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E.N.G. Engineering the Next Generation

NYC Clear Path Project: Cleaning New York with New Technology

Allen, Tiffany, David and Sofia

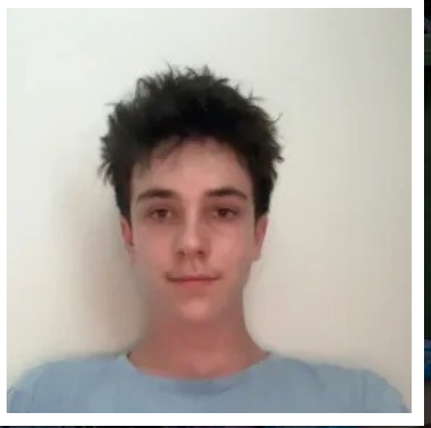
Team

Allen Rivera

Park East High School
Interest: Electrical Engineering
Hobbies: Coding, Skateboarding, Playing Bass Guitar, and Drawing

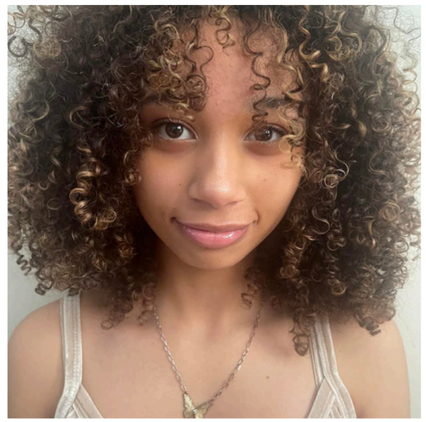
Tiffany Qu

Stuyvesant High School
Interest: Engineering & Environmental Science
Hobbies: Running, Gardening, Reading, Volunteering



David Gelpi

Columbia Secondary School
Interest: Computer Science
Hobbies: Chess, Soccer, Volleyball



Sofia I. Acevedo

Bard High School Early College Queens
Interest: Environmental Engineering
Hobbies: Cooking, Painting, Flag Football

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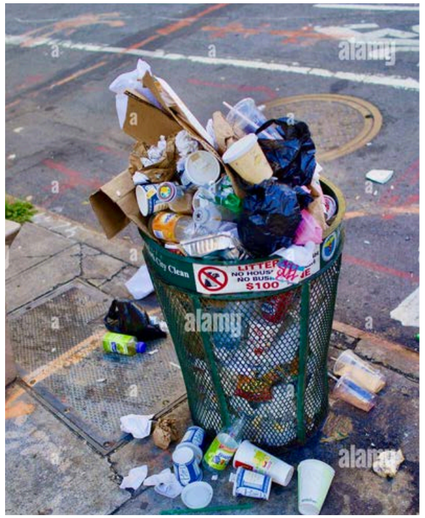
Problem

How many of you have experienced from trash on the streets causing

blockage



overflowing

rodents

Research Question: How would AI trash detection technology help improve the lives of 125th Harlem community members?

