

Spare-it

Created by Mustafa Taibah, Jason Oh, Tessa Wu

Client: Laurent Meunier

16,000

Disposable cups
per second



Less than 5%
ultimately recycled

Source: Gitnux, Jannik Lindner

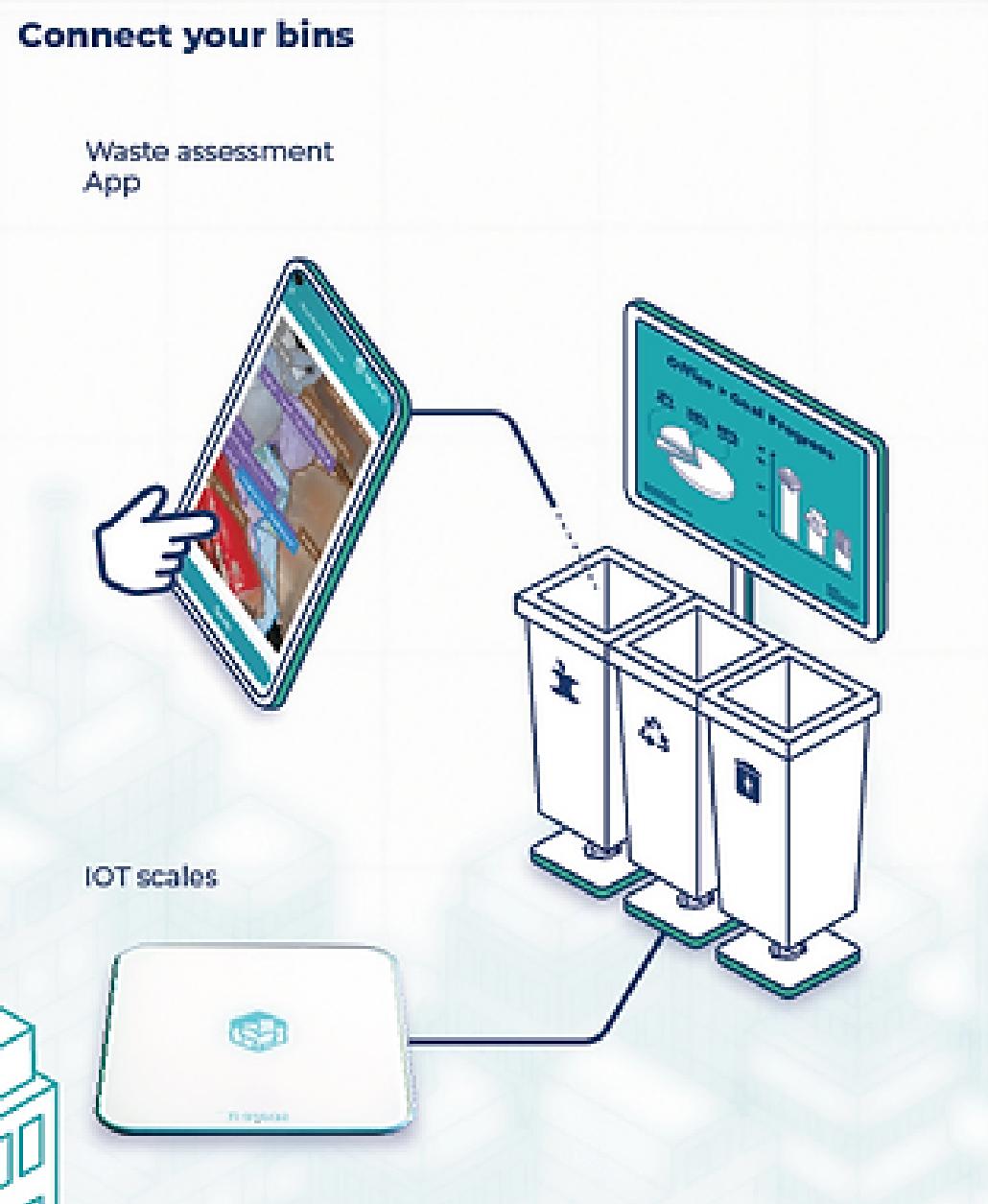
Problem statement

- 2 cubic feet of CO₂ for each cup
 - Boston Red Sox stadium
- This is only for the cups...

