Litter Log

Artem Lebedev, Nick Johnson, Evelyn Li, Lily Magliente

Montco Today

Introduction

- Pollution is omnipresent and recycling efforts have failed
- There is a disconnect between the intent to recycle and properly recycling items
- Can we identify the brands that are most often polluted to incentivize and rally for a positive change?
- Open Litter Map is an open source, interactive, and accessible database of the world's litter and plastic pollution

What We Do

1. Conduct Logo Recognition

Powered by Machine Learning methods and Classification Models

2. Collect and compile outputs for insight from model

Leverage model outputs to encourage consumers and companies to make informed purchasing and business decisions.

Our Mission

1. Empower consumers' purchasing decisions

2. Empower companies with insights for business

The Problem

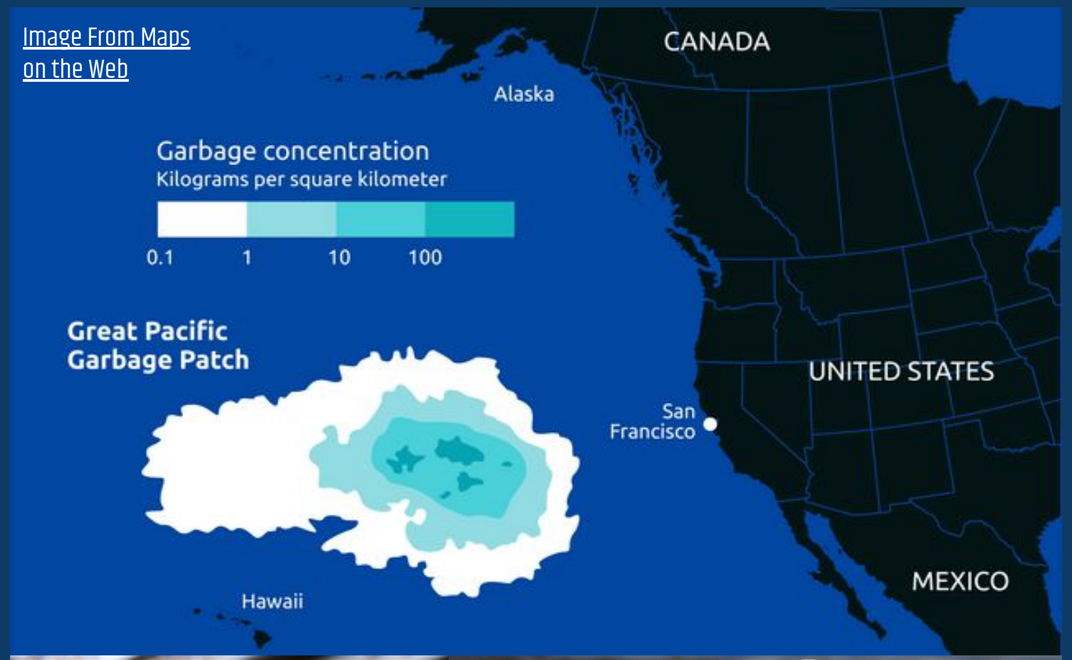


Image From Maps on the Web

Image from Environmental Working Group

Image from International Bird Rescue

The Users

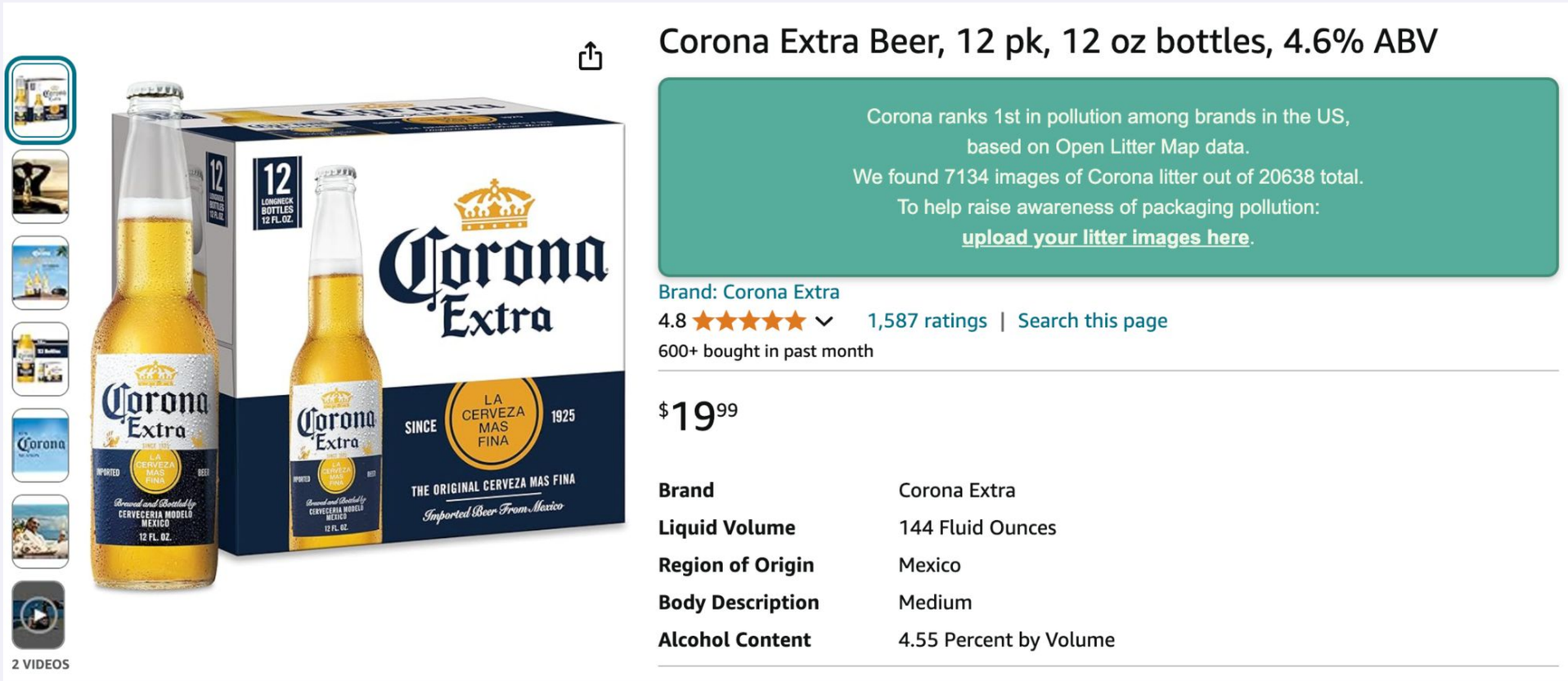
Images from Oppen Litter Map

“These insights would be extremely valuable to OpenLitterMap users”

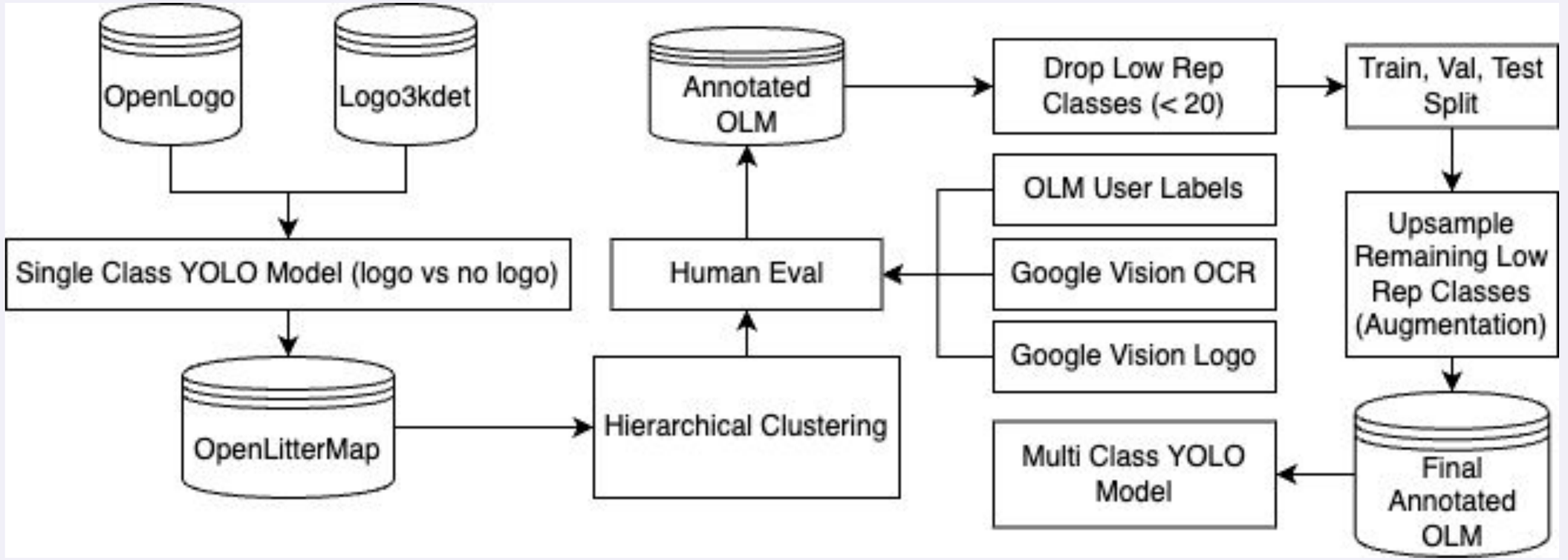
Sean Lynch, founder of OpenLitterMap

Product Demo

[Demo Link]
[Demo Video]



