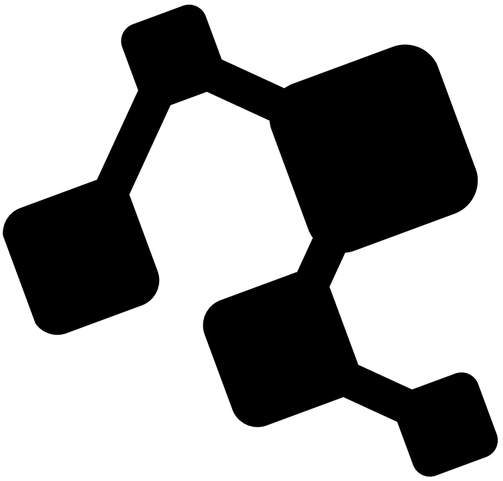
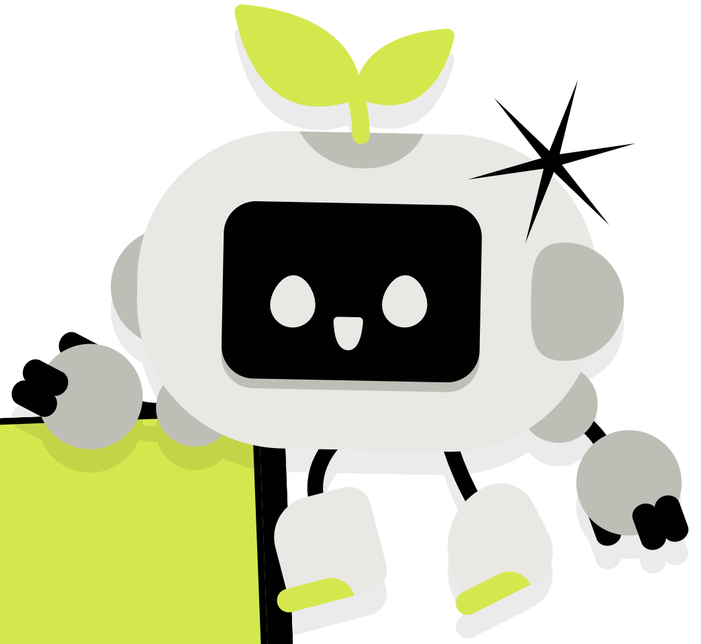
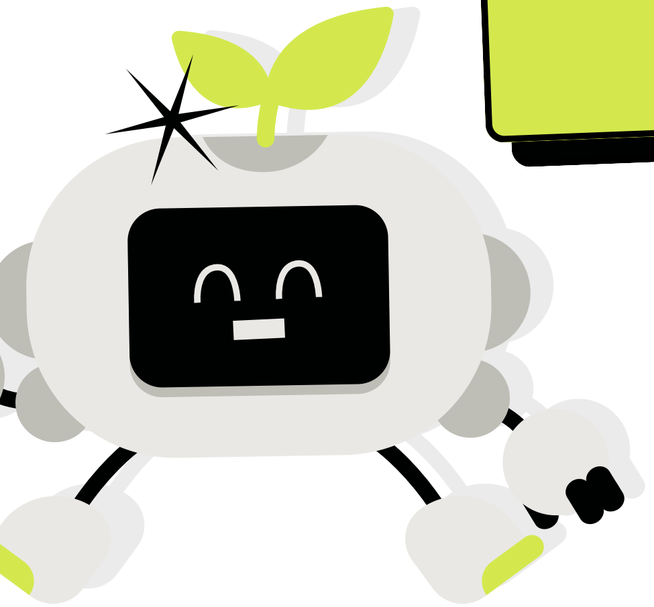
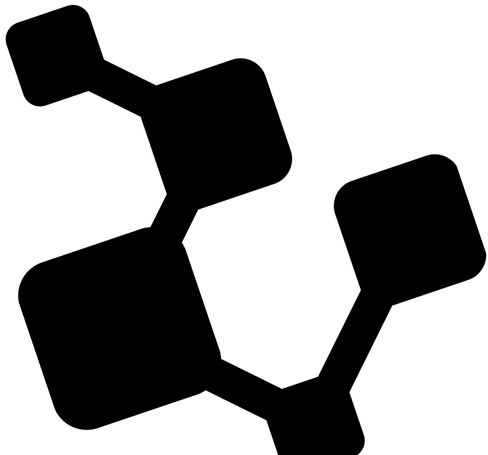