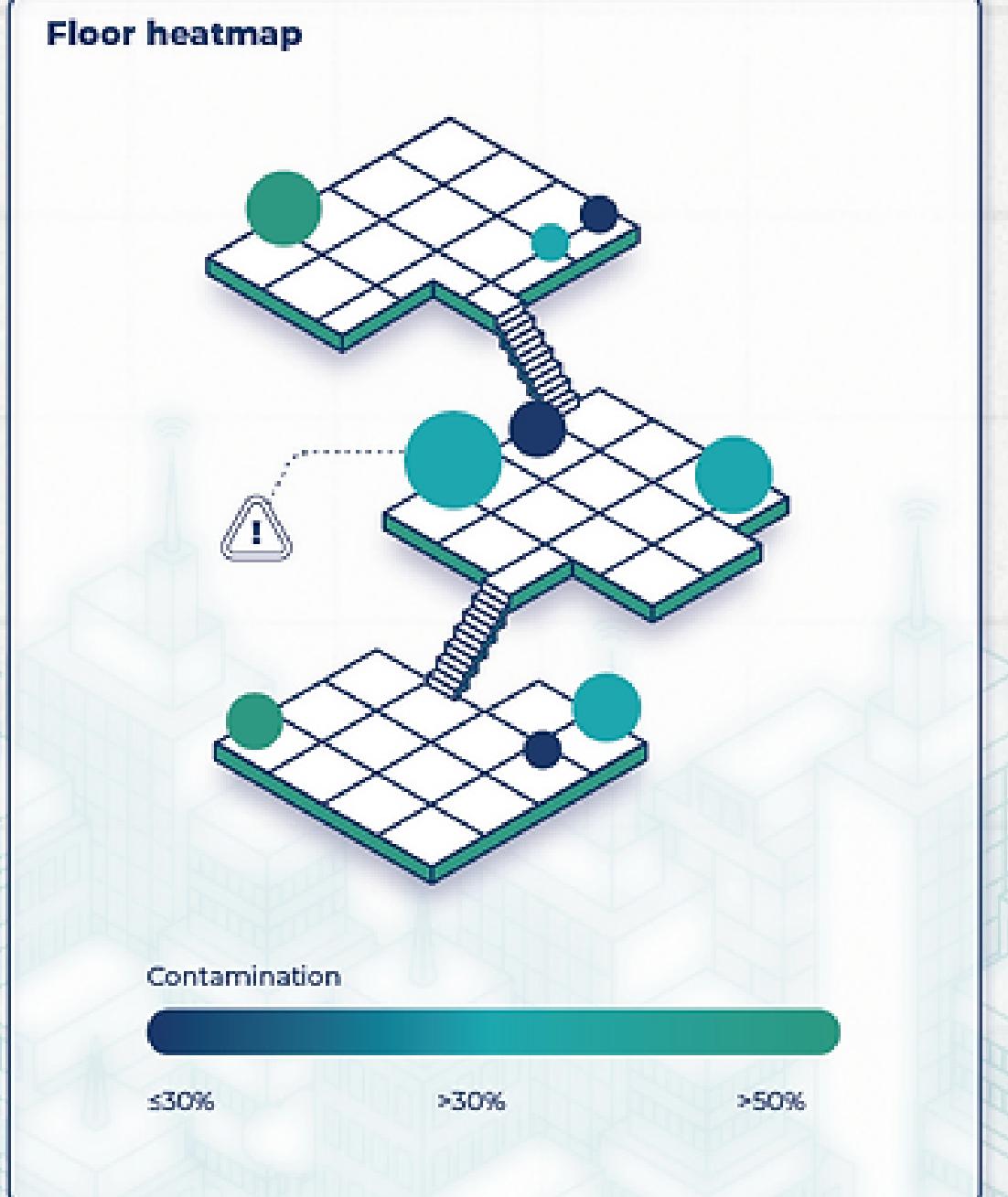


Waste Intelligence Platform

Monitor



Discover



Transform



Datasets

1	Paper Cup	1	Complex - Trash	   
2	Snack or Candy Bag or Wrapper	2	Complex - Trash	 
3	Wipe	4	Complex - Trash	
4	Wax Paper	5	Complex - Trash	
5	Latex Gloves	6	Complex - Trash	
6	Juice or Other Pouch	7	Complex - Trash	  
7	Diaper	8	Complex - Trash	 
8	Padded Envelope (mixed materials)	9	Complex - Trash	
9	Blister Pack	10	Complex - Trash	
10	Plastic strapping	36	Complex - Trash	
11	Pens and Pencils	11	Complex - Trash	
12	Miscellaneous Office Supplies	14	Complex - Trash	
13	Facemask and Other PPE	15	Complex - Trash	
14	Shelf Stable Carton	16	Complex - Trash	