Technical Approach - Data



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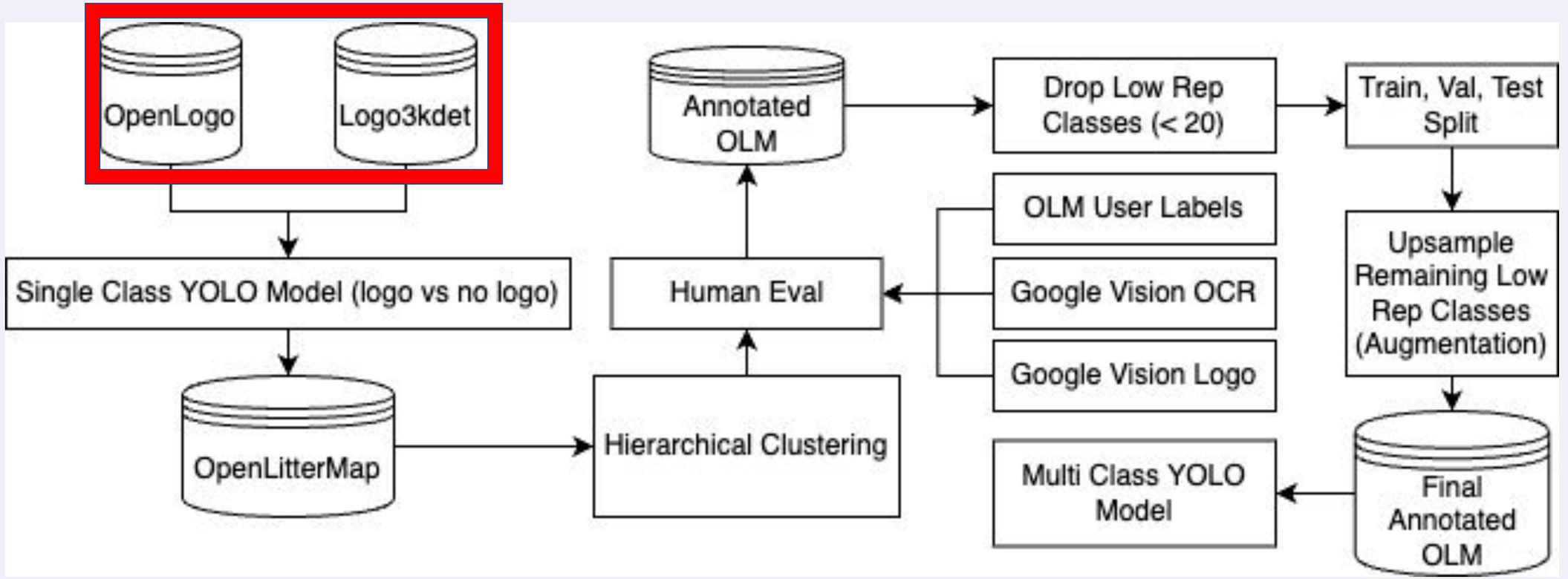

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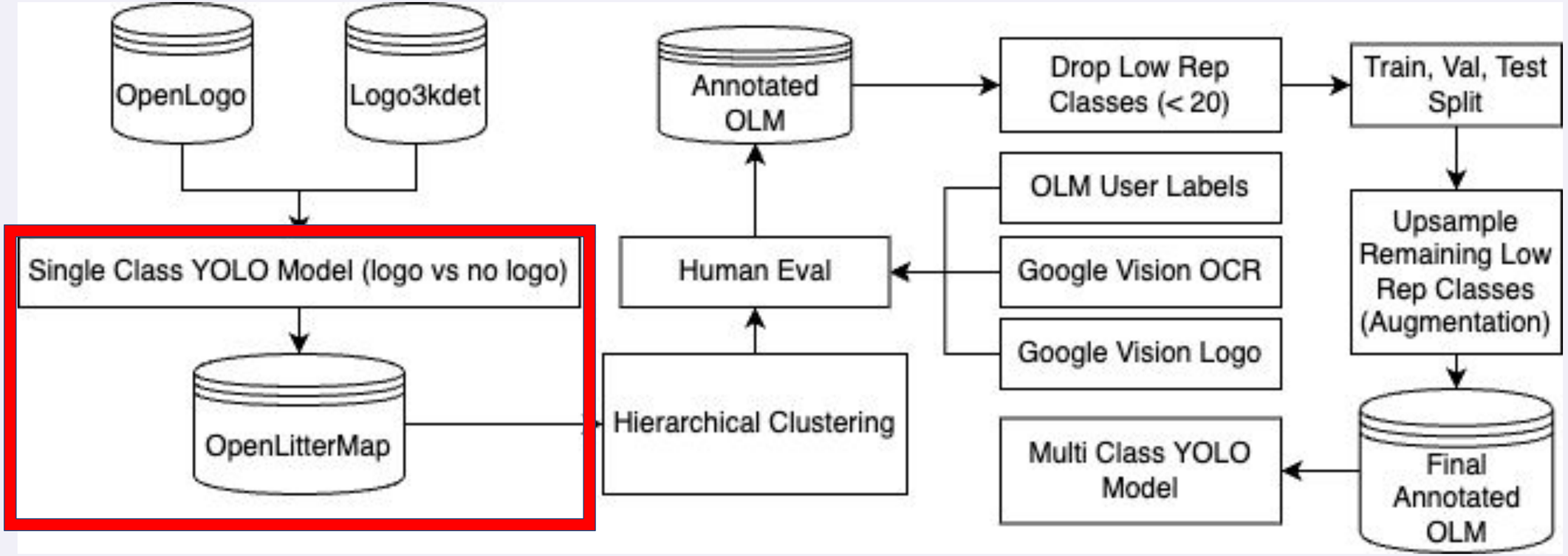

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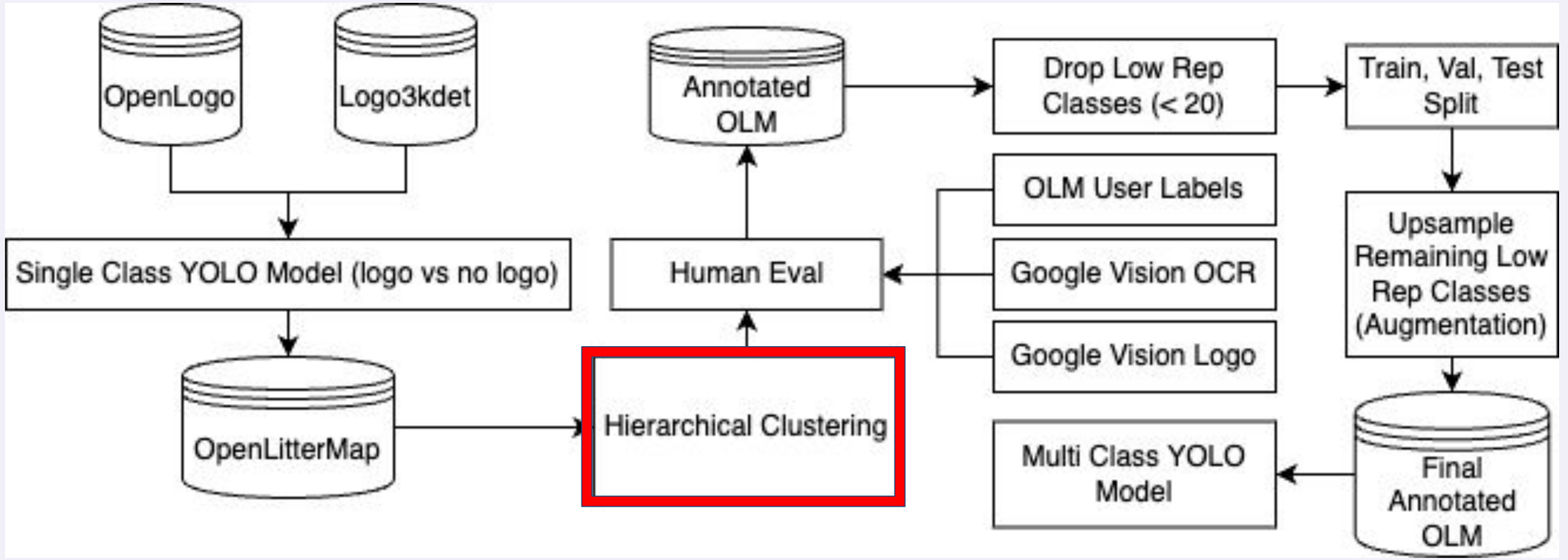