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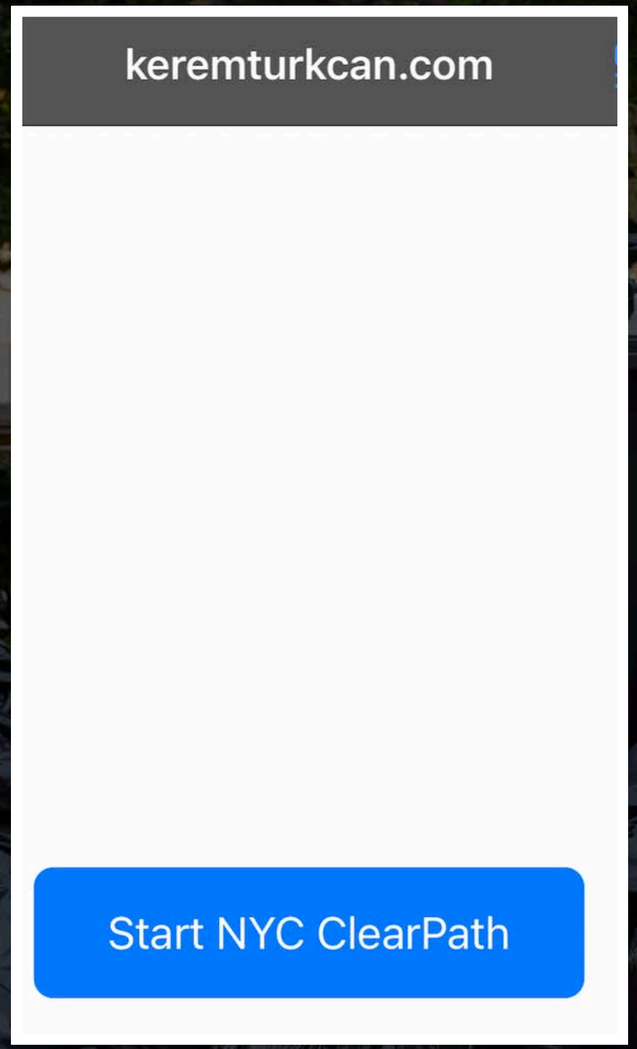
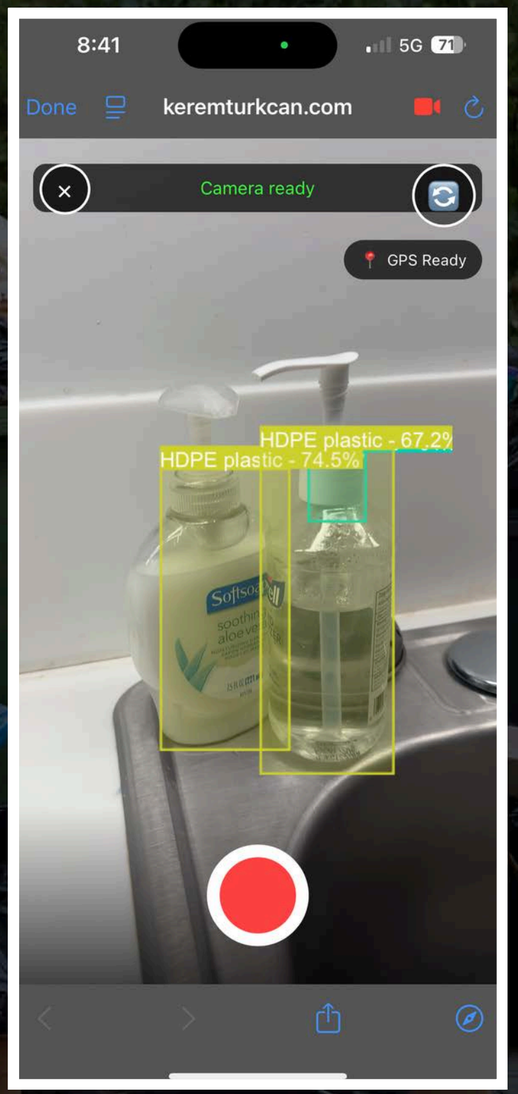
Our Solution

NYC ClearPath



NYC ClearPath primary target group



Contributions

Simulation

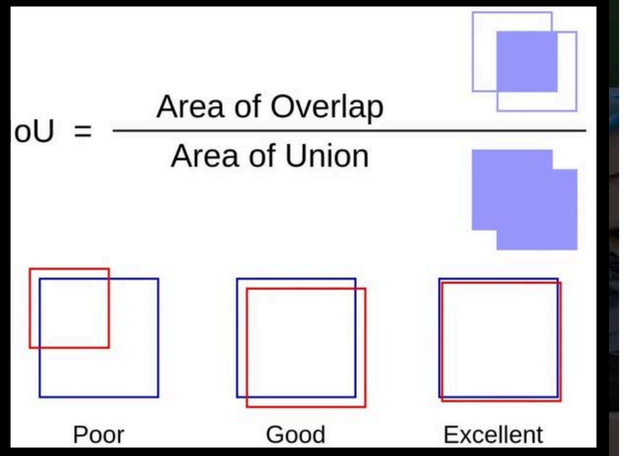
(coded in Unity C#)

Why do we need AI in our app?