SMART WASTE DETECTION AND SORTING





TEAM MEMBERS

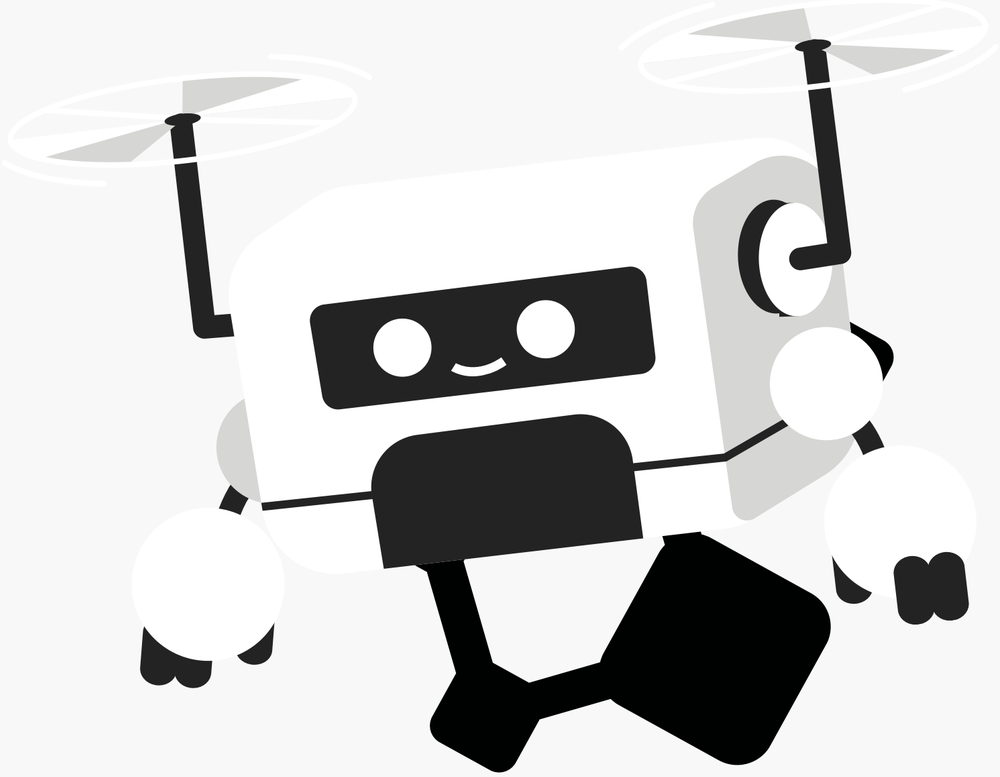
MOHAMED HOSAM

ABDALAH MEDHAT

NOUR ELDEIN AHMED

SALMA MOHAMED

AHMED ELSAEED



PROJECT OVERVIEW

DATA COLLECTION

DATA PREPROCESSING

DATA PREPROCESSING

IMAGE CLEANING

01

BALANCED CLASSES

02

IMAGE RESIZING

03

DATA PREPROCESSING

DATA AUGMENTATION

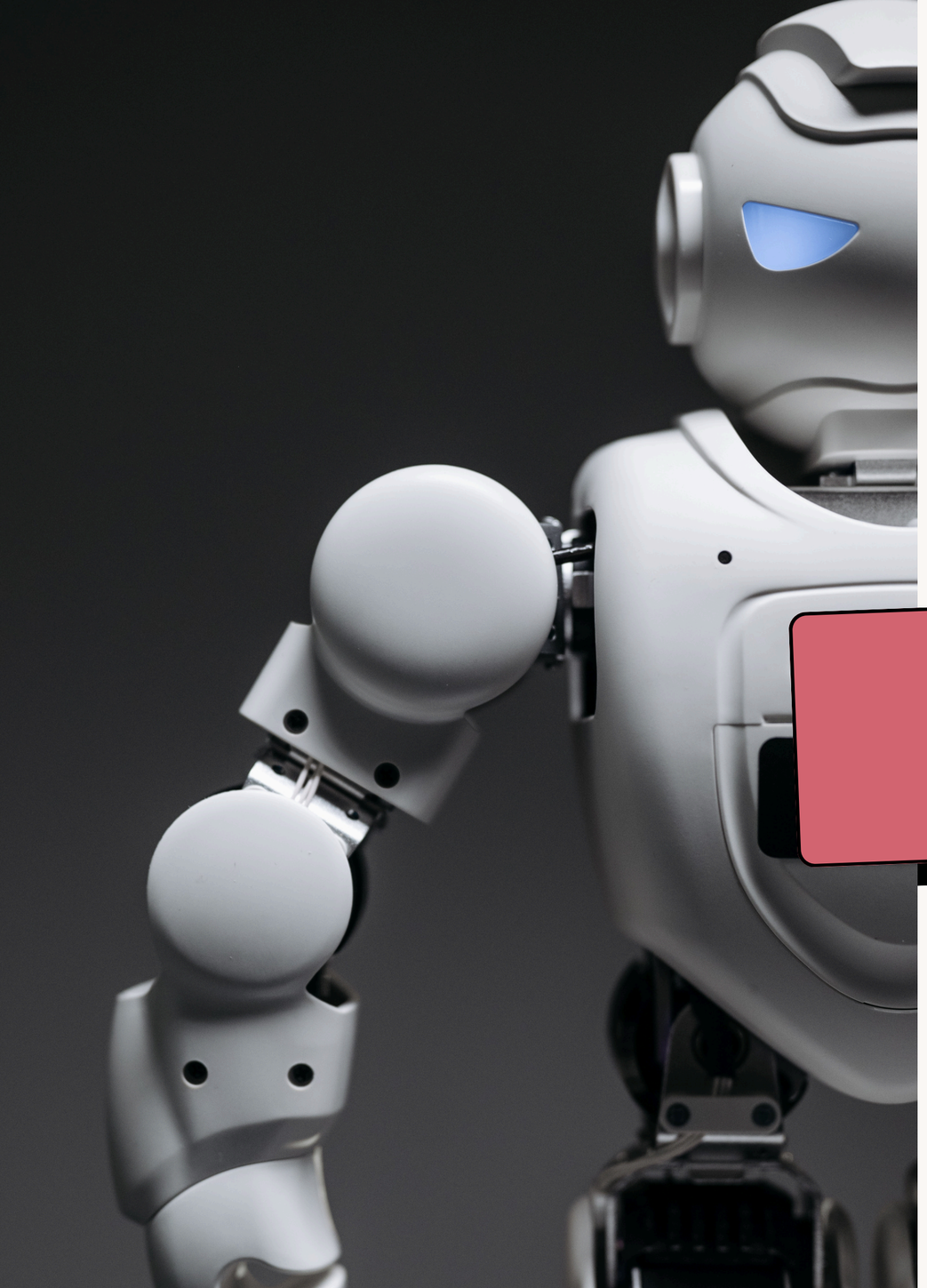
04

REMOVE BAD SAMPLES

05

TRAIN / VAL / TEST SPLIT

06

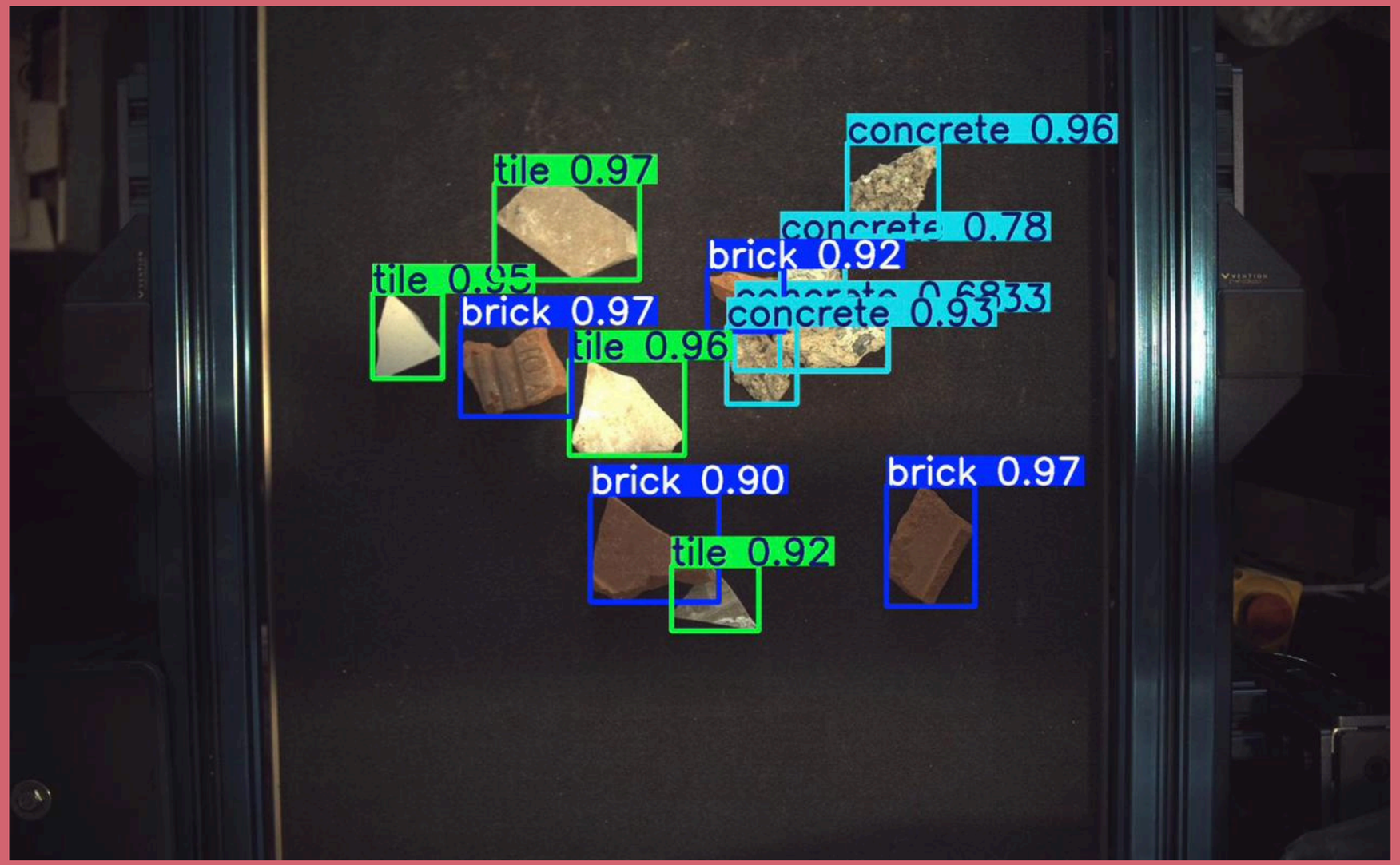


MODEL BUILDING

MODEL DEVELOPMENT & TRAINING PHASE

THE MODEL DEVELOPMENT PHASE FOCUSED ON SELECTING A HIGH-QUALITY DATASET, OPTIMIZING CLASS BALANCE, AND TRAINING AN OBJECT DETECTION MODEL CAPABLE OF ACCURATELY CLASSIFYING DIFFERENT TYPES OF
WASTE IN REAL TIME. SEVERAL DATASETS WERE EVALUATED AND TESTED TO DETERMINE WHICH ONE PROVIDED THE
