

Team Copy Waste

Project Bazaar 1

Dec.6, 2021 - Jan.25, 2022



THE TEAM



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Machine Learning



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Front-End Services



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Back-End Services

PROJECT VISION

REDUCE RISK FOR
WASTE MANAGEMENT
WORKERS & COST FOR
MUNICIPALITIES



PROJECT MISSION

TO *AUTOMATE* THE
DETECTION OF
SEVERE & RARE
CONTAMINANTS IN
RECYCLING



Business Needs

- Reduce Risk of Fires and Associated Health Concerns
- Reduce Cost
- Address Careless Recycling & Hazardous Contamination

Business Needs



Saskatchewan

Firefighters knock down recycle depot fire in Regina's west end



<https://www.cbc.ca/news/canada/saskatchewan/crews-fighting-fire-at-crown-shred-and-recycling-1.5980051>

<https://www.cbc.ca/news/canada/saskatchewan/emterra-recycle-depot-fire-1.6202918>

STATUS
GREEN

Individual Contributions



- Collected/annotated image datasets
- Separated/categorized images using python scripts
- Created, trained, and generated results for initial YOLO detection model
- Annotated additional training images
- Python scripts for imports

Individual Contributions



- Research implementations of Copy Paste data augmentation
- Collecting annotated images of Prairie Robotics audited hopper images
- Begin prototype version copy paste augmentation on a subset of images

Individual Contributions



- Training Detection Models in YOLOv5
- Evaluate Model Performance
- Re-Training Detection Model
- Deploy Model to Recycling Truck Edge Computer

Project Issues / Changes

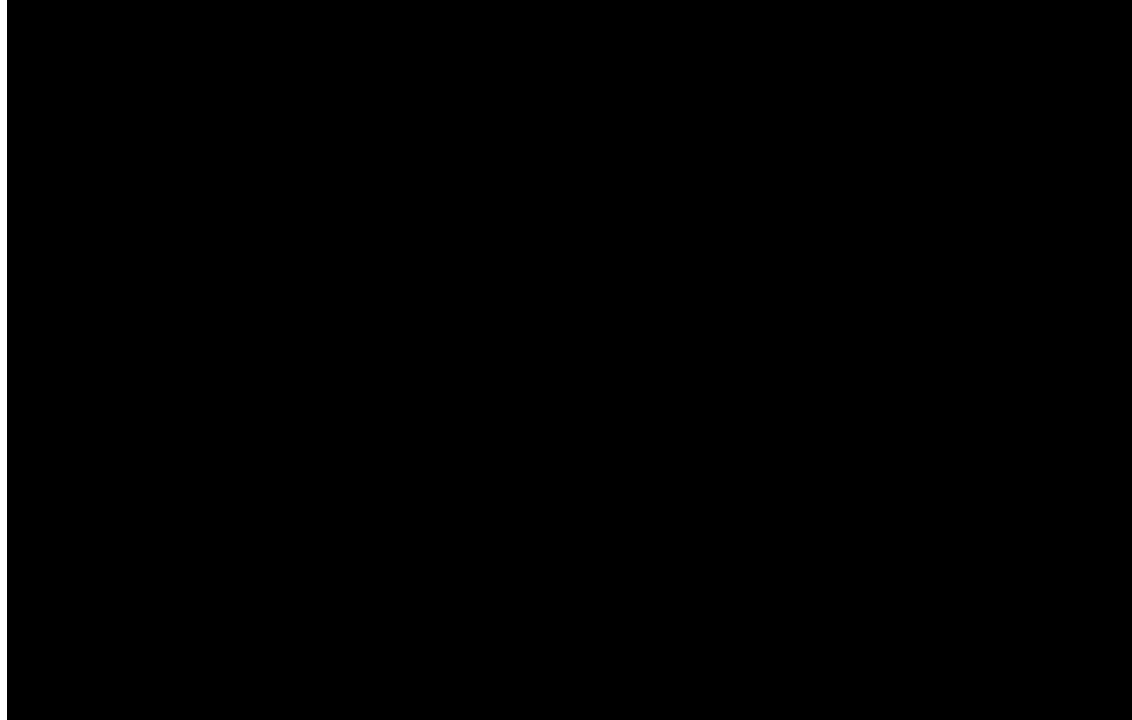
- Experimental Methodology
- New Faculty Mentor
- Updates to Edge Computers
- Yard Waste as First Contaminant