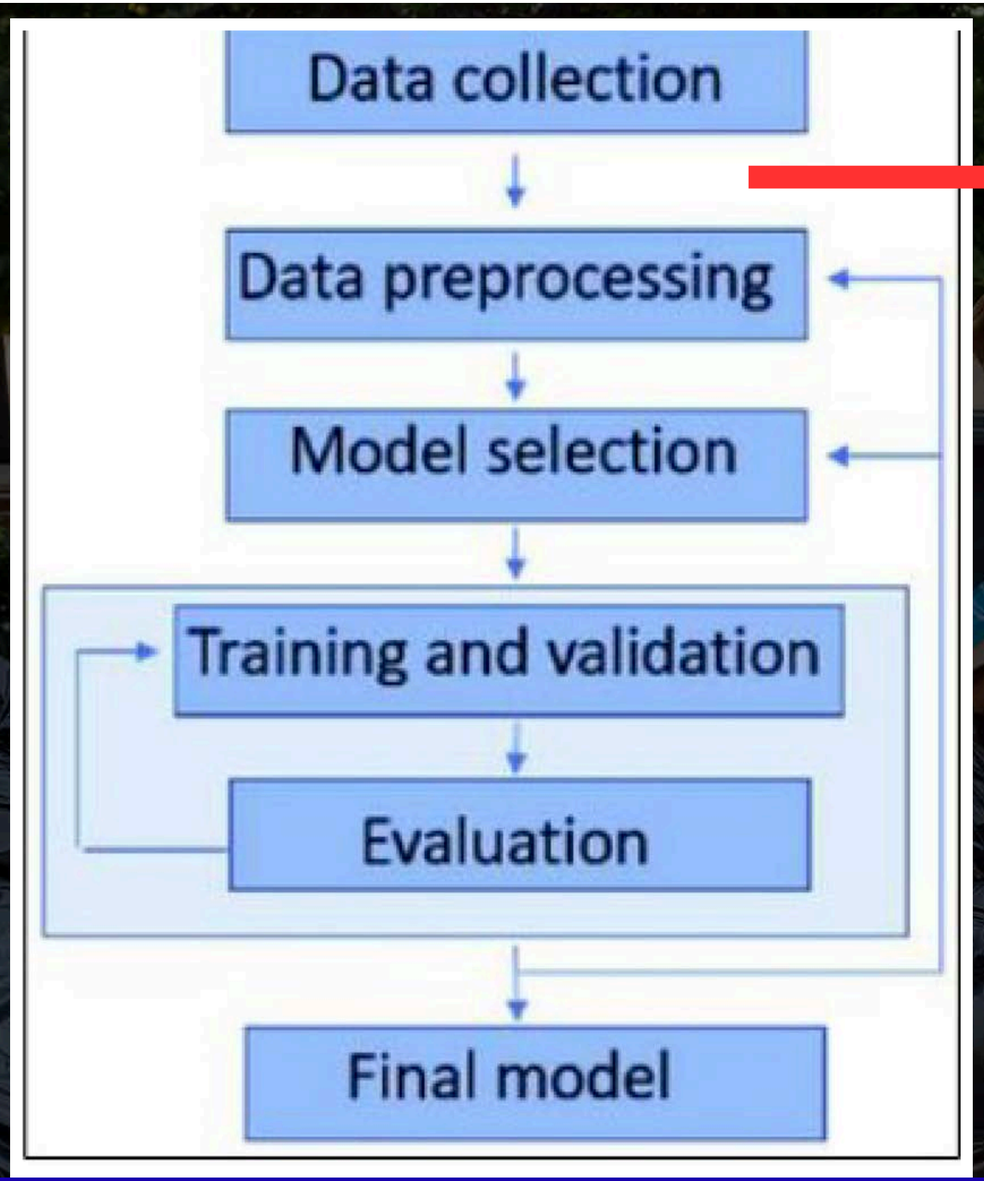
Artificial Intelligence (AI) is the ability of computer models to complete tasks that typically need human intelligence.