BEST PERFORMANCE IN TERMS OF IMAGE QUALITY, ANNOTATION ACCURACY, CLASS DISTRIBUTION, AND COMPATIBILITY WITH YOLO MODELS. THROUGHOUT THIS PROCESS, DIFFERENT YOLO VERSIONS WERE EXPERIMENTED WITH, AND DATA AUGMENTATION WAS APPLIED WHERE NECESSARY TO IMPROVE ROBUSTNESS.

AFTER EXTENSIVE EXPERIMENTATION, THE CONSTRUCTION AND DEMOLITION WASTE OBJECT DETECTION DATASET (CODD) WAS IDENTIFIED AS THE MOST SUITABLE DATASET. IT OFFERED STRONG IMAGE DIVERSITY AND BALANCED WASTE CATEGORIES, LEADING TO STABLE TRAINING RESULTS. THE FINAL YOLOV8 MODEL ACHIEVED 97% ACCURACY ON THE TRAINING SET AND 90% ACCURACY ON THE VALIDATION SET, MAKING IT THE HIGHEST-PERFORMING MODEL AMONG ALL ATTEMPTS.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tile 0.97
concrete 0.78
brick 0.92
tile 0.95
concrete 0.93
brick 0.97
tile 0.96
brick 0.90
brick 0.97
tile 0.92