15	Soiled Plastic	17	Complex - Trash	  
16	Soiled Metal	18	Complex - Trash	  
17	Soiled Glass	19	Complex - Trash	  
18	Ceramics	115	Complex - Trash	
19	Unclassifiable	114	Complex - Trash	
20	Filled Bag	116	Complex - Trash	
21	Coffee Pod	117	Complex - Trash	
22	Other Trash	122	Complex - Trash	
23	Flexible container lid / seal	123	Complex - Trash	
24	Snack Food Canister	124	Complex - Trash	
25	Hard Cover Books	127	Complex - Trash	 
26	Compostable Fiber Ware	20	Compostables	 



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```

EDA

Total number of files in the directory: 6253

Number of .json files in the folder: 2024

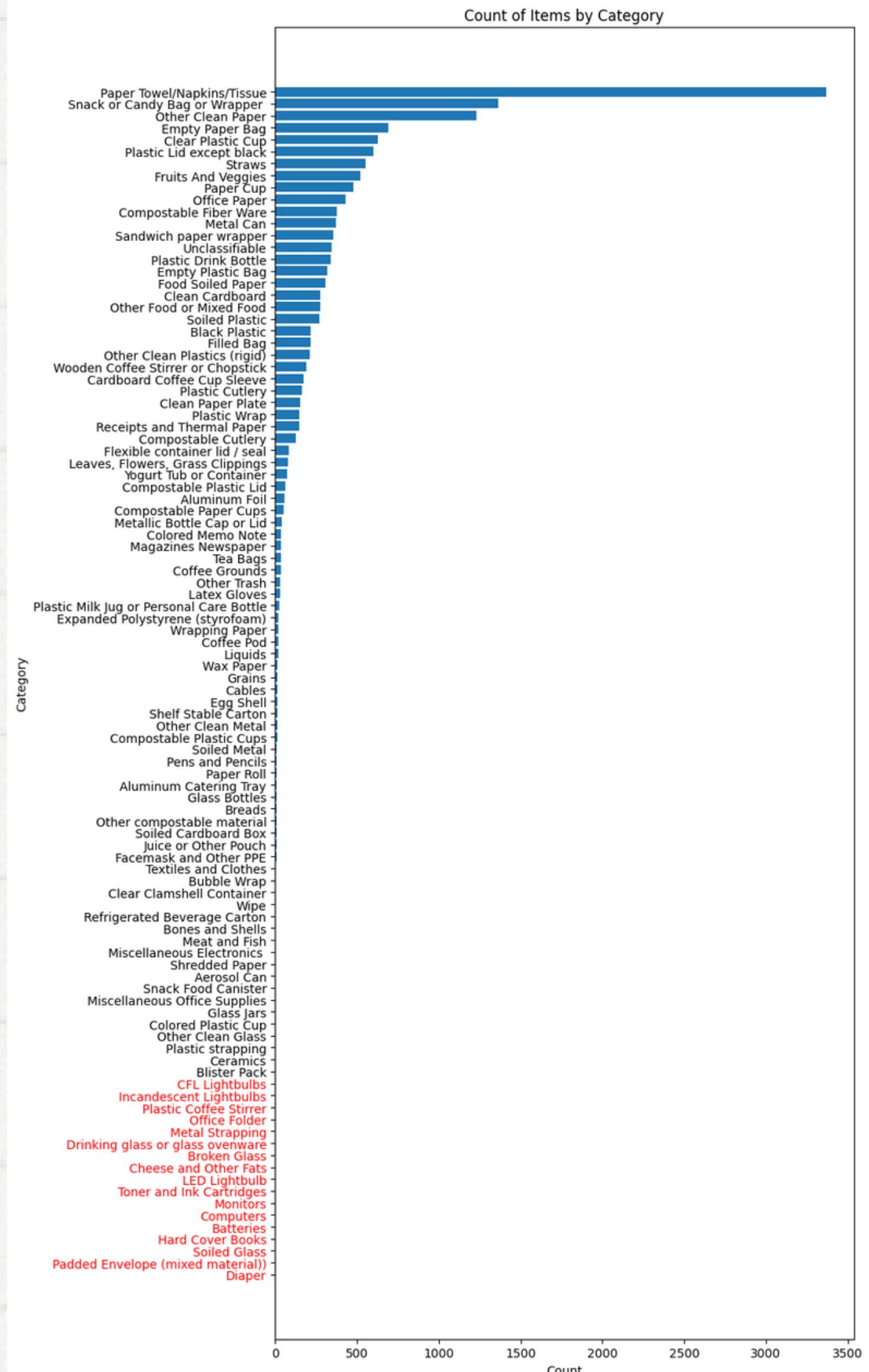
Number of image files in the folder: 4228