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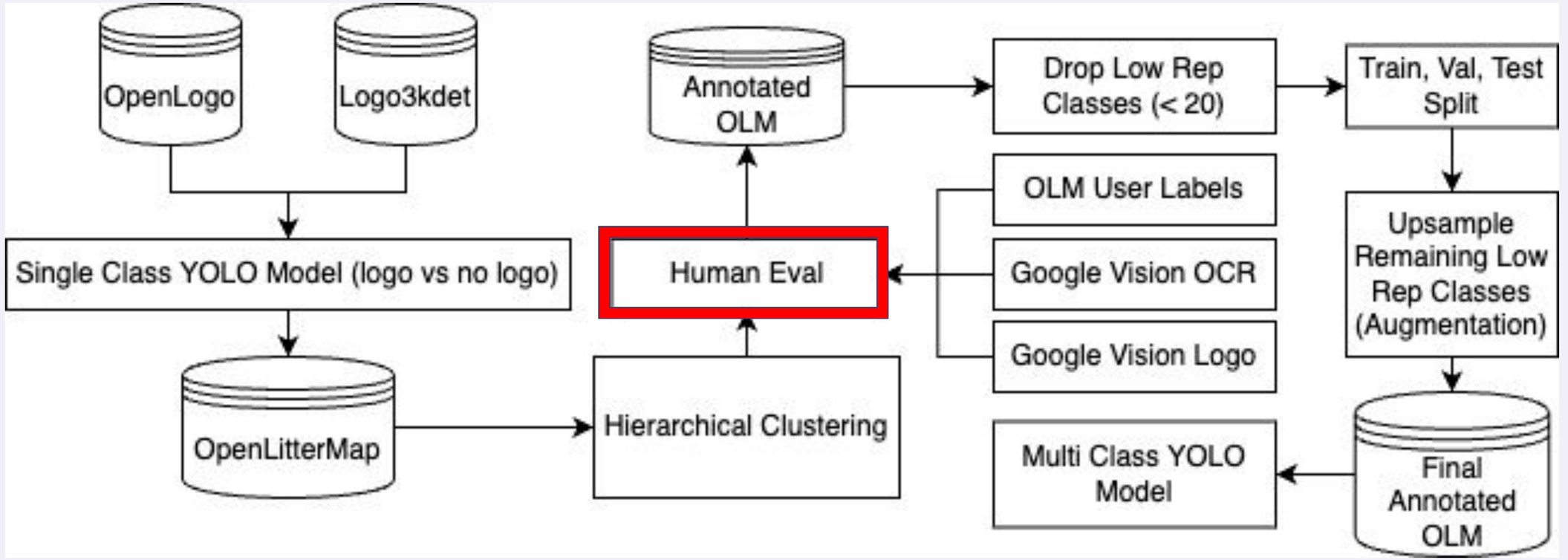

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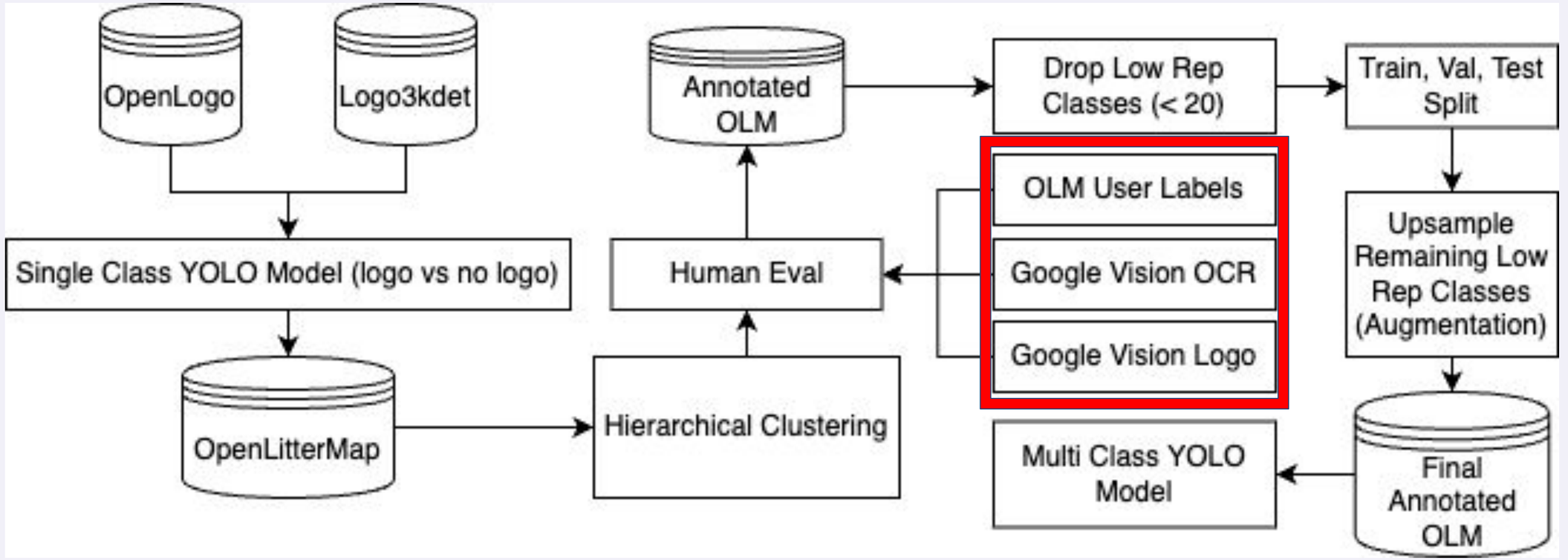

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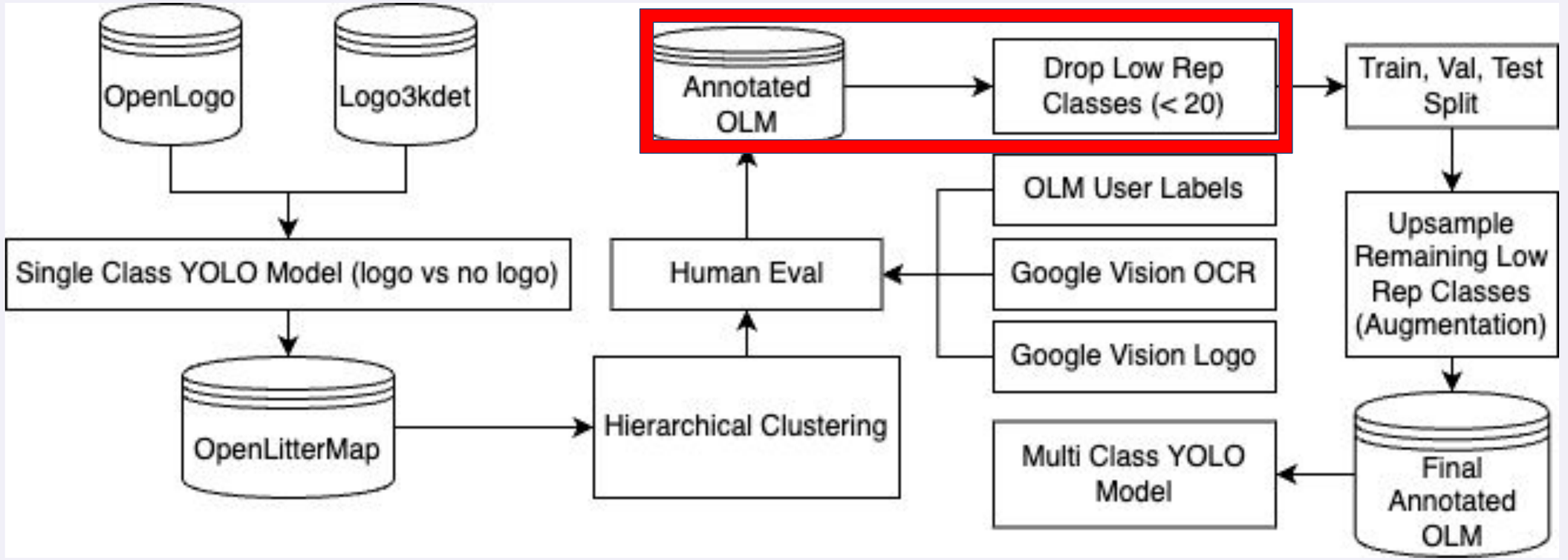

