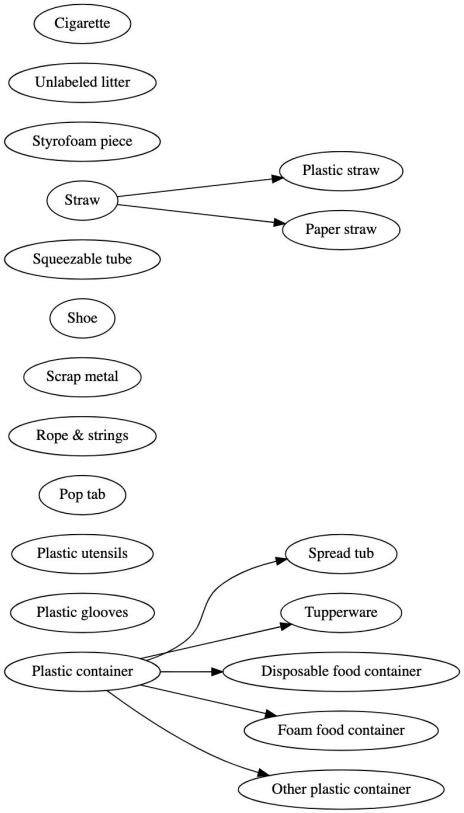
A Simple Solution to garbage detection & classification.

Project goal



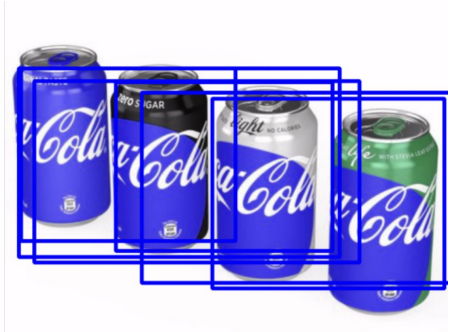
A snapshot of the categories

- Boundary/Object detection
- Garbage type classification

What we did to try and achieve the goal

Alpha Garbage

- **RetinaNet**
  - Boundary detection
  - Bad performance when garbage are gathered/ covered
  - Slow to train
- MobileNetV2
- ViT



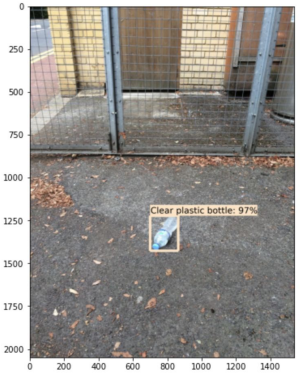
What we did to try and achieve the goal

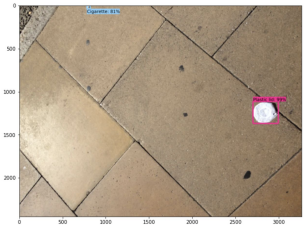
Alpha Garbage

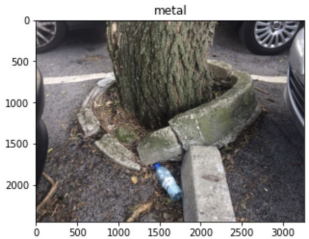
- RetinaNet

- **MobileNetV2**
  - Leveraged from `ssd_mobilenet_v2_coco`
  - Fine-tuned the last layer to TACO dataset
  - Perform bad for garbages combined with fresh foods

- **ViT**
  - Leveraged from `google/vit-base-patch16-224-in21k`
  - Fine-tuned with the garbage classes dataset
  - Proform bad for complex backgrounds







Performance metrics

Alpha Garbage

	MobileNetV2	ViT
Accuracy	92%	95.6%

What went well

- There are powerful models that we can leverage transfer learning
- ViT is pretty fast and simple for fine-tuning

Didn’t go well

- Some of the categories do not exist in pre-built model, so we did a mapping to make it fit
- RetinaNet and MobileNetV2 are slow, hard to tune hyperparameters
- ViT can not be used to detect the objects

Possible improvements

Alpha Garbage

Overall level:

- More garbage class type
- More accurate boundary detection

Model level:

- RetinaNet is sensitive to learning rate, using lr_scheduler to control learning rate
- More hyperparameter tuning

Thank You!