+

Spare-it Labeling Reference Table.doc

Class imbalance

Red items - 0 occurrence



EDA

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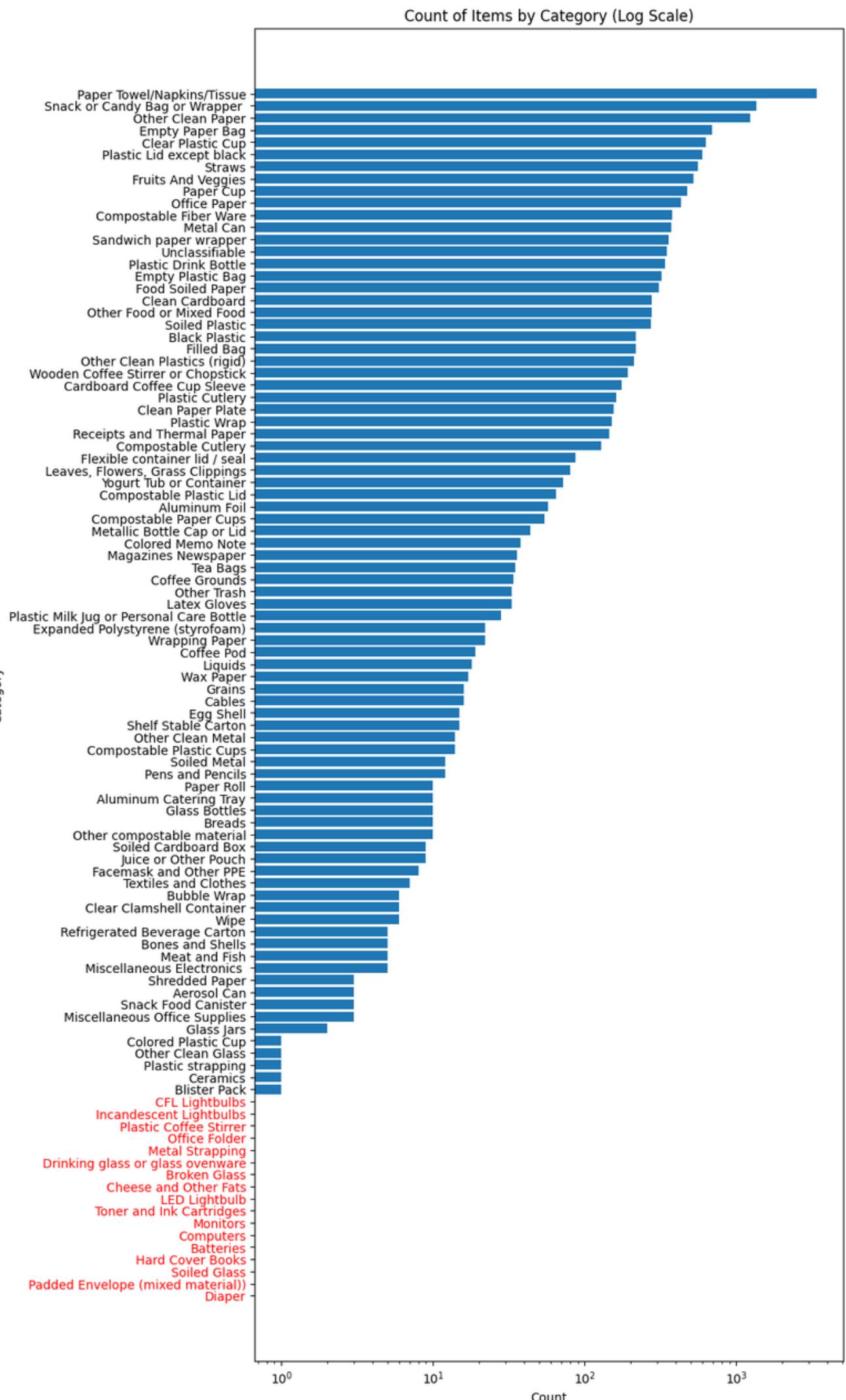
Number of image files in the folder: 4228