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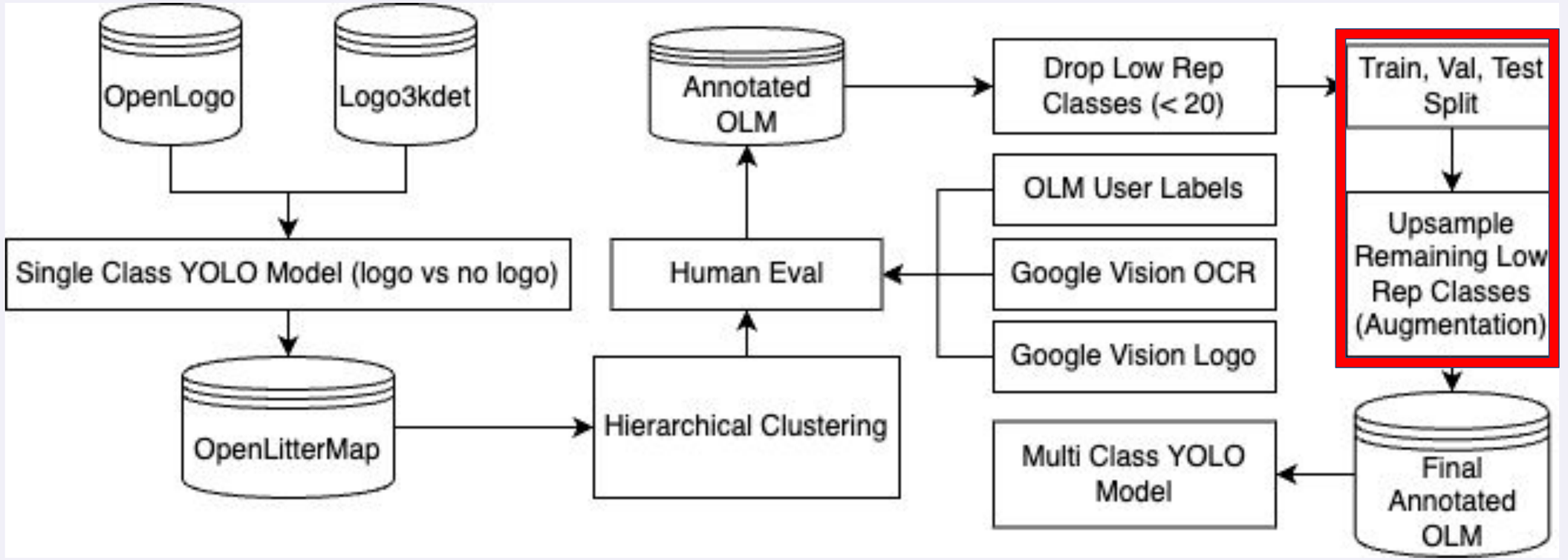

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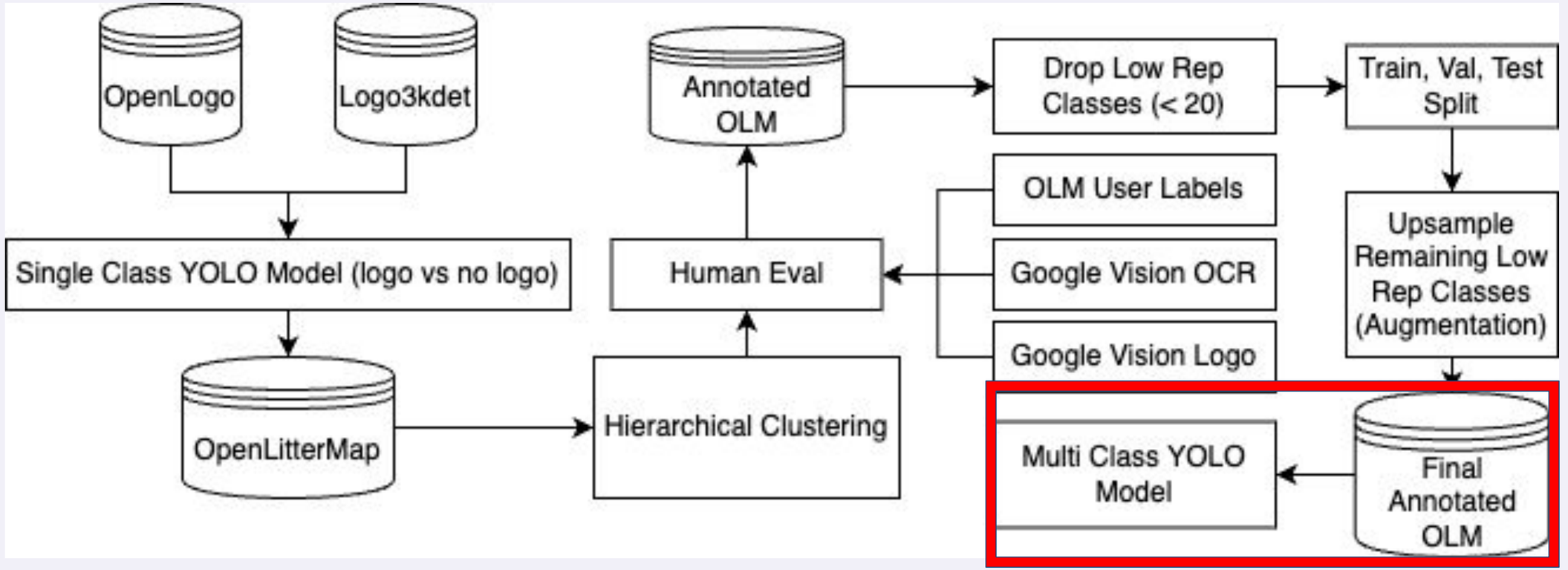
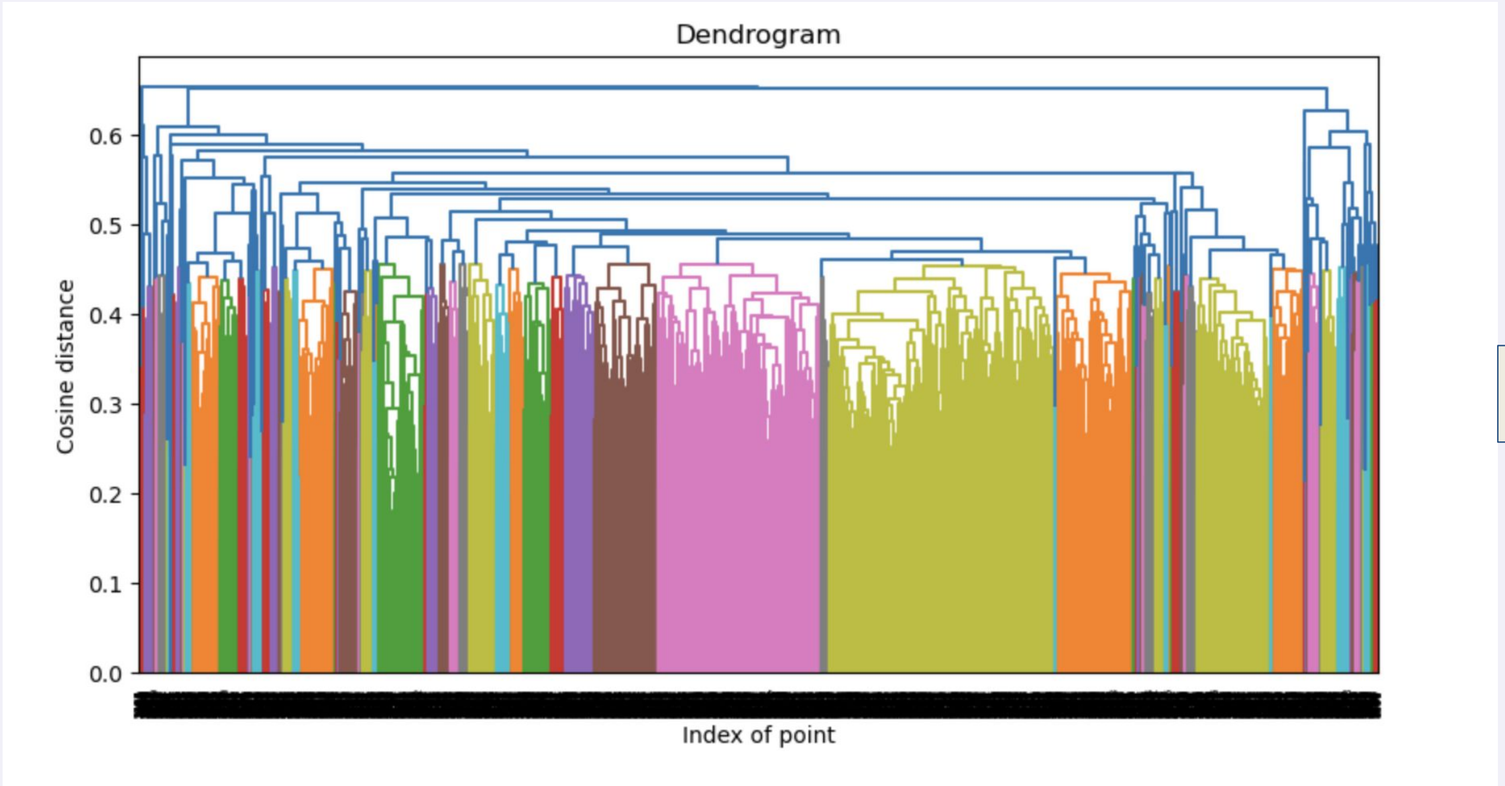
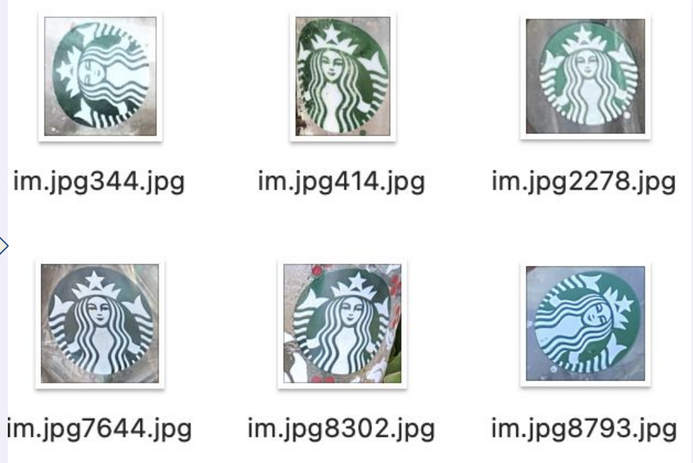