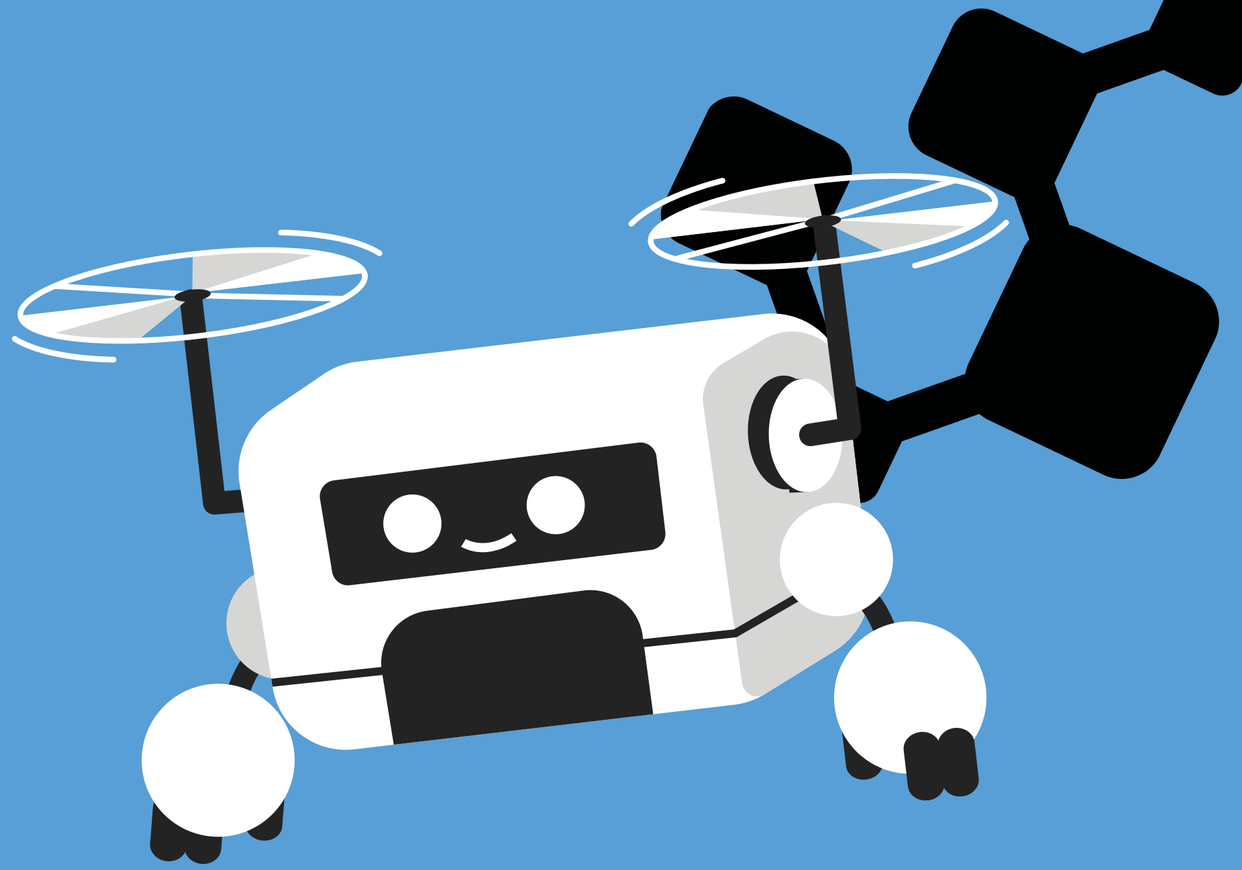
MODEL EVALUATION

1. Evaluate on Training Set

2.EVALUATE ON VALIDATION SET

3. EVALUATE ON TEST SET

4.FINE-TUNING & ITERATION



MODEL EVALUATION

DEPLOYMENT

DEPLOYMENT

1

PREPARE THE TRAINED MODEL

2

CHOOSE DEPLOYMENT PLATFORM