Object Detection

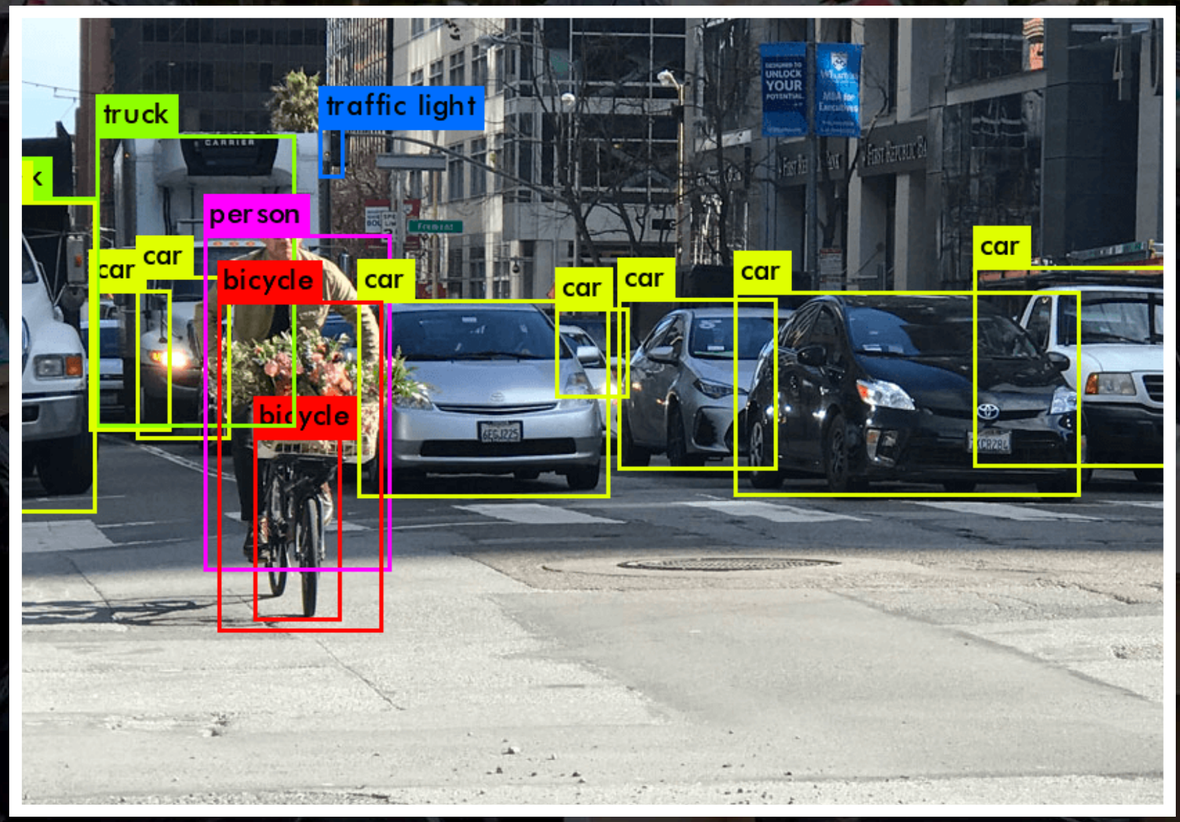
- Detection of object (classification and localization)
- Labels object using bounding box, class labels, and confidence score