Technical Approach - Modeling

- **Clustering**: KMeans,, Hierarchical Clustering (by cosine sim)
- **Output**: Use to train 2nd stage classifier (SVM, Efficient Net) or use as annotations for multi-class yolo

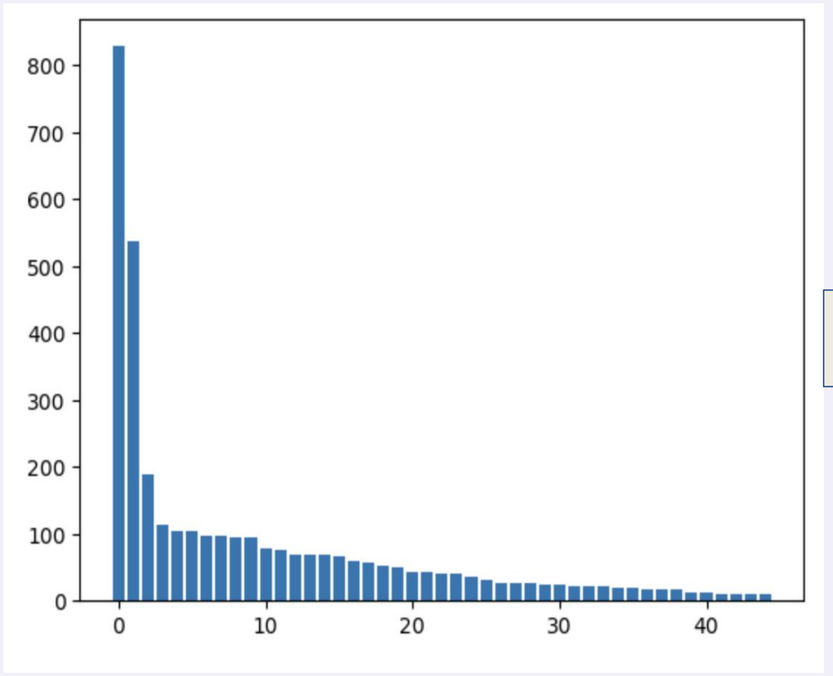


Cluster Output



Technical Approach - Modeling

Ct of Annotations by Class Before



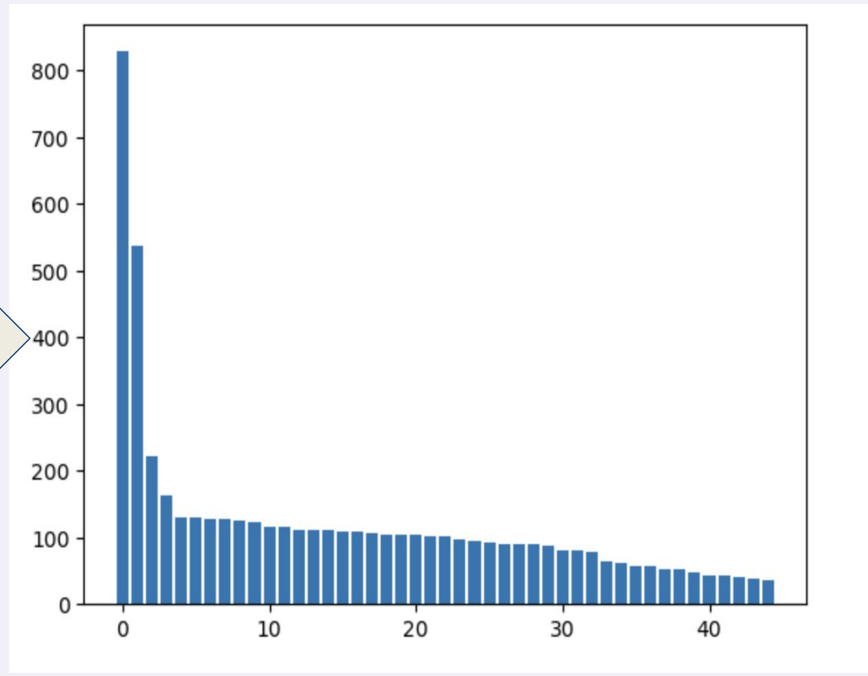
Existing Models