3

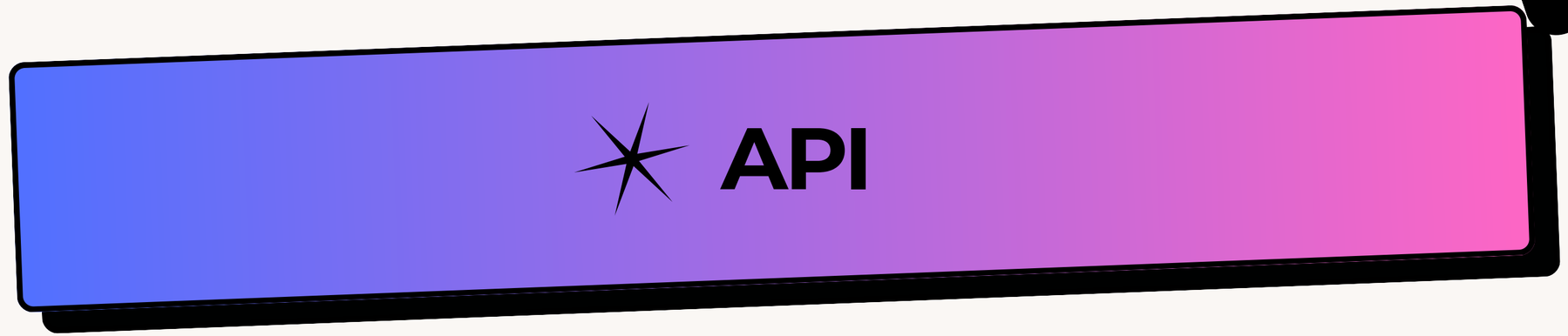
DEVELOP INFERENCE PIPELINE

4

INTEGRATE WITH APPLICATION

5

TEST DEPLOYMENT


API

FastAPI

BUILT USING FASTAPI AND ONNX RUNTIME

1

RECEIVES AN IMAGE AND RETURNS DETECTED OBJECTS

2

STREAMLIT INTEGRATION

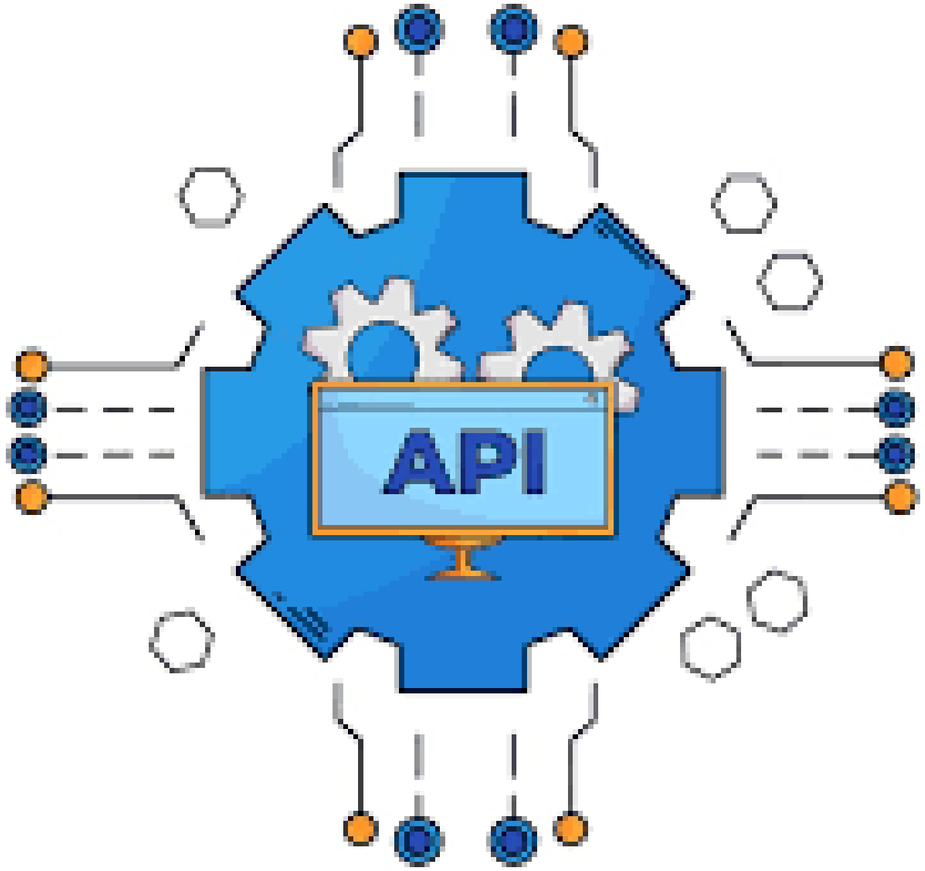
3

API PREPROCESSING

01 **FILTER & CLASSIFY**

02 **NORMALIZATION**

03 **CONVERT (BGR TO RGB)**

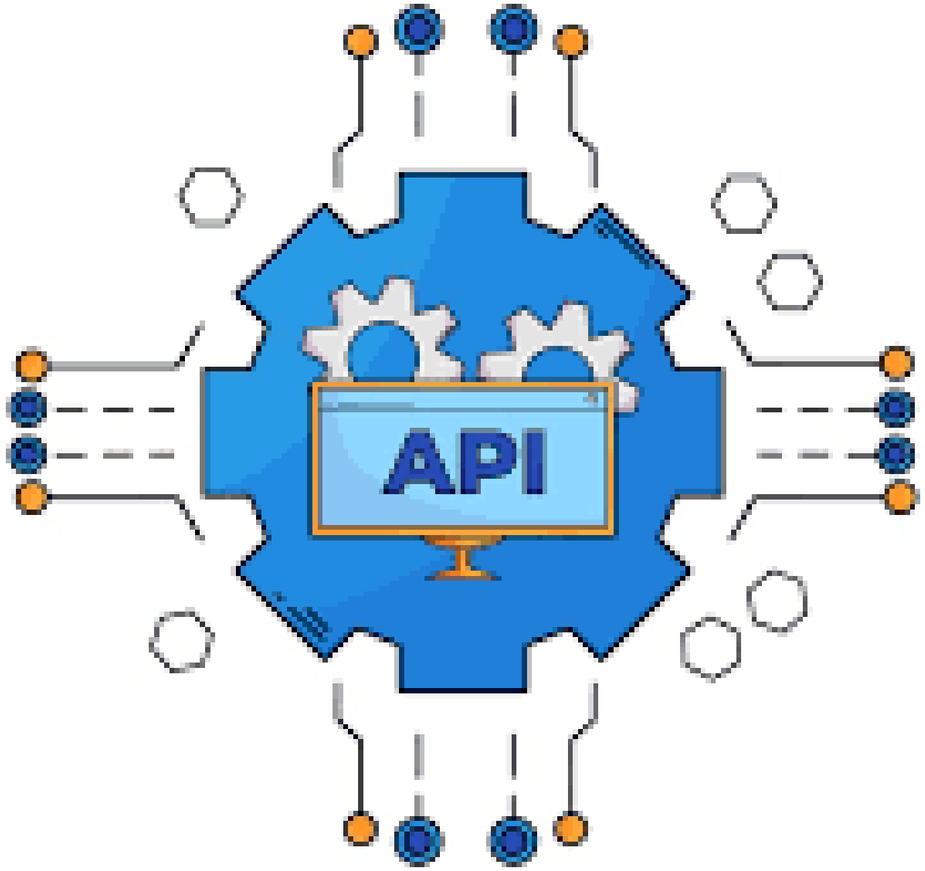


API POSTROCESSING

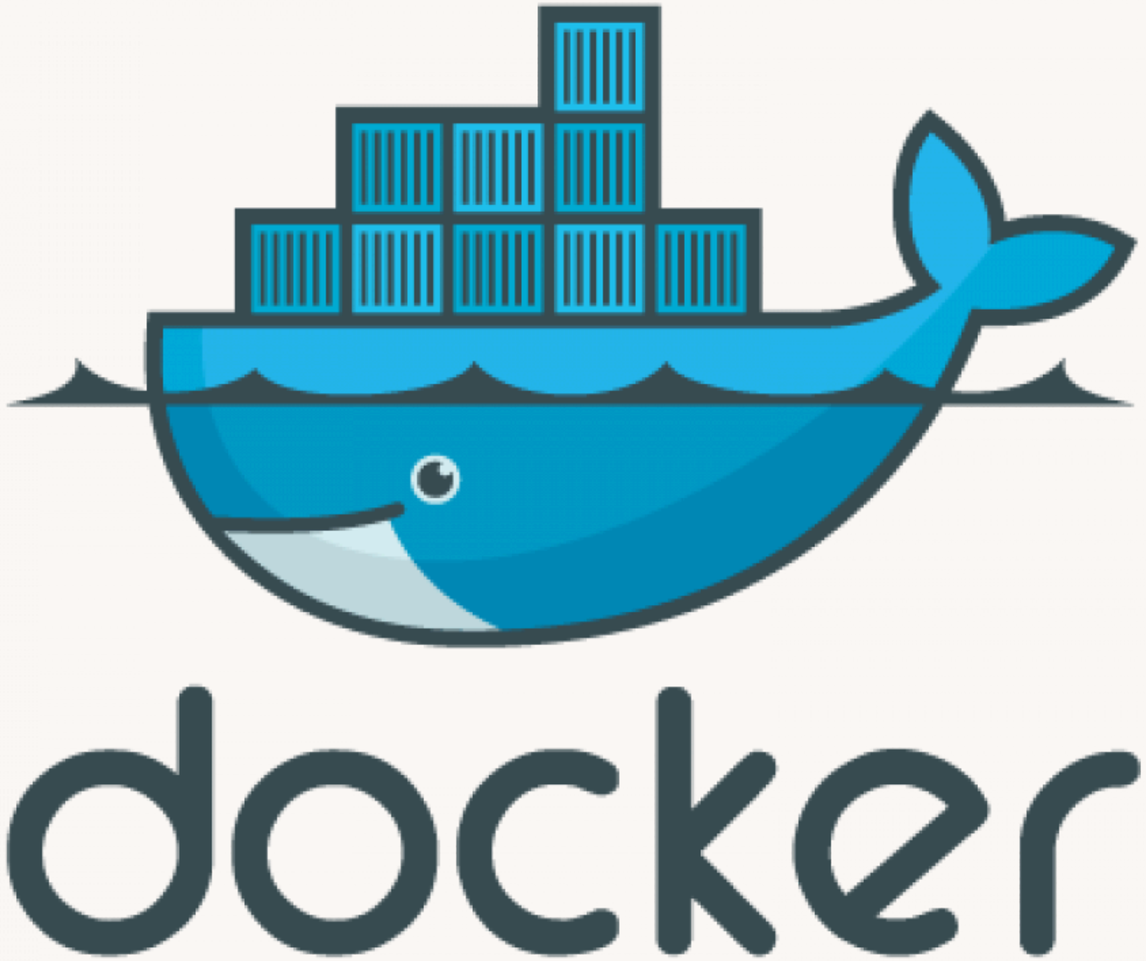
01 **FILTER & CLASSIFY**