+

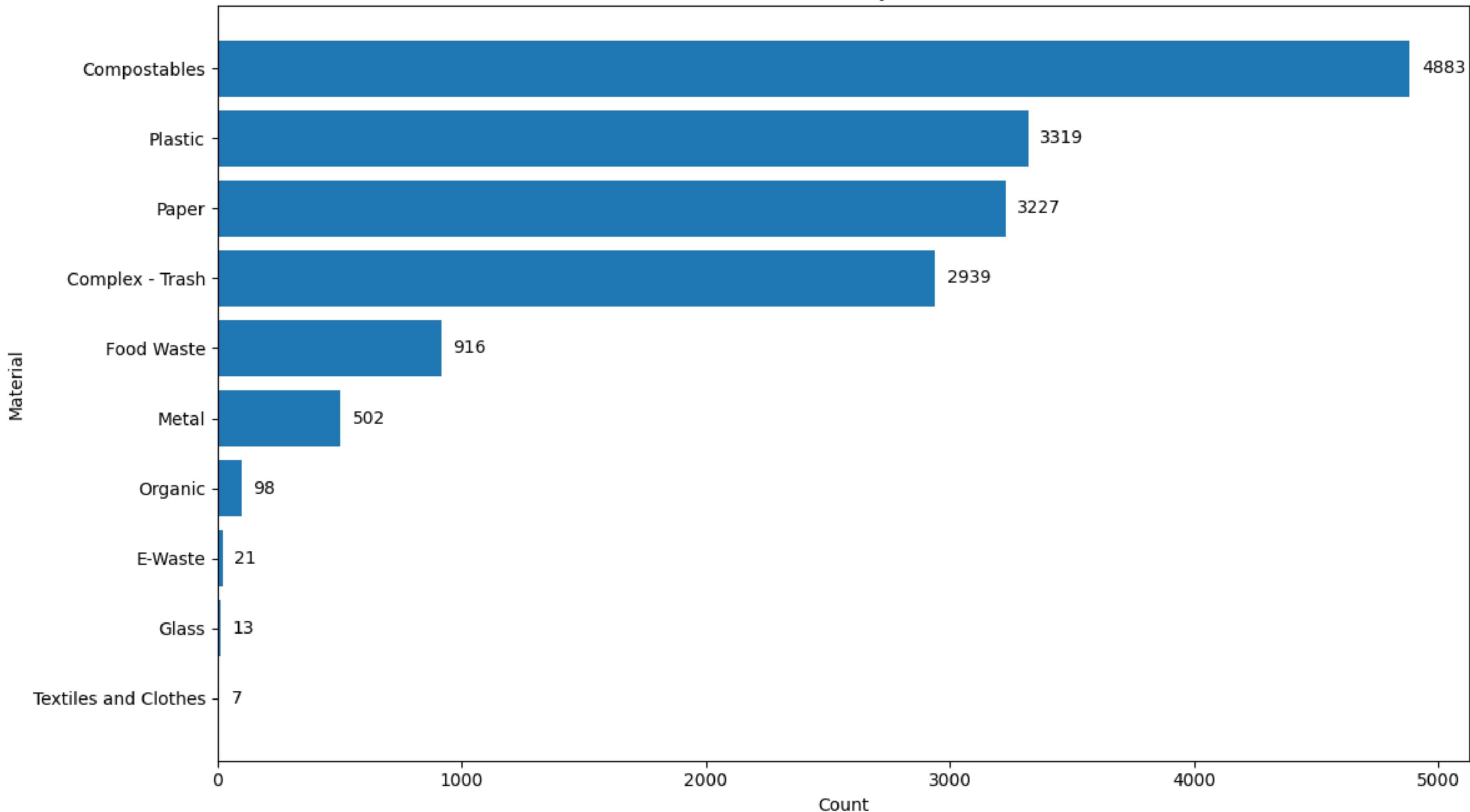
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Count of Items by Material



ML Task to Attempt



Objective : Develop an object detection model for waste identification and classification.