Cloud Vision API

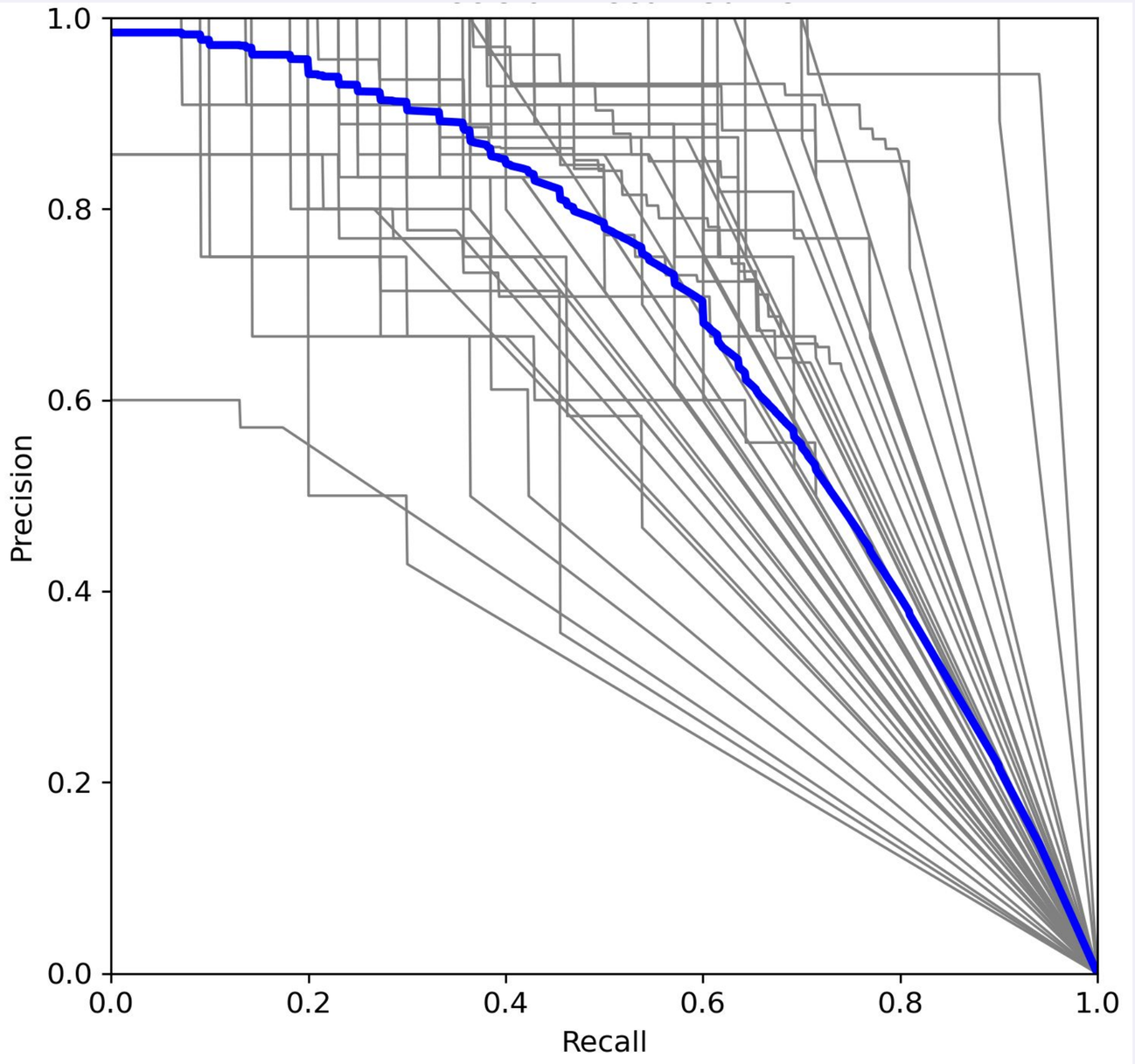
User Provided Labels

Augmentation

Ct of Annotations by Class After



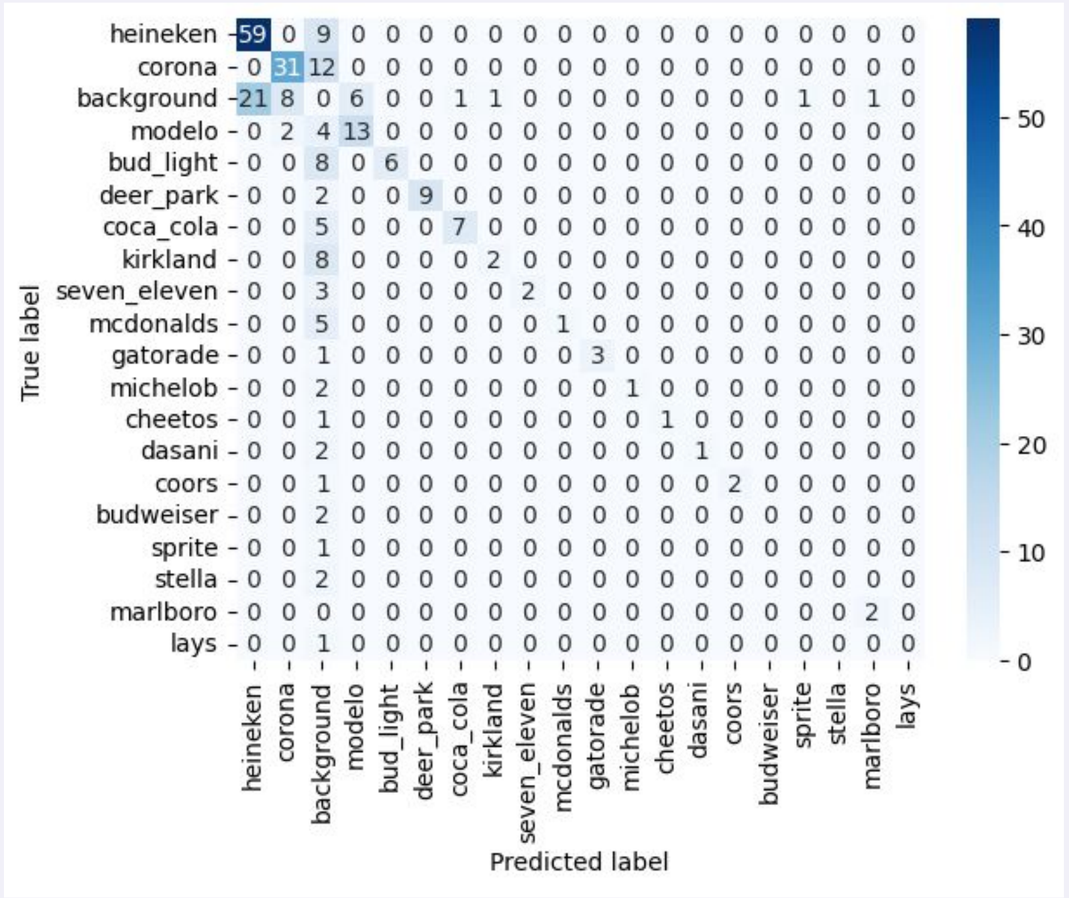
Model evaluation: mAP



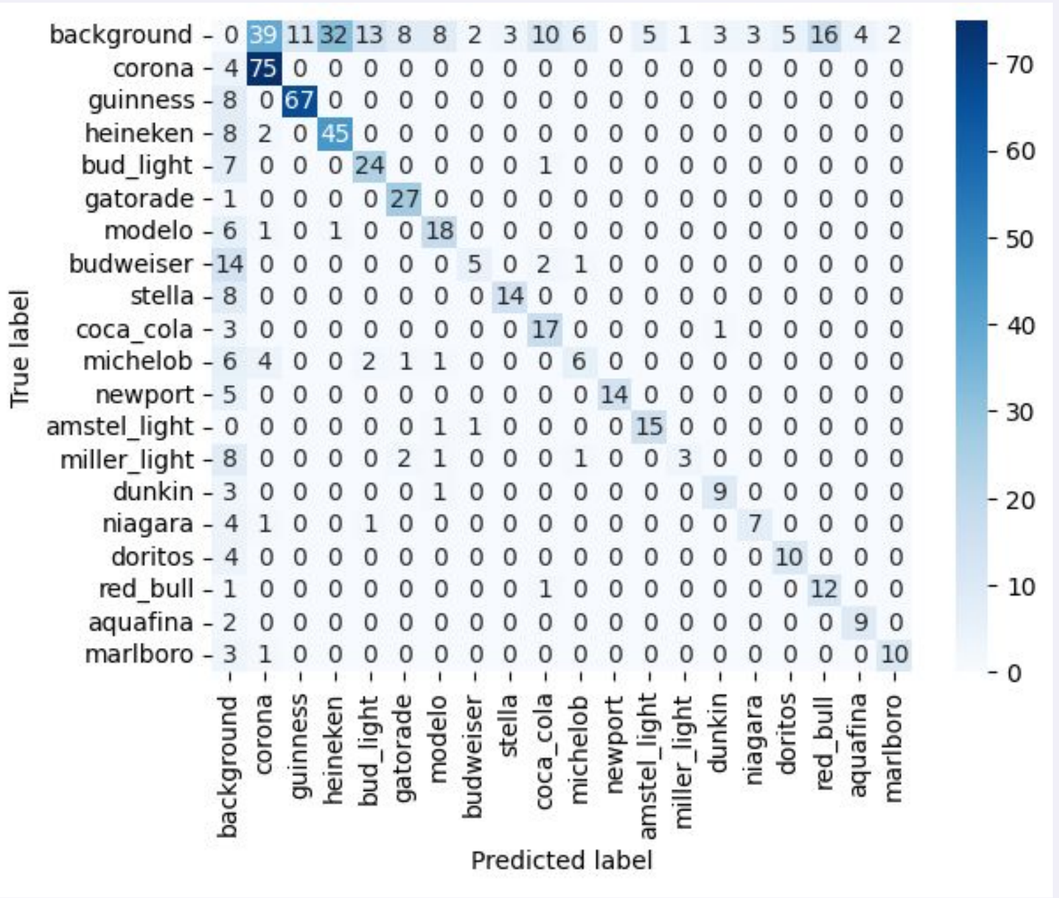
test dataset	**conf = 0.25**	**conf = 0.1**
Random: random 1% sample of OLM dataset	33.5	34.4
Enriched: upsampled low frequency brands	68.3	68.1

