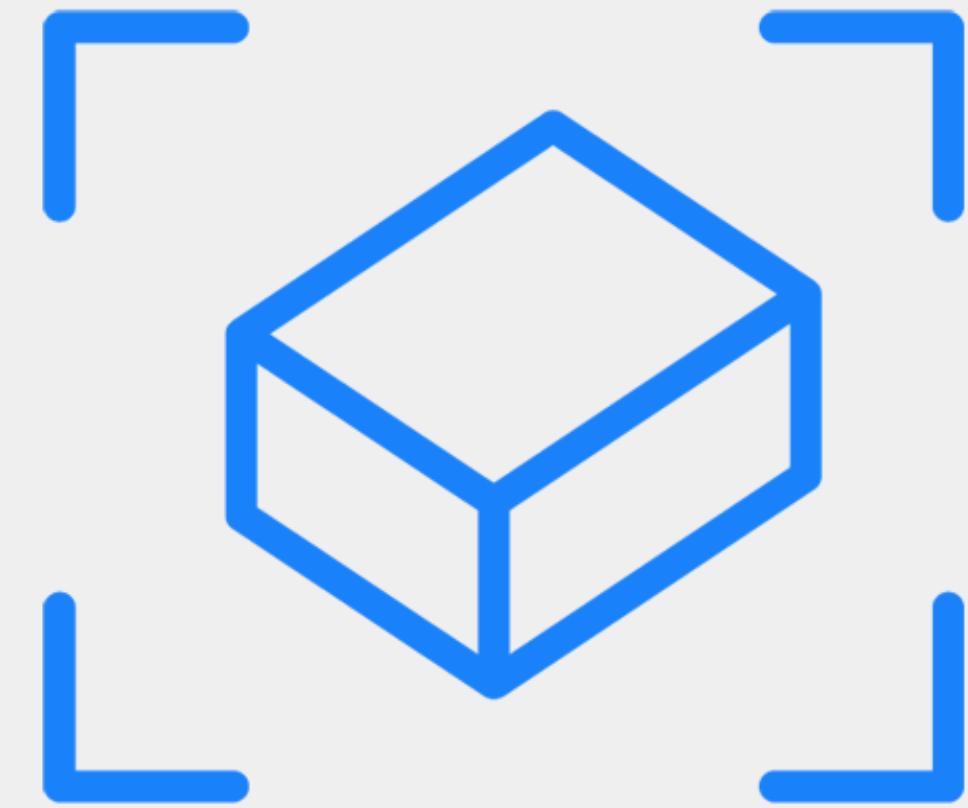


Final Project Presentation

Real-Time Safety Monitoring System



2025.06.16

MEERKAT

Table of Contents

01 Introduction (Team Wide)

02 System Architecture

03 Frontend Development

04 AI Integration (YOLO)

05 Backend Development

06 Demo Video

Our Team

Meet our Team Members

**ALIBOEV
ABBOS**

Team Leader
AI, Frontend

김태영

AI, Backend

전설민

Backend, DB

Tools & Technologies

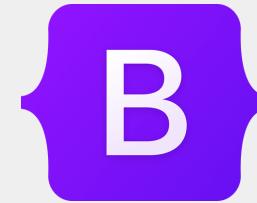
Design

Canva

Frontend



React



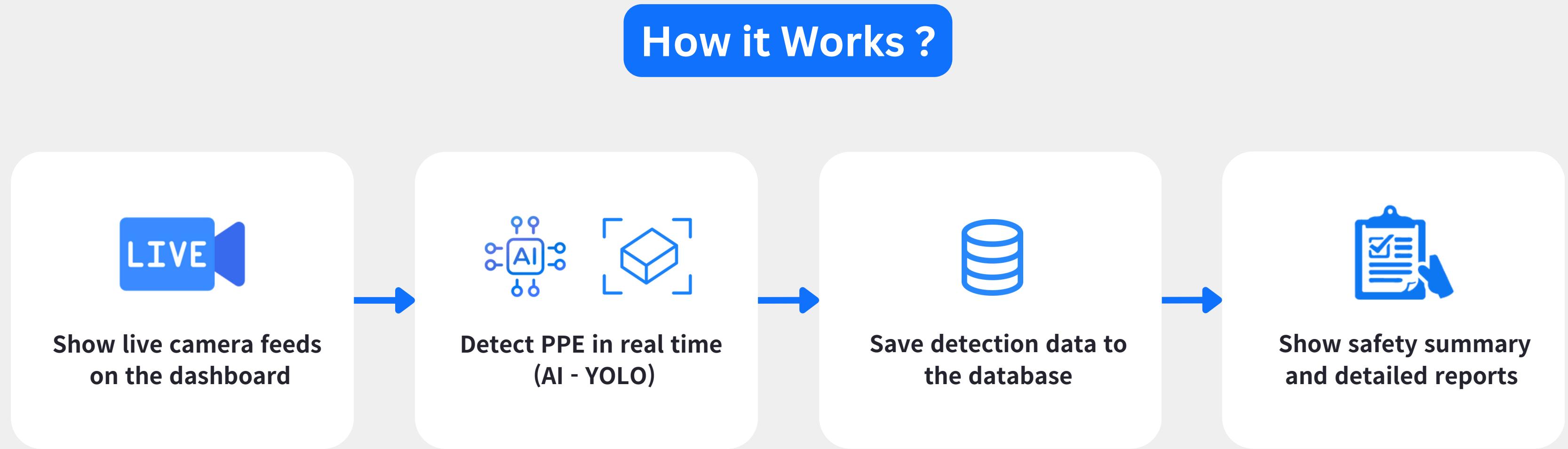
Backend



AI



System Architecture

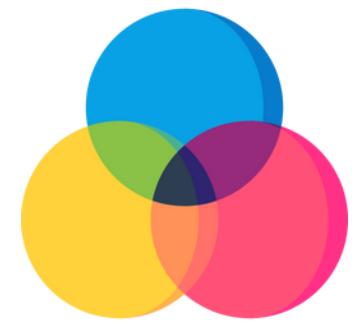


Frontend Development

UI DESIGN -> WELCOME -> DASHBOARD -> REPORT -> TIMELINE -> RESPONSIVE DESIGN -> REUSABLE COMPONENTS

UI Design

Simple and Clean



Blue & White



Minimalism



Mobile-friendly

Website Overview

Pages of Our Website

01 Welcome

02 Login

03 Dashboard

04 Camera Detail

05 Settings

06 Summary

07 Timeline

08 Report

09 Info

Let's see the UI details →

Welcome Page

AI Safety

Home About Services Pricing [Login](#)

Welcome to the Real-Time Safety Monitoring System

Monitor workplace safety in real time using smart AI technology. Detect PPE violations instantly, view live camera feeds, and stay in control — anytime, anywhere.

[Get Start](#)

What we do

Our system is designed to make safety monitoring fast, smart, and user-friendly. Simplicity and real-time response are our strengths.

Login Page



AI Safety
Safety Monitoring System

[INFO ABOUT SYSTEM](#)

Login Account

Email ID

Password

Keep me signed in [Support](#)

Login

[LOGIN FORM](#)

Dashboard Page (Home)

This image shows the Home page of a Factory Monitoring System. The interface includes a sidebar, a main monitoring area with six camera feeds, and various control and status elements.

Sidebar: Located on the left side, containing navigation items: AI, Home, Summary, Timeline, Archive, Report, Info, and a user icon.

Repository name: A label pointing to the "Home" tab in the sidebar.

Record icon: A label pointing to a circular icon in the top right corner of the main monitoring area.

Reload Language Settings: A label pointing to a gear icon in the top right corner of the main monitoring area.

Counts: A label pointing to numerical values (e.g., 12, 8, 16, 25, 15, 26, 12) displayed above each camera feed.

Status indicators: A label pointing to colored circles (orange, red, green) indicating the status of each camera feed.

Runtime: A label pointing to the timestamp displayed below each camera feed.

Factory Monitoring System: The main title for the monitoring area.

Camera Feeds: Six camera feeds labeled CAM 1 through CAM 6, showing different areas of the factory:

- CAM 1: Shows workers on a production line. Status: Safe. Runtime: 01:00:24. Counts: 12 (orange), 5 (red).