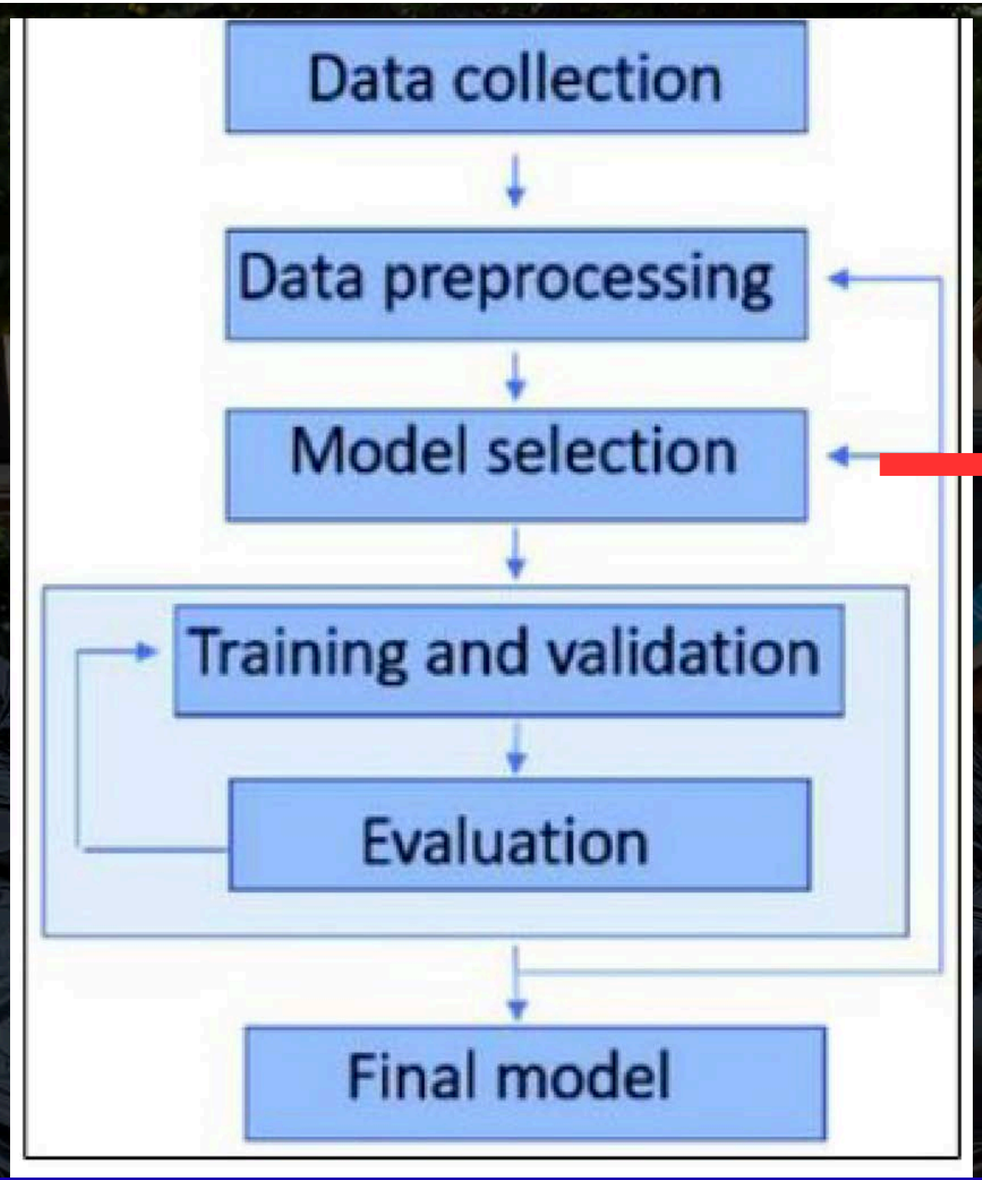
Object Detection Pipeline



Good Dataset
Variety + Large dataset
Pre-process with correct annotations



Pipeline

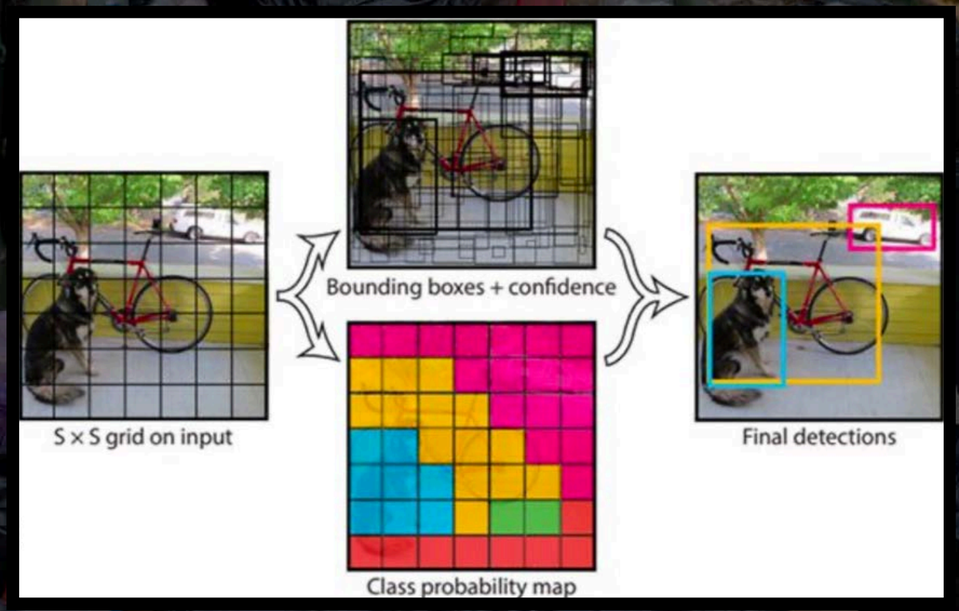


Model Architecture

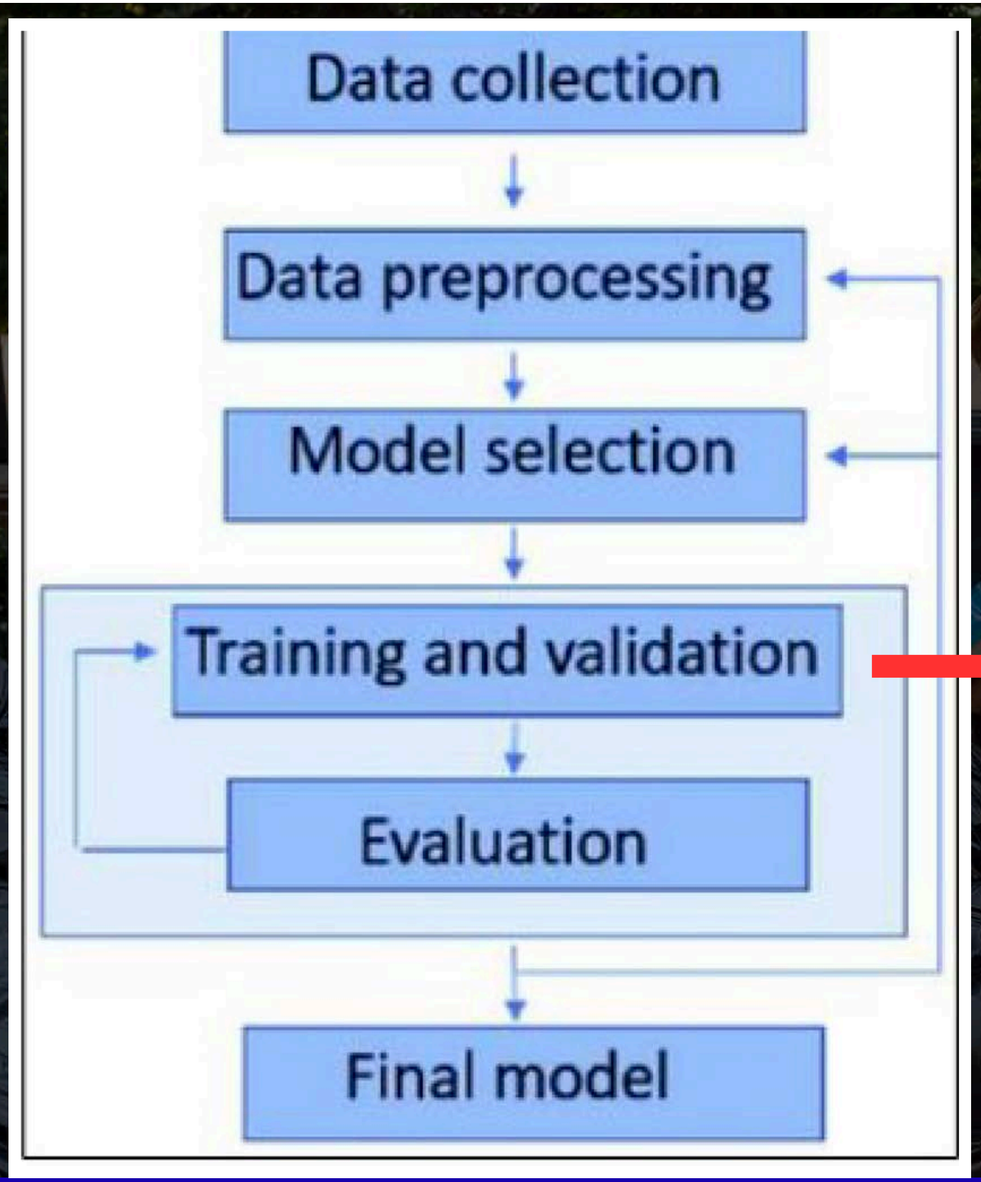
YOLO v8

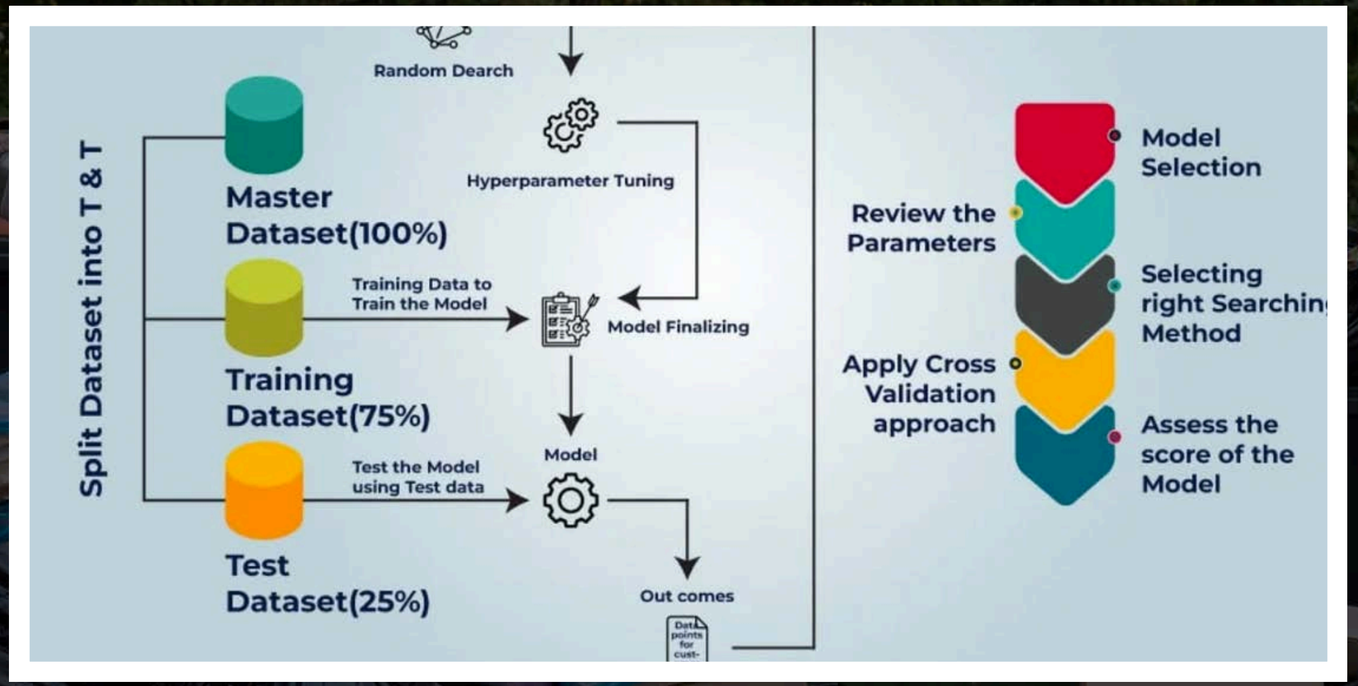
Layers extracting features

Embedding



Pipeline

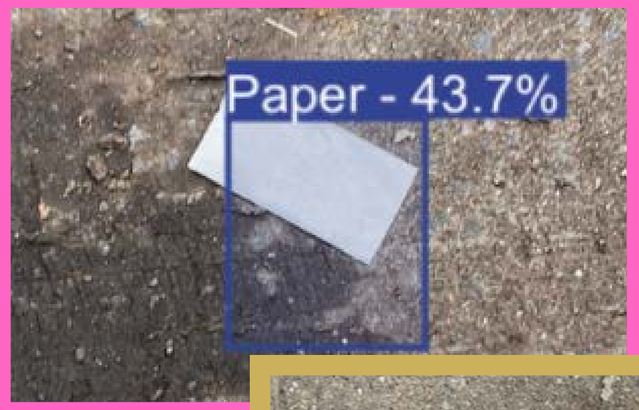