Model evaluation: confusion matrices

test set: random

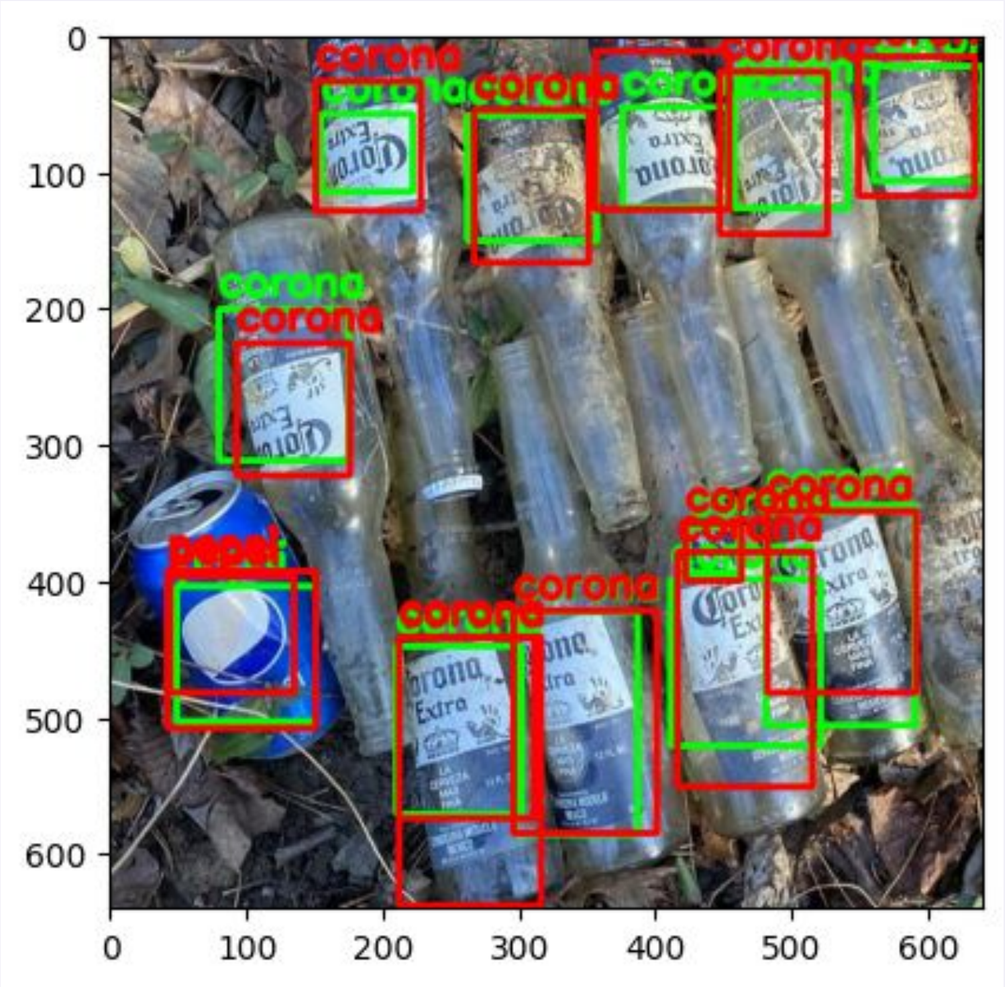


test set: enriched

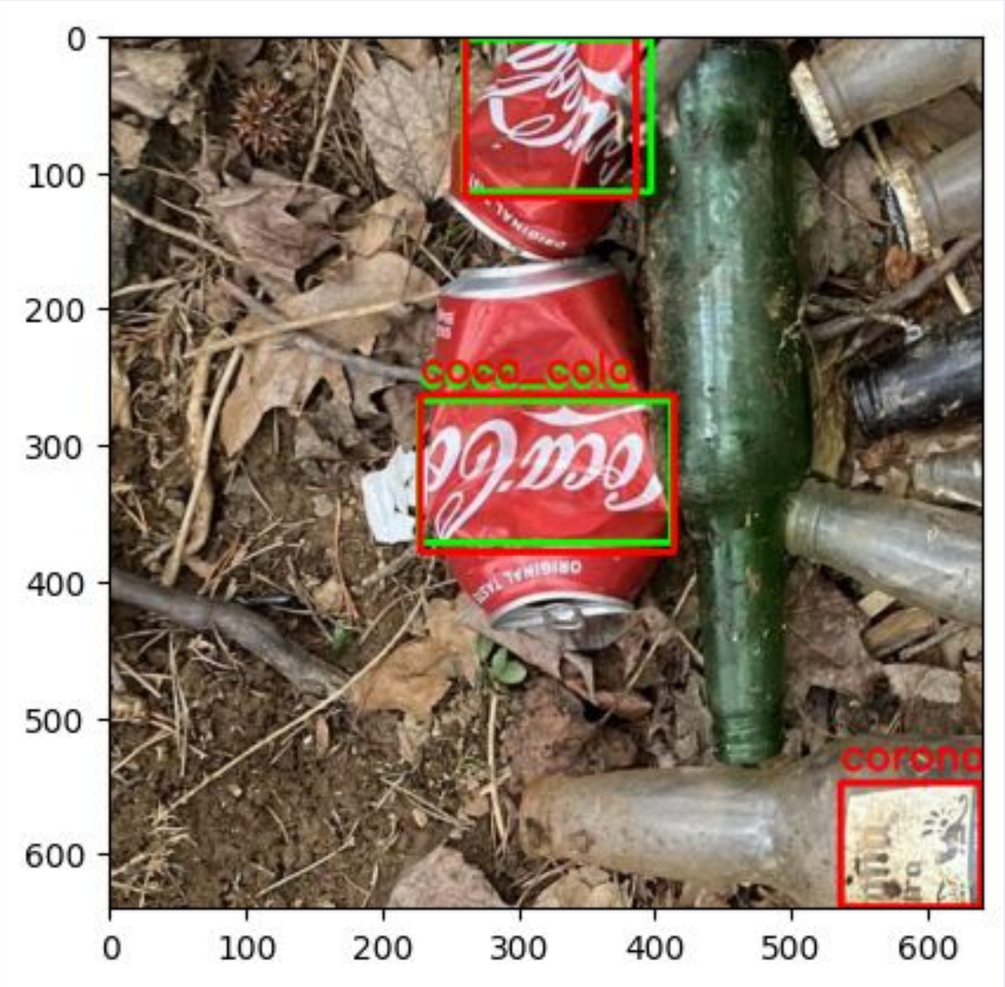


Model evaluation: Examples

Success

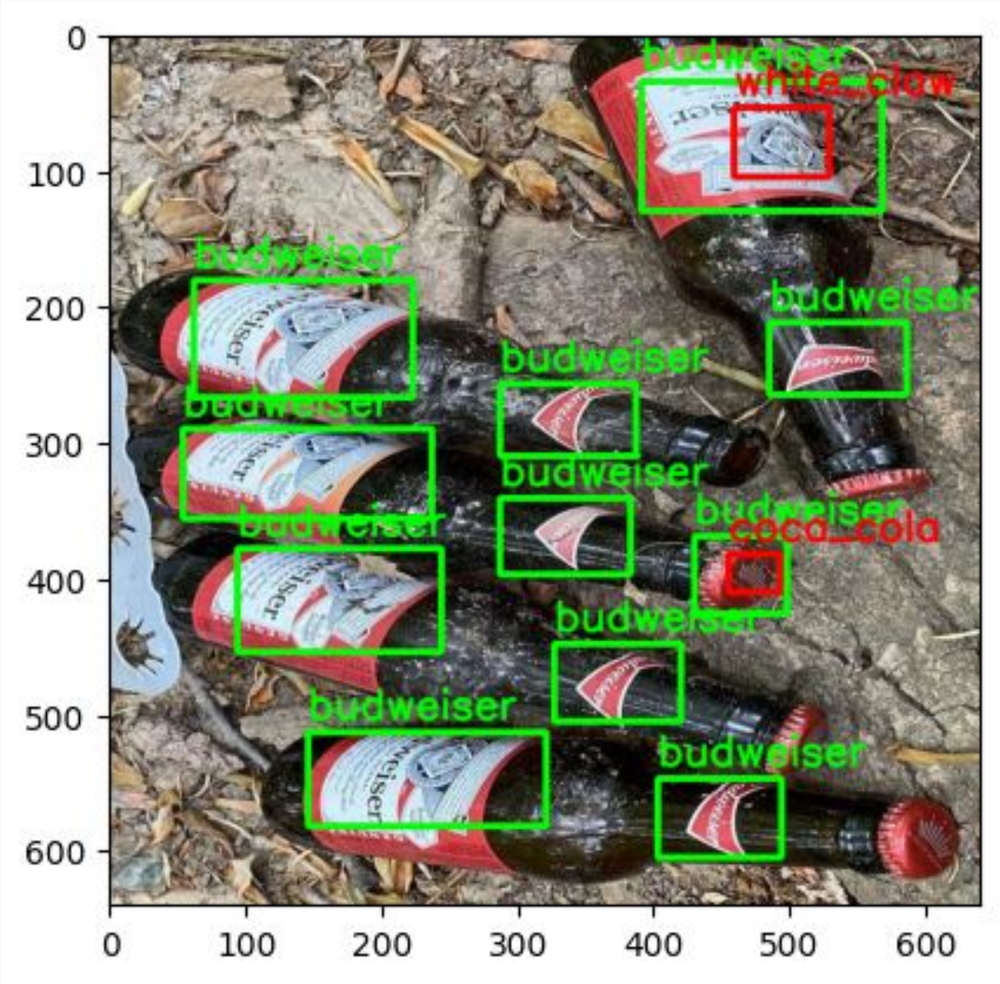


Super success

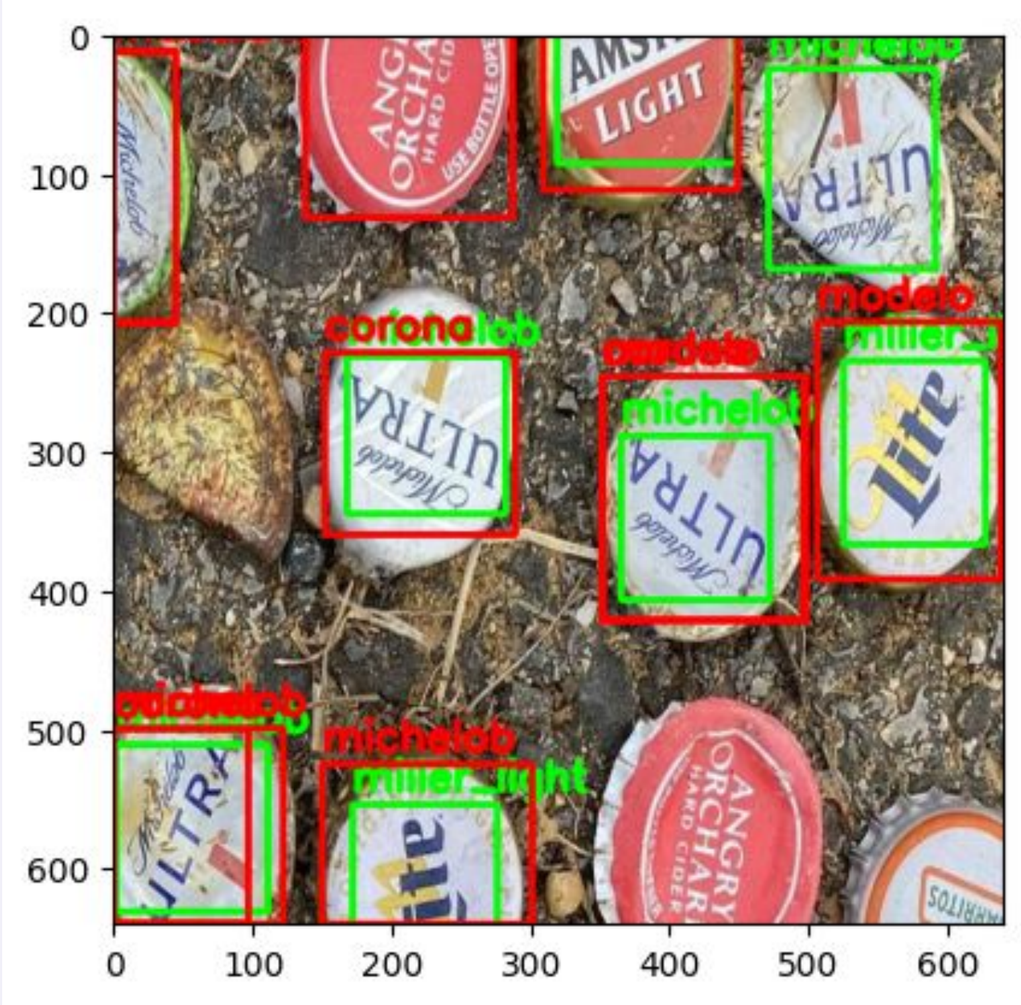


Model evaluation: Examples

Frequent mode of failure



Disaster



Technical takeaways

68% mAP is acceptable model performance

Brands are sure they are not accountable for someone else's deficiencies.