- CAM 2: Shows a warehouse floor with yellow bins. Status: Danger. Runtime: 01:07:19. Counts: 8 (orange), 12 (red). REC indicator is present.
- CAM 3: Shows a worker in a warehouse aisle. Status: Safe. Runtime: 01:15:02. Counts: 16 (orange), 3 (red).
- CAM 4: Shows a warehouse floor with stacks of boxes. Status: Warning. Runtime: 01:19:56. Counts: 25 (orange), 9 (red). REC indicator is present.
- CAM 5: Shows a forklift in a warehouse. Status: Safe. Runtime: 00:53:03. Counts: 15 (orange), 2 (red). Inside Warehouse label is visible.
- CAM 6: Shows a worker at a dock. Status: Safe. Runtime: 00:45:25. Counts: 26 (orange), 12 (red). Inside Dock label is visible.

Camera Detail Page

The screenshot displays the Camera Detail Page for 'CAM 1'. The interface is organized into several sections:

- Left Sidebar (AI):** Includes links for Home, Summary, Timeline, Archive, Report, and Info.
- Top Bar:** Shows the camera name (> CAM 1), a date and time indicator (Wed, 12/02/2024, 17:54 GMT+3), and three main buttons: **Filter**, **Photo & Video**, and a circular icon.
- Alerts Section:** Titled 'Camera Alerts' and lists events from Feb 10 to 12, 2025, categorized by type (e.g., Hard Hat, Mask, Glasses, Reflective Vest, Fall, Fire). A blue box labeled 'Detect events' highlights the 'Report' link in the sidebar.
- Video Preview:** A large video player window shows a factory floor scene with three workers. Annotations provide details for each worker: Worker ID: 2 (Confidence: 83%), Worker ID: 3 (Confidence: 91%), and Worker ID: 1 (Confidence: 89%). These annotations include PPE status (e.g., Hard hat checked, Gloves unchecked) and a timestamp (-03:46). A blue box labeled 'Icon' highlights the camera icon in the bottom right of the video player.
- Metrics Section:** Displays counts for different categories: HELMET (7), VEST (5), FIRE (3), and FALL (2). A blue box labeled 'Count of alerts' highlights the '12 Alerts' count.
- Line Chart:** A chart showing trends for Helmet, Vest, and Fire over the days Monday through Sunday. A blue box labeled 'Trend analysis' highlights the chart area.
- Detections Section:** Lists detections for specific workers: Worker ID: 03 (9) and Worker ID: 02 (3). A blue box labeled 'Counts by workers' highlights these counts.

Annotations with dashed blue boxes and arrows point to specific UI elements:

- Icon:** Points to the camera icon in the bottom right corner of the video preview.
- Recorded Video:** Points to the play button in the video player.
- Save:** Points to the save icon in the bottom right corner of the video player.
- Count of alerts:** Points to the '12 Alerts' text in the top right corner.
- Count of detect:** Points to the counts in the 'HELMET', 'VEST', 'Fire', and 'Fall' section.
- Trend analysis:** Points to the line chart showing trends.
- Counts by workers:** Points to the counts for Worker ID: 03 and Worker ID: 02.

Timeline Page

The screenshot shows the Timeline Page interface with several key components highlighted:

- Filter**: A button on the left sidebar.
- Events by Camera**: A section on the left sidebar showing event counts for different cameras.
- Main Event**: A section on the left displaying a list of events from all cameras, with one event from Cam 4 selected.
- Archive**: A section on the right displaying records of detected events, ordered by time.
- Buttons**: A group of three icons at the top right: Refresh, Global, and Settings.
- Camera Tab**: A tab bar at the top of the Archive section, with "Cam 1" selected.
- Filter**: A dropdown filter in the Archive section.
- Events**: A section on the right showing event details with thumbnail images.

Main Event (Left Column):

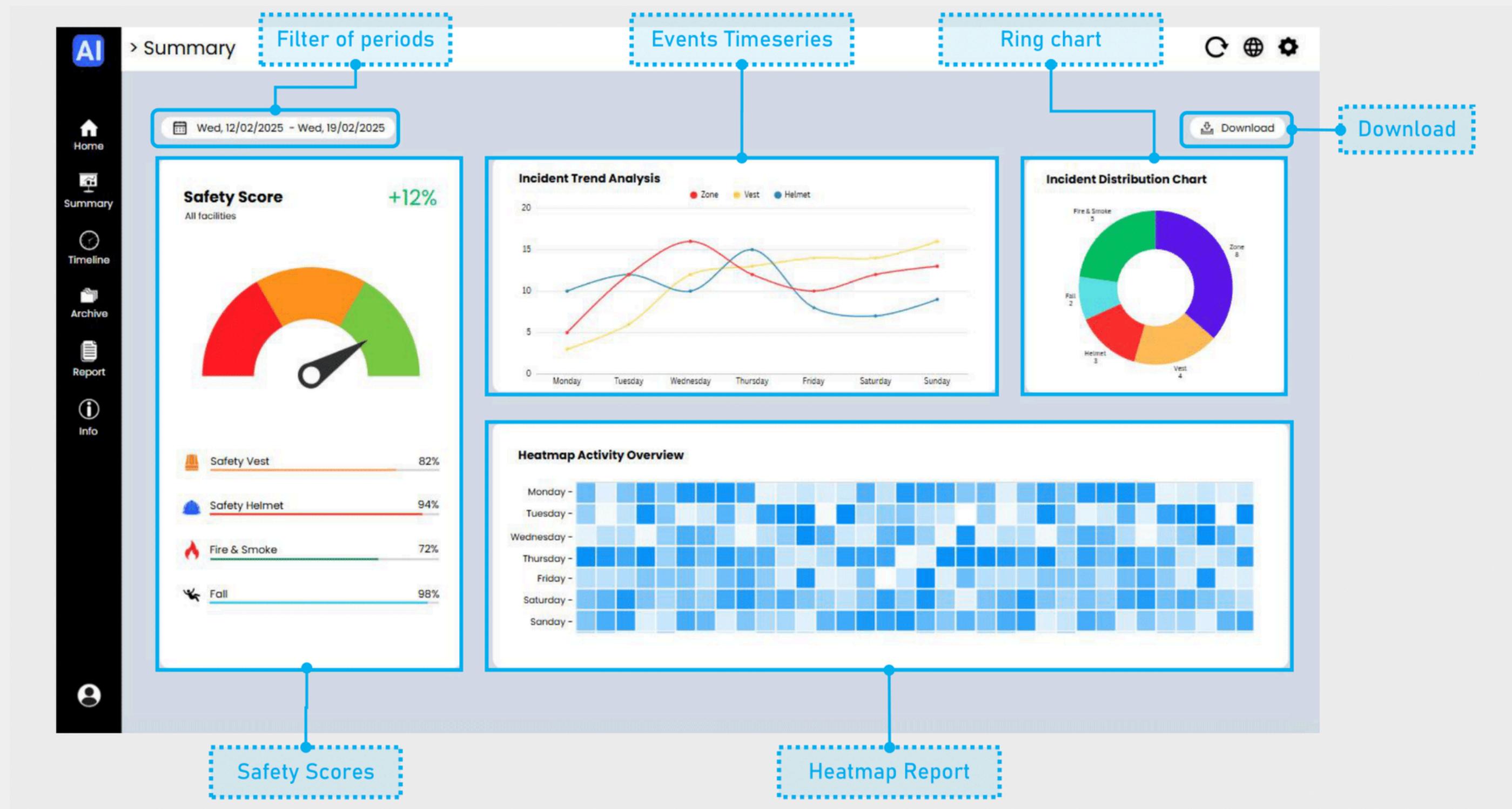
Camera	Date	Action
Cam 3	Feb 12, 2025, 18:25	Bell icon
Cam 4	Feb 12, 2025, 17:54	Bell icon
Cam 2	Feb 12, 2025, 16:45	Glove icon
Cam 1	Feb 12, 2025, 12:12	Flame icon
Cam 3	Feb 12, 2025, 18:25	Bell icon
Cam 4	Feb 12, 2025, 17:54	Bell icon
Cam 2	Feb 12, 2025, 16:45	Glove icon
Cam 1	Feb 12, 2025, 12:12	Flame icon
Cam 3	Feb 12, 2025, 18:25	Bell icon
Cam 4	Feb 12, 2025, 17:54	Bell icon
Cam 2	Feb 12, 2025, 16:45	Glove icon
Cam 1	Feb 12, 2025, 12:12	Flame icon

Archive (Right Column):

Time	Situation
Feb 12, 2025, 18:25	Helmet Detect
Feb 12, 2025, 18:12	Vest Detect
Feb 12, 2025, 18:05	Helmet Detect

Summary Page

Recharts React Library



Report Page

Bootstrap

The screenshot shows a report page interface with the following components highlighted:

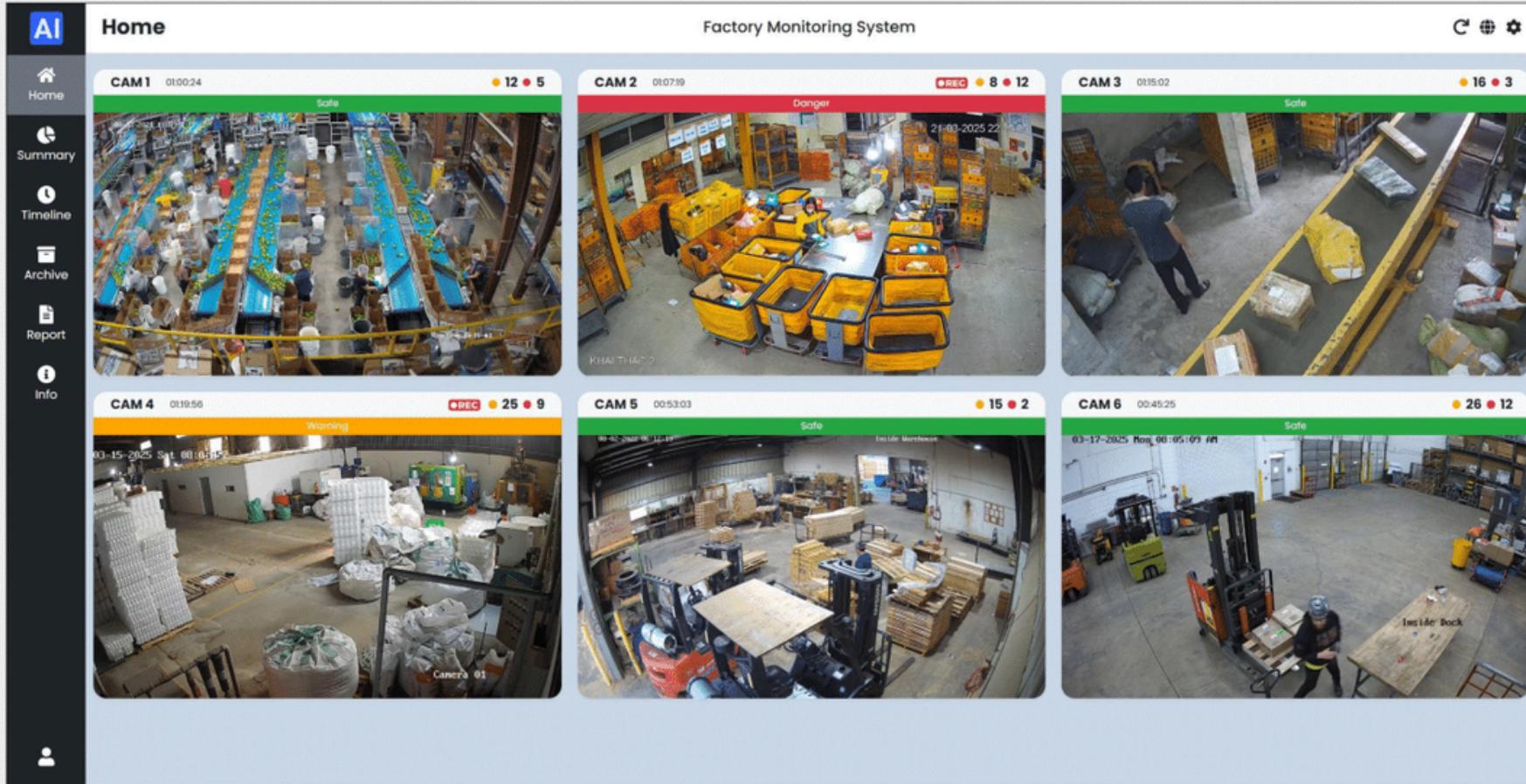
- Filter**: A sidebar menu on the left containing icons for Home, Summary, Timeline, Archive, Report, and Info.
- Search**: A search bar at the top of the main content area.
- More info**: A "More Info" button next to each row in the table.
- Alert Button**: An "ALERTED" button in the "Notify Advisor" column for the second row.
- Select All**: A "Select All" checkbox at the top of the "Select" column.
- Select**: Individual checkboxes in the "Select" column for each row.
- Alert & Download Buttons**: Buttons for "Alert" and "Download" located at the bottom right of the table.
- Worker Details**: A label pointing to the "Timeline" icon in the sidebar.

Search Results

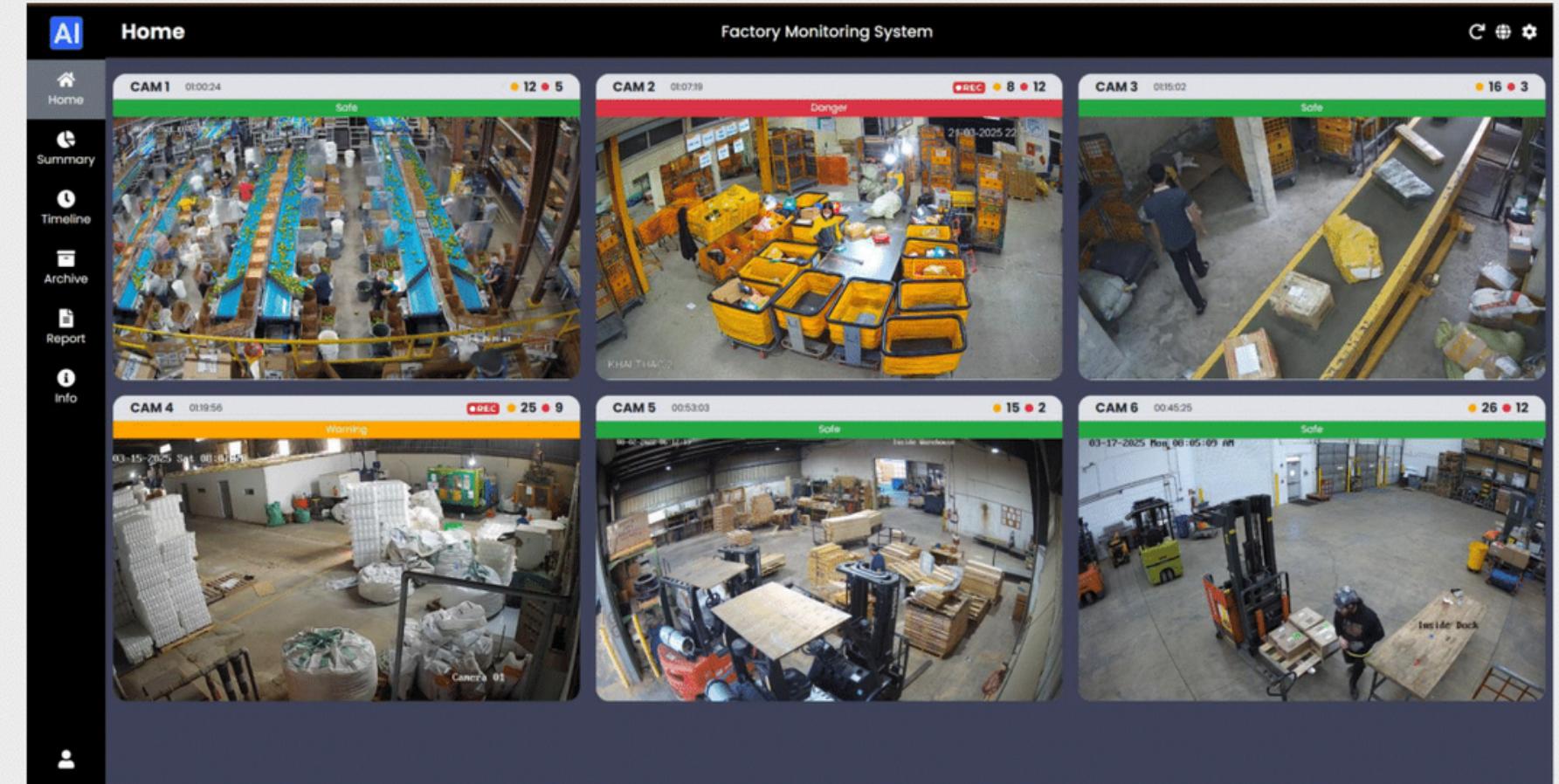
ID	Name	Date	Event	Notify Advisor	Select
2025041	Kim Su Min	2025.05.12 18:01	More Info	ALERTED	<input checked="" type="checkbox"/>
2025167	Lee Mln Ho	2025.05.12 17:55	More Info	ALERT	<input type="checkbox"/>
2025793	Kang Dong Won	2025.05.12 15:48	More Info	ALERTED	<input checked="" type="checkbox"/>
2025041	Kim Su Min	2025.05.12 12:42	More Info	ALERT	<input type="checkbox"/>
2025041	Kim Su Min	2025.05.11 13:39	More Info	ALERTED	<input checked="" type="checkbox"/>
2025793	Kang Dong Won	2025.05.11 10:35	More Info	ALERT	<input type="checkbox"/>
2025167	Lee Mln Ho	2025.05.11 08:32	More Info	ALERT	<input type="checkbox"/>
2025041	Kim Su Min	2025.05.10 13:26	More Info	ALERT	<input type="checkbox"/>
2025167	Lee Mln Ho	2025.05.10 12:23	More Info	ALERTED	<input checked="" type="checkbox"/>
2025041	Kim Su Min	2025.05.10 10:55	More Info	ALERT	<input type="checkbox"/>
2025793	Kang Dong Won	2025.05.10 10:32	More Info	ALERT	<input type="checkbox"/>
2025041	Kim Su Min	2025.05.10 09:25	More Info	ALERT	<input type="checkbox"/>

Dark and Light Mode

Light Mode

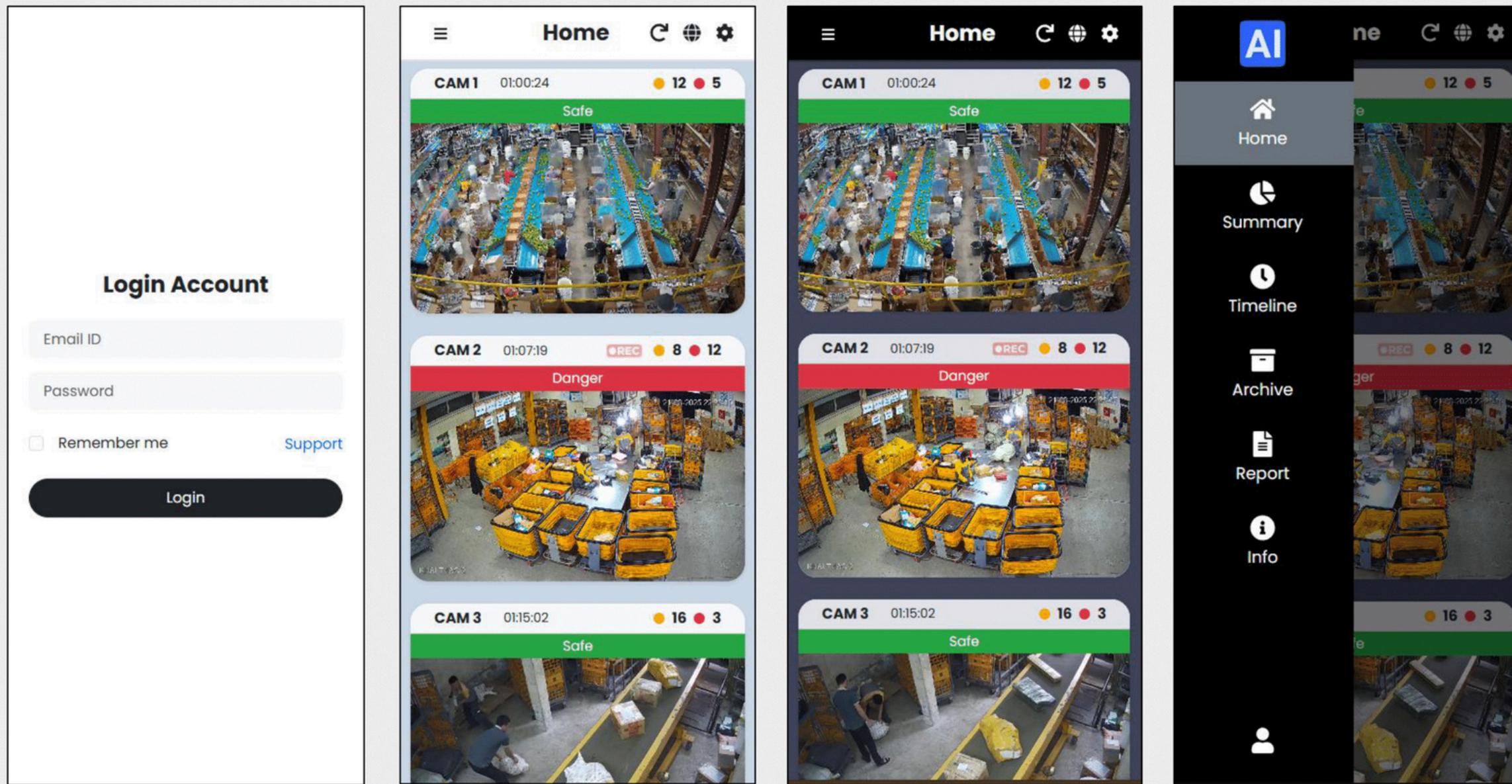


Dark Mode



Responsive Design

Mobile Device



Bootstrap & Media Quiry

Hooks and Routing

Ex: Camera Detail Page

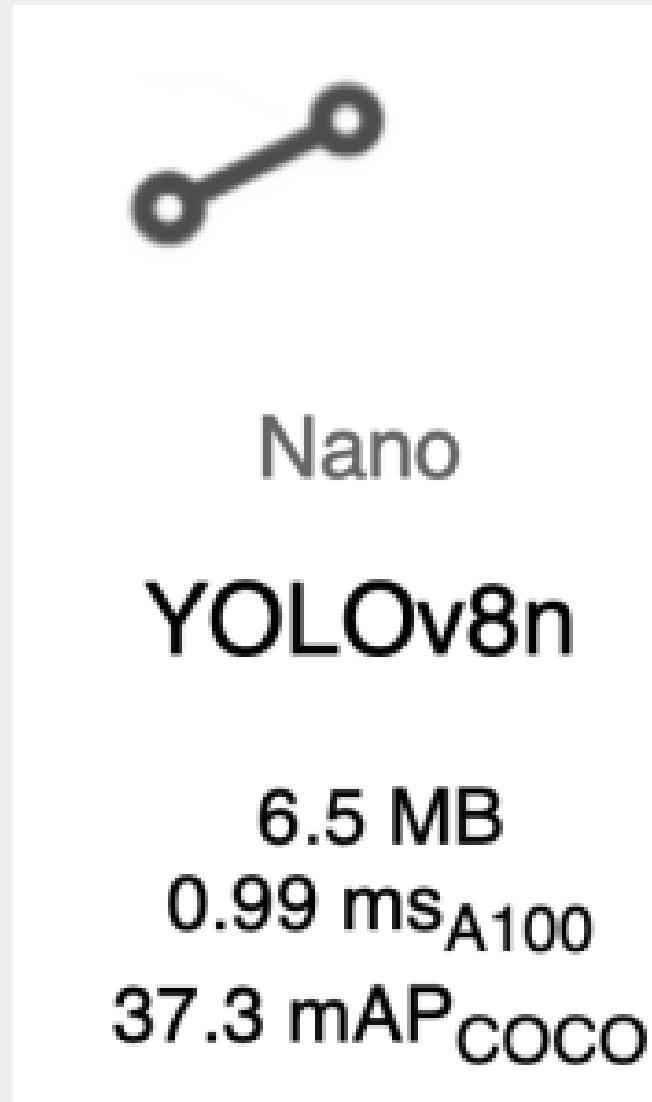
HOOK	SYMBOL	DESCRIPTION EXAMPLE
USESTATE		ALERTS, FILTER → UI UPDATES
USEEFFECT		FETCH ALERTS EVERY 10S
USEMEMO		COUNT & SORT ALERTS FASTER
USEPARAMS		/CAMERA/3 → CAMERA ID = 3
USEOUTLETCONTEXT		SHARE DATA FROM PARENT LAYOUT

AI (YOLO) Development

TRAINING → LOGIC

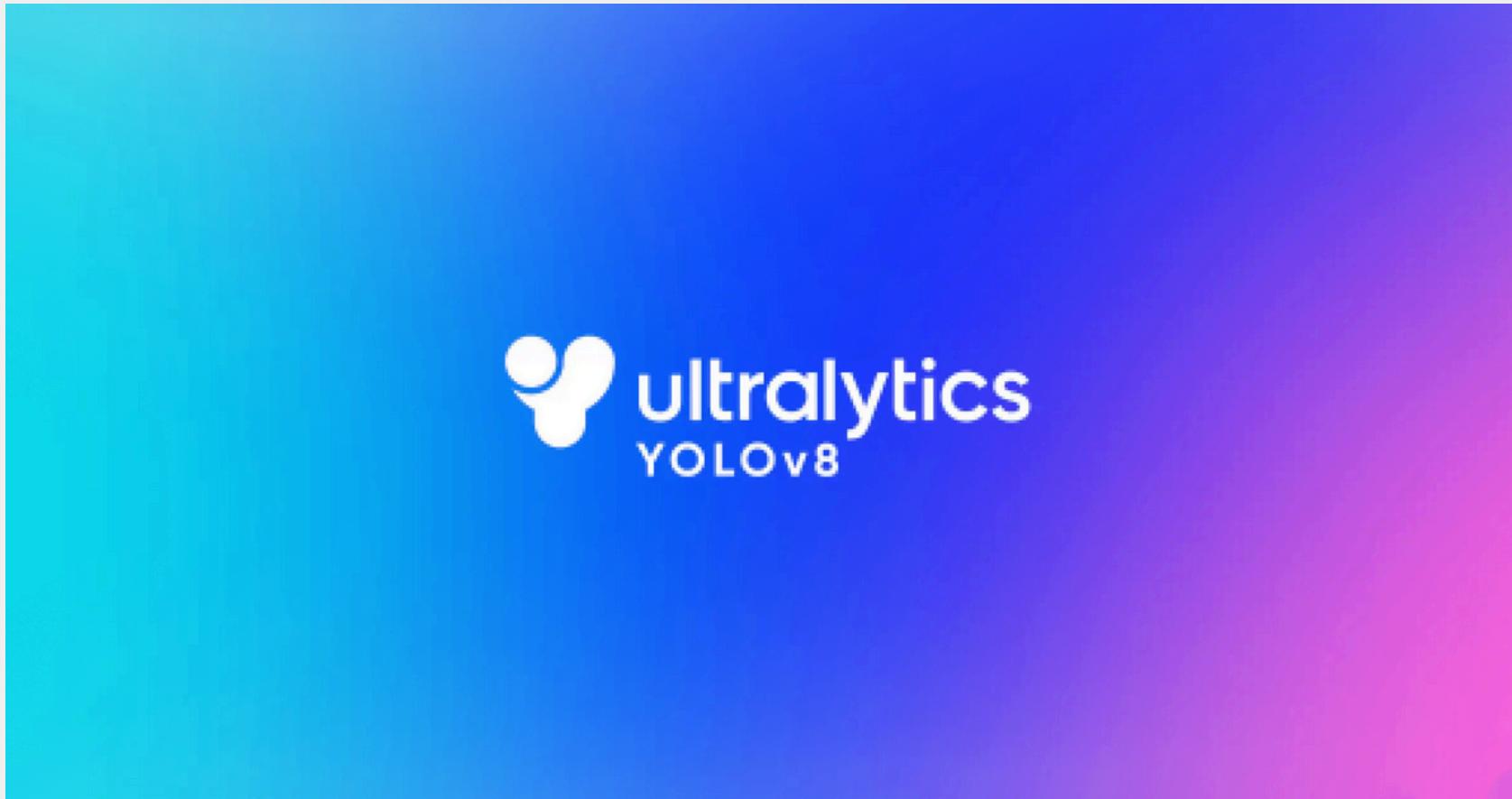
AI Model

YOLOv8n



AI Model

YOLOv8n



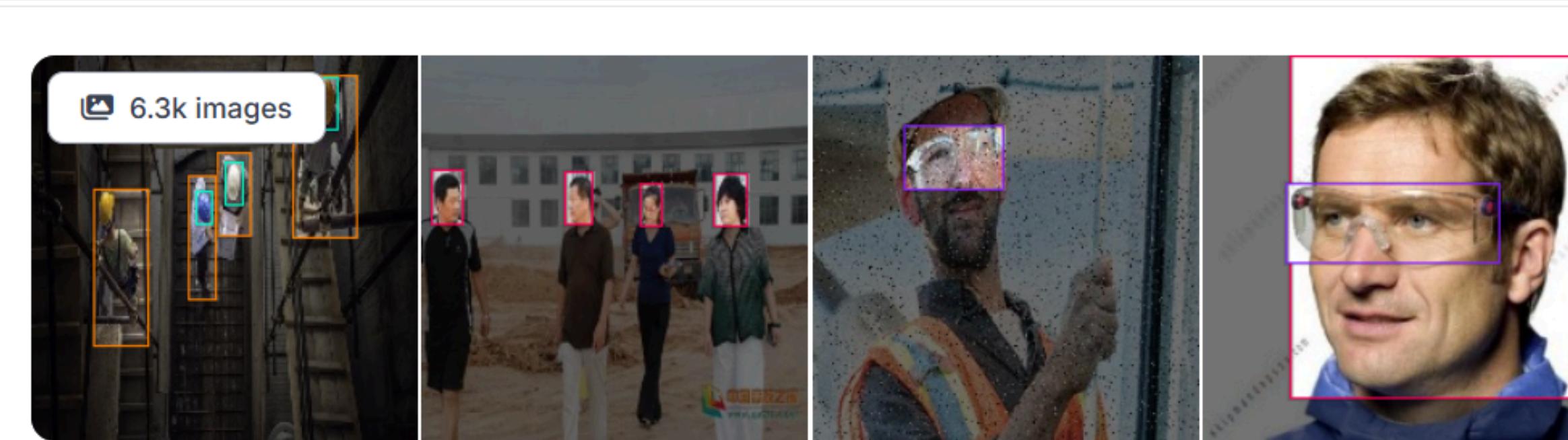
ONLY ONE



Need Multi-Label Class

AI Model

Phase 1



PPE Detection Computer Vision Project

ppe Updated 2 years ago

1,176 images

AI Model

Classes 7

Tags 0

?

What is a class?

L

COLOR	CLASS NAME	COUNT
	Gloves	995
	Safety-Boot	1,243
	glass	750
	head	3,726
	helmet	2,729
	person	6,585
	vest	2,806

AI Model



AI Model

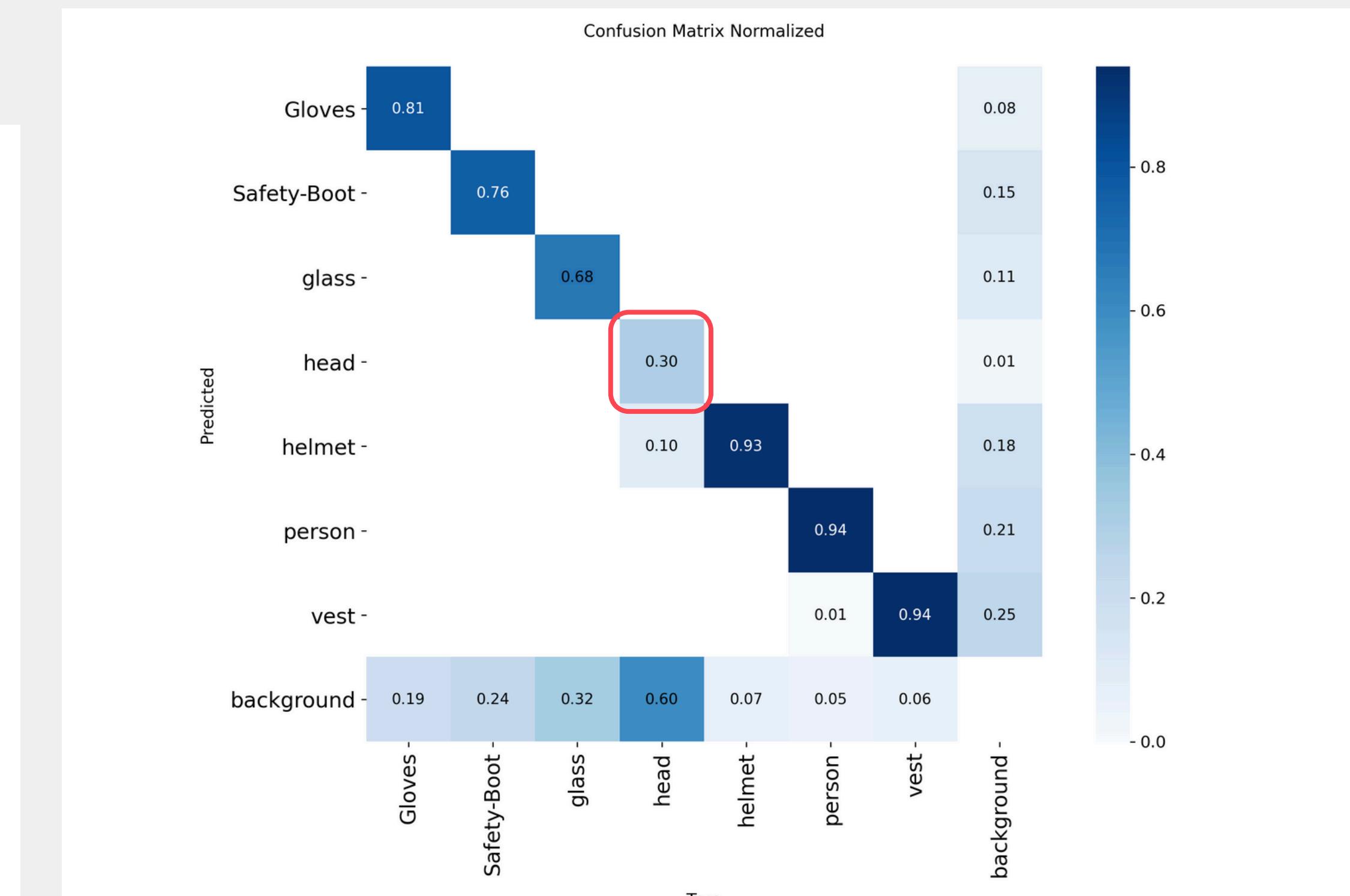