Supervised Training vs. Unsupervised + Testing

Parameters - adjustments control how model learns

Carton - 57.1%


Paper - 43.7%

GPS Ready
Paper - 61.0%
LDPE plastic - 38.2%

Cardboard - 75.5%

GPS Ready
PET plastic - 91.2%

PET plastic - 74.7%

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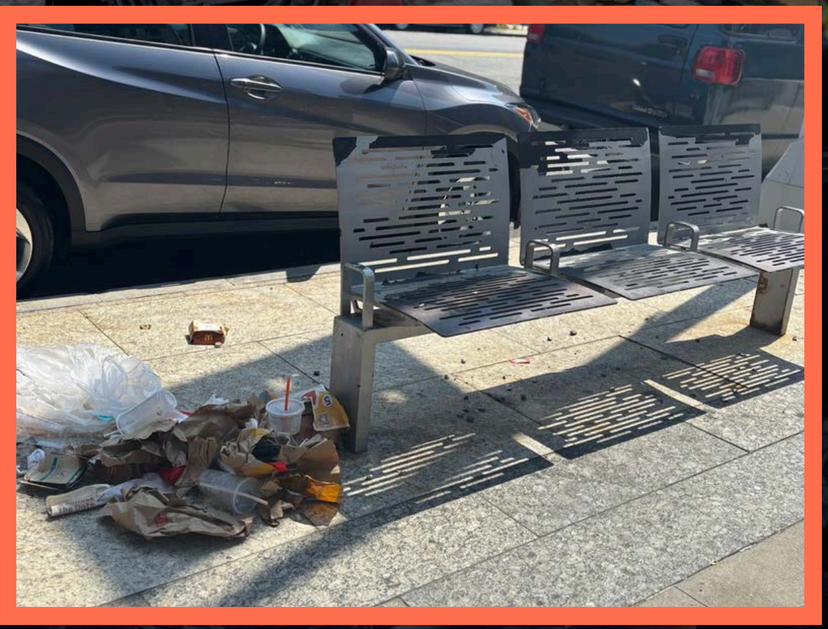
Field Trips

Interviews & Observations

East Harlem & Central Harlem



- Disconnection
- Nobody Cares
- Substance abuse
- Generational Influence
- Difference in Appearance & Activism

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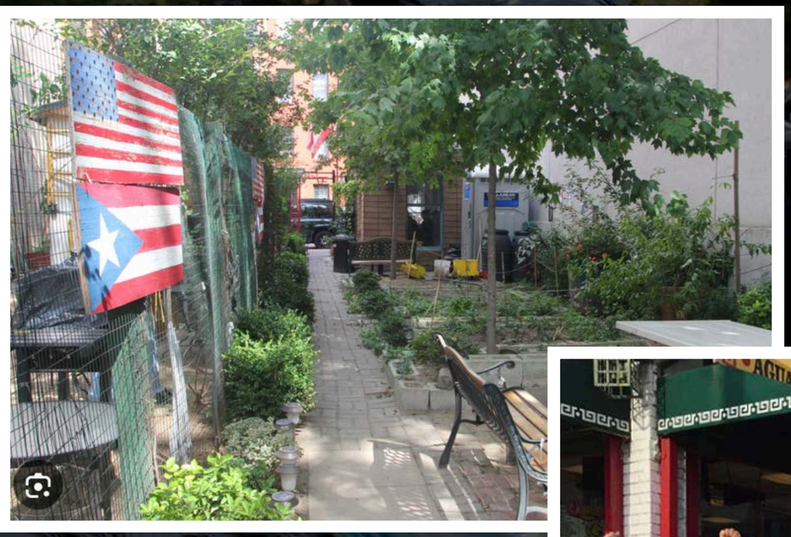
Interviews & Observations

What does this mean?



Societal vs. Governmental problem

Gentrification

Our app relies on the community initiative

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Mentors

Engineering

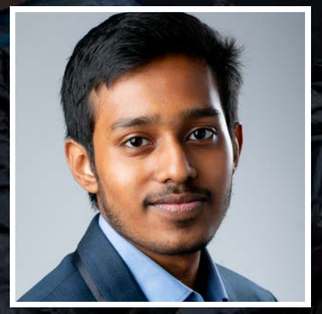
Andrew Smyth
Professor

Boshra Khalili
PhD Student

Emma Sombers
MS Student

Zoran Kostic
Professor

Raksha Chandrashekar
MS Student



Pranav Milind Bidve
MS Student

Social Science

Jenny Fondren
Community coordinator

Seon Britton
PHD Student

Organizers

Fernanda Martinez

Trey Greene

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Thank you Columbia University!

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