Challenges we encountered and our solutions

No ground truth	:	semi-automated labelling sequence of models
Class imbalance	:	selective training set enrichment and augmentation
Unknown brands	:	hierarchical clustering and logo/not logo detectors

Technical Road map:

Multimode labeling: can we use text recognition at the time of inference?

Litter type detection: can bottle vs cup detection help brand detection?

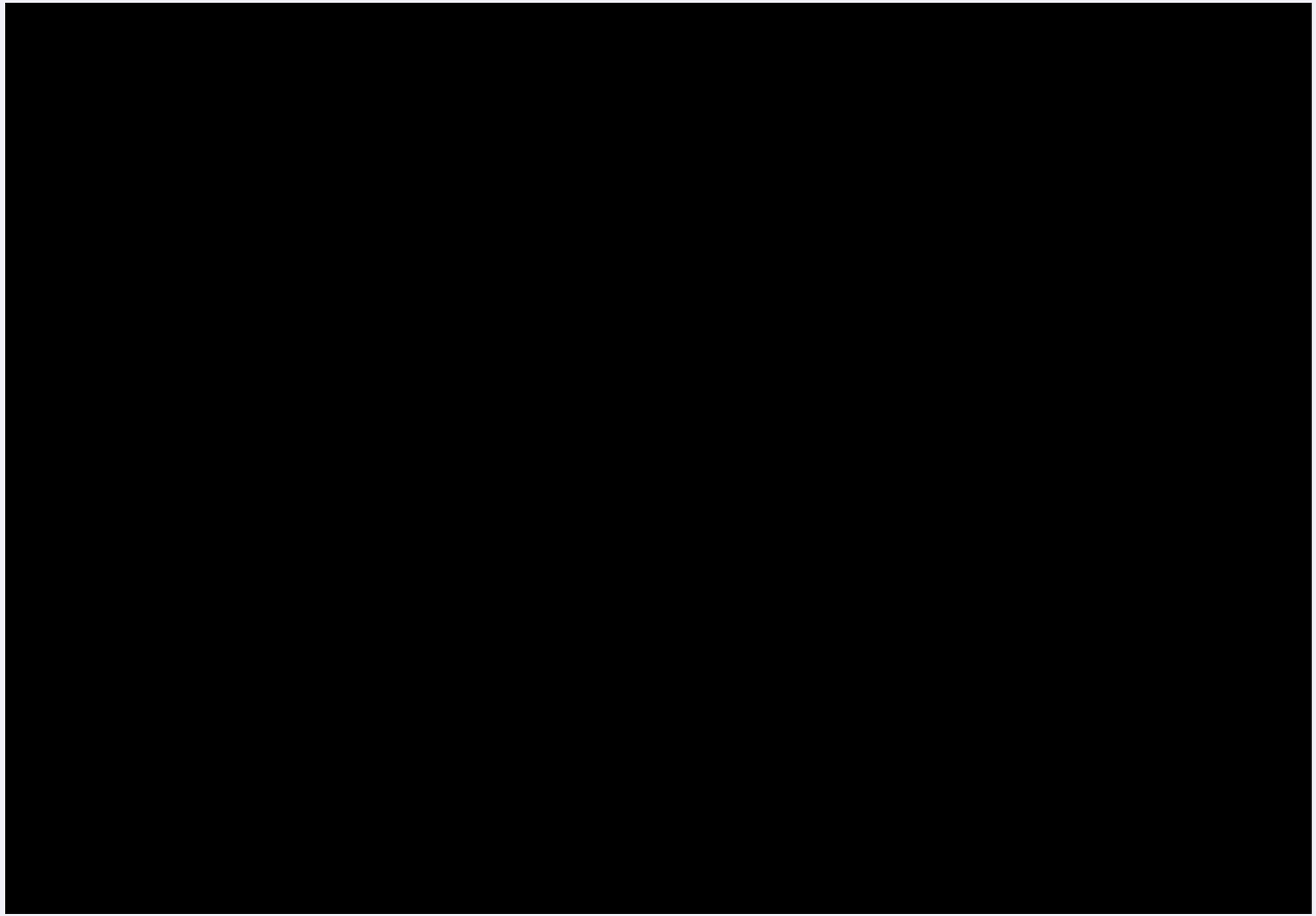
Brand clustering: can we use clustering at the time of inference?

Wrap-Up

“ **Our Mission:** Litter Log is a partnership with Open Litter Map that leverages ML techniques to identify brands that are habitually polluted and feeds these findings to our users to encourage positive changes.

We aim to **empower** and **incentivize** users and companies for a more eco-friendly future ”

Demo Video



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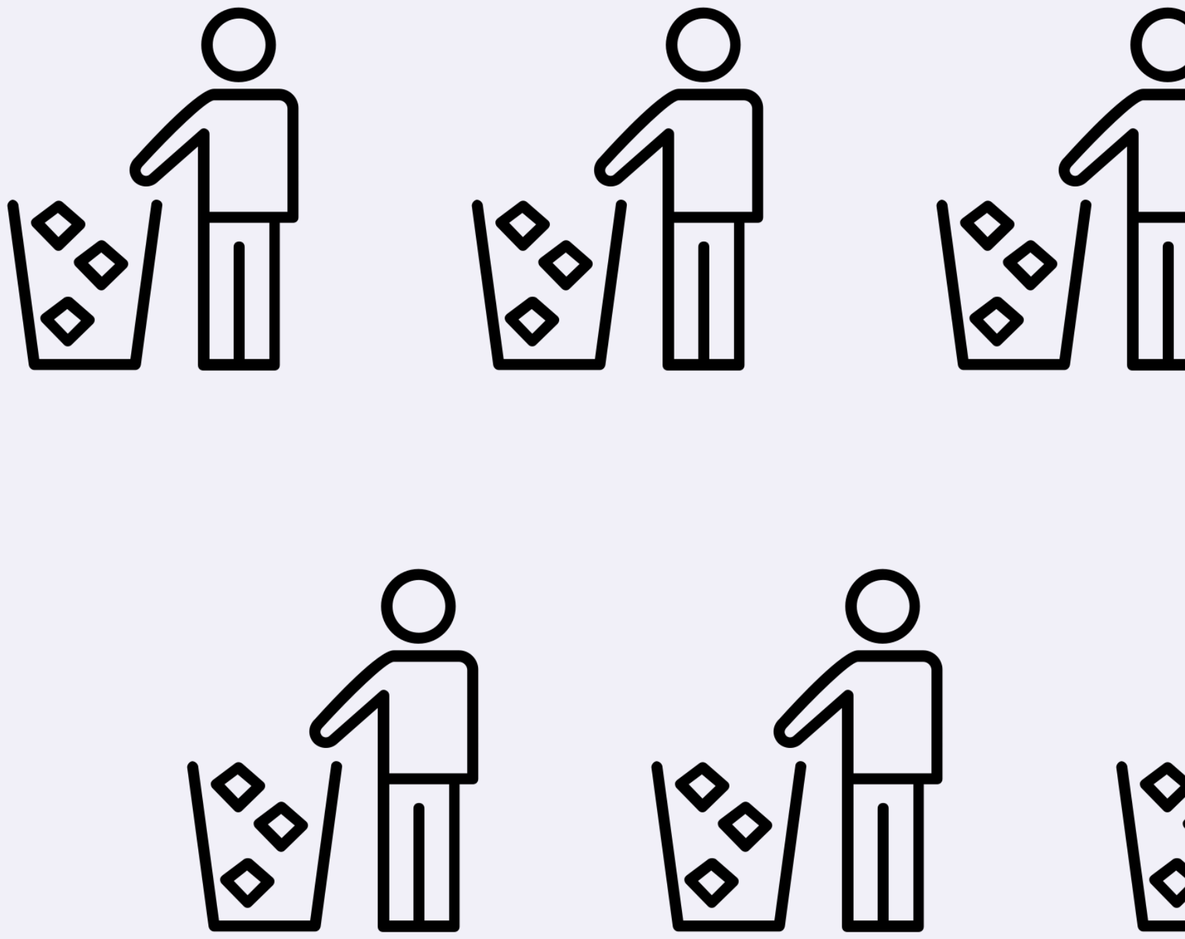
2. Empower companies with insights for business