YOLO deep learning model can distinguish similar plastics like PET and PET-G accuracy exceeding 91.7%

EfficientNet-BO demonstrated effective waste classification with an accuracy range of 74% to 84% in top-1 over the ImageNet dataset.

Data Augmentation + YOLO_EC: Achieves top performance in waste detection on the HPU_WASTE dataset through optimized DCGAN and an improved YOLOv4 framework.

Models & Repos

Open Source Models

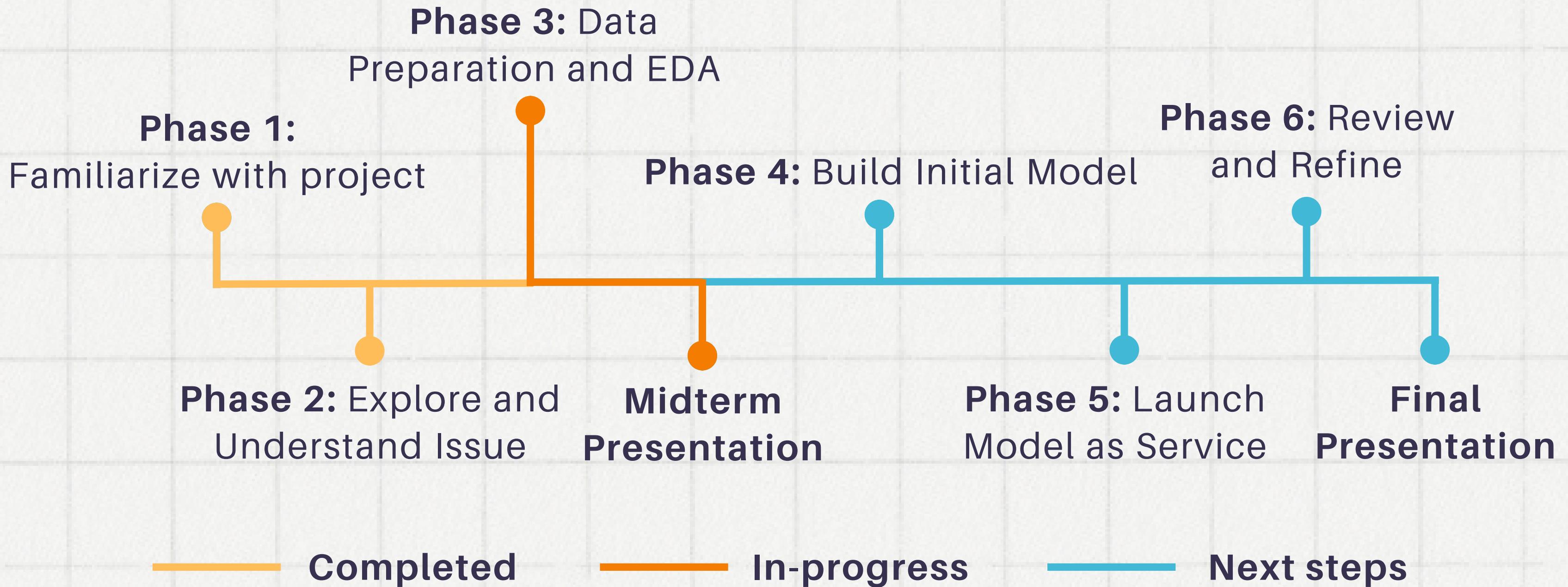
- YOLOv8
- ResNet 152 for Waste Classification

Extra Datasets

- TACO (Trash Annotations in Context)
- Litterati



Milestones & Timeline



Future Works

01.

Implementing YoloV8

02.

Addressing Class Imbalance

03.

Data Augmentation

04.

Expanding Dataset /
Continuous Improvement

Thank you!

github.com/BU-Spark/ml-spare-it-contamination