Product Demonstration



Bin Tip Overview

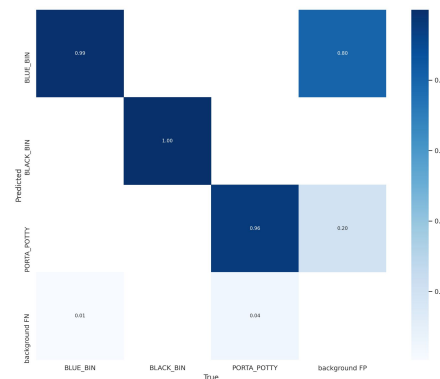


Bin Tip Overview

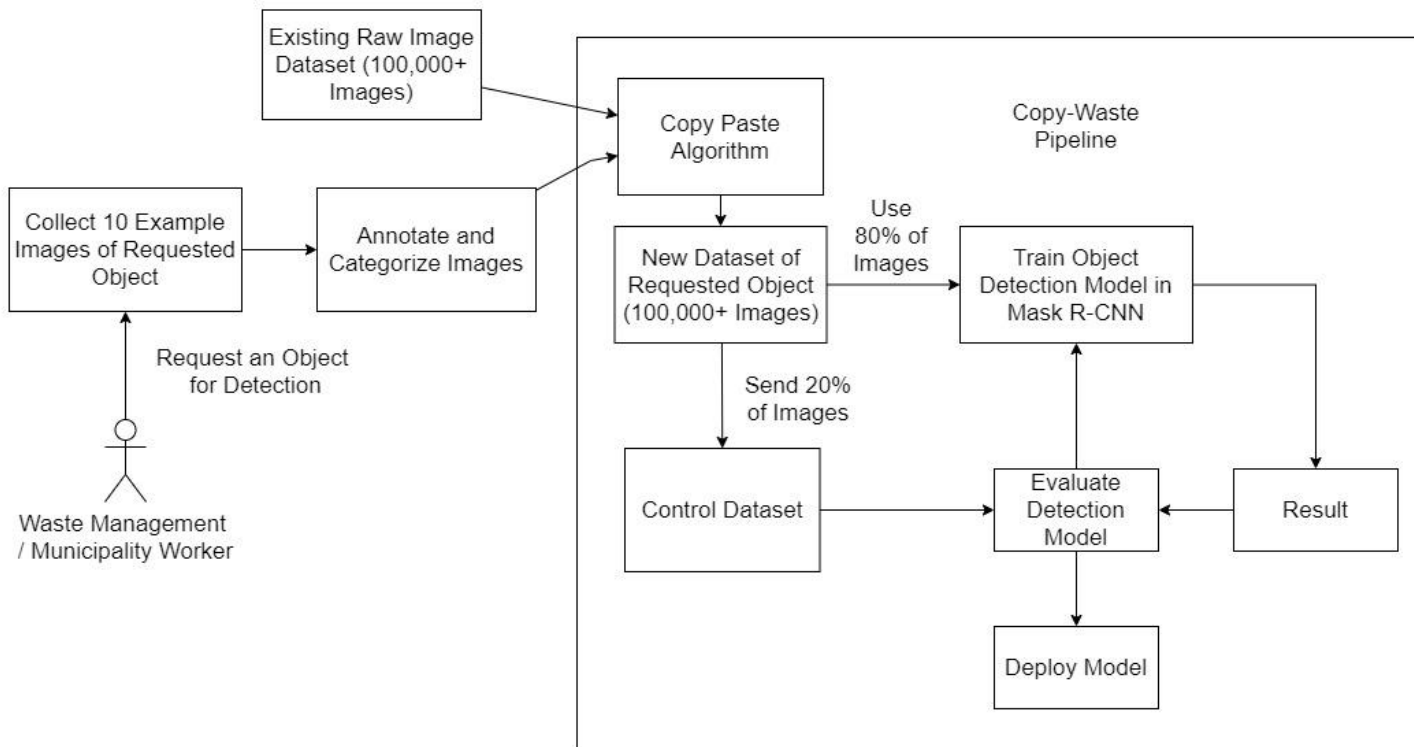
Classes	Predicted	True Pos	False Pos	False Neg	Precision	Recall
BLUE_BIN	1236	1172	64	32	0.948	0.973
BLACK_BIN	316	315	1	0	0.997	1.0
PORTA_POTTY	140	140	0	0	1.0	1.0