02 **CONVERT & SCALE BOXES**

03 **SUPPRESS OVERLAPS**



DOCKERIZATION

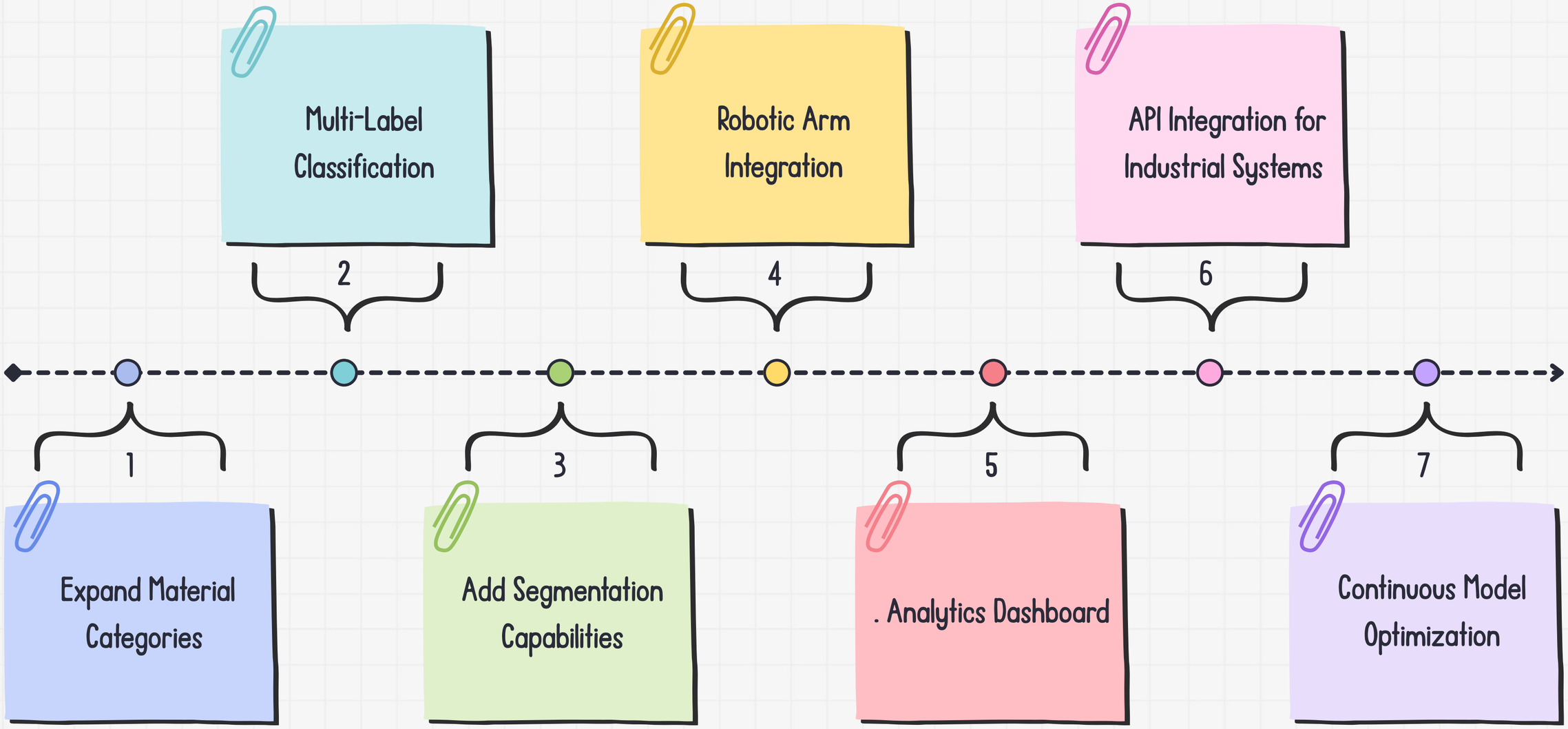


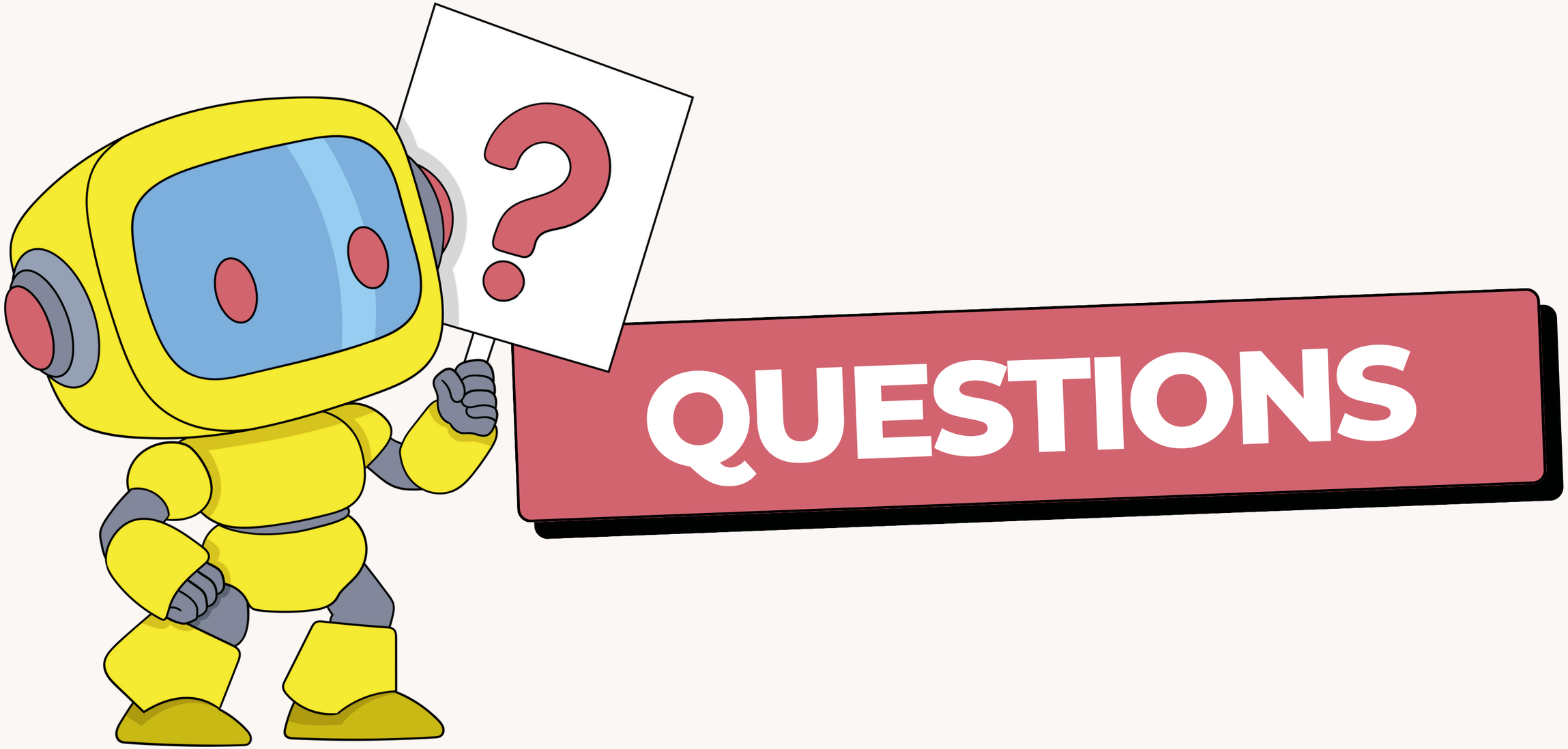
DOCKERIZATION

WHAT IS DOCKER	WHY DOCKER IS USEFUL	BASIC TERMINOLOGY
1	2	3

APP REVIEW

FUTURE DEVLOPMENT AND MARKTING


Multi-Label Classification
Robotic Arm Integration
API Integration for Industrial Systems
2
4
6
1
3
5
7
Expand Material Categories
Add Segmentation Capabilities
. Analytics Dashboard
Continuous Model Optimization


QUESTIONS

THANK YOU