94.8% Accuracy in detecting Blue Bins

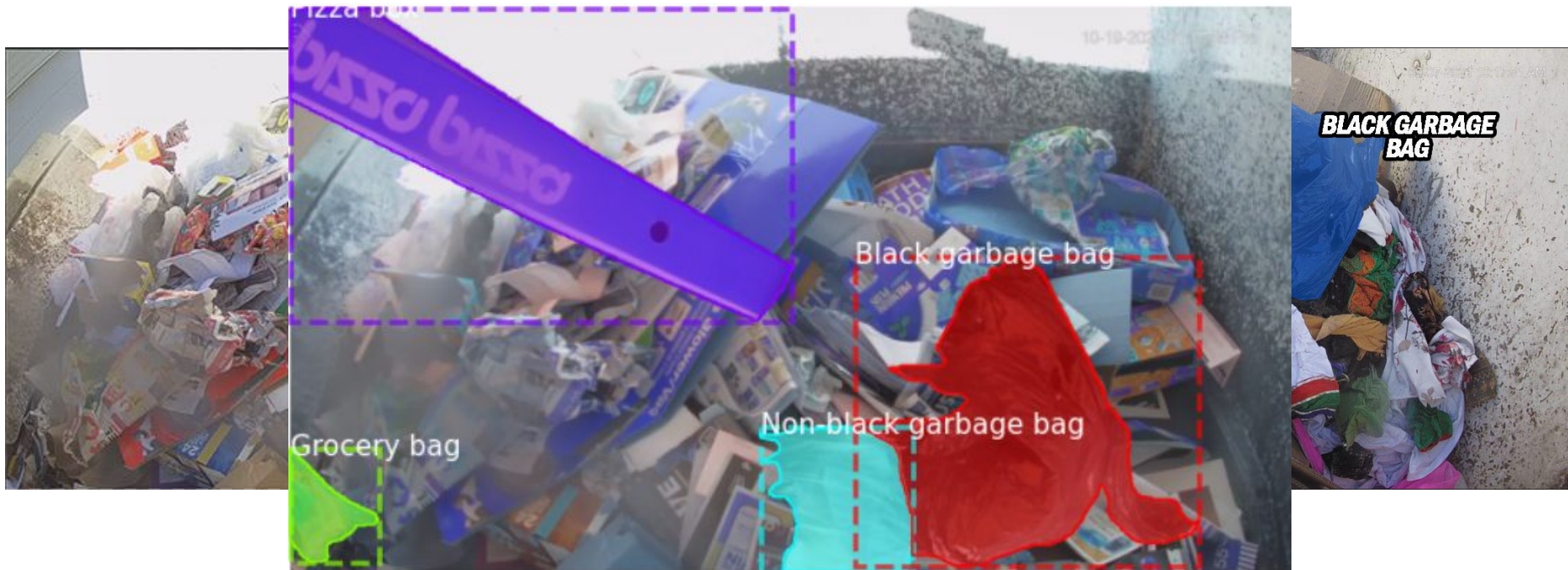
Ready for real world deployment



Simple Copy-Paste



Copy Paste Overview



Dashboard Overview

GREEN SCREEN

Green Screen Dashboard

Username *

DemoAdmin

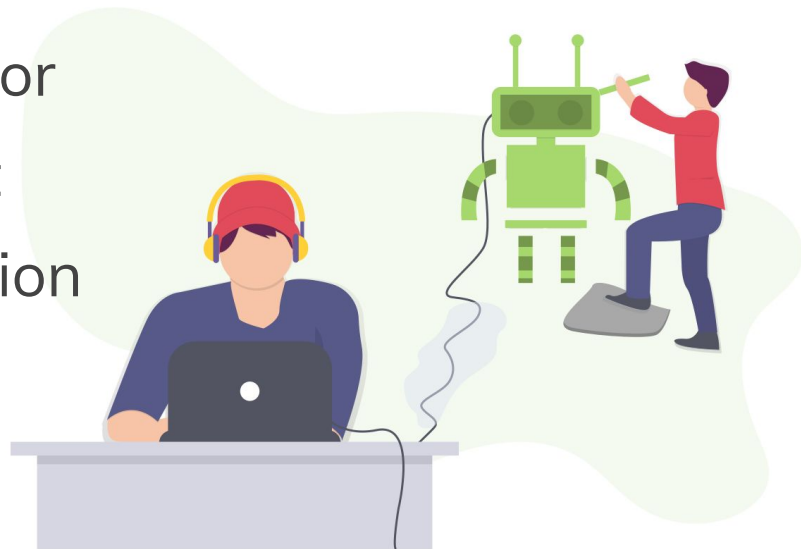
Password *

SIGN IN

Demo

Next Up

- Meetings with New Mentor
- Bin Detector Deployment
- Copy-Paste Implementation



Reflection

- Does the team feel "on track"?
 - We believe we are still on track
- What progress does the team particularly feel good (great) about?
 - Universal Bin Detector
 - Initial progress on Copy Paste Implementation

Reflection

- What barriers (if any) does the team feel are a current impediment to success?
Limited copy-paste documentation
- What help (if any) does the team require to move positively forward?
Regular meetings with our Industry Partner for guidance and code reviews.

Reflection

→ What questions or concerns does the team have (if any)?

No concerns at this time

References

- <https://leaderpost.com/news/local-news/smouldering-load-and-spray-cans-led-to-fire-at-crown-shred-says-regina-fire-department>
- <https://www.cbc.ca/news/canada/saskatchewan/crews-fighting-fire-at-crown-shred-and-recycling-1.5980051>
- https://www.epa.gov/system/files/documents/2021-08/lithium-ion-battery-report-update-7.01_508.pdf
- <https://www.waste360.com/business/li-ion-battery-fires-unfairly-cost-waste-recycling-and-scrap-operators-over-12-billion>

References

- <https://www.linkedin.com/pulse/2019-report-annual-reported-waste-recycling-facility-fires-fogelman/>
- <https://publications.gc.ca/site/eng/9.871296/publication.html>
- <https://arxiv.org/abs/2012.07177>
- <https://arxiv.org/pdf/1506.02640.pdf>

Thanks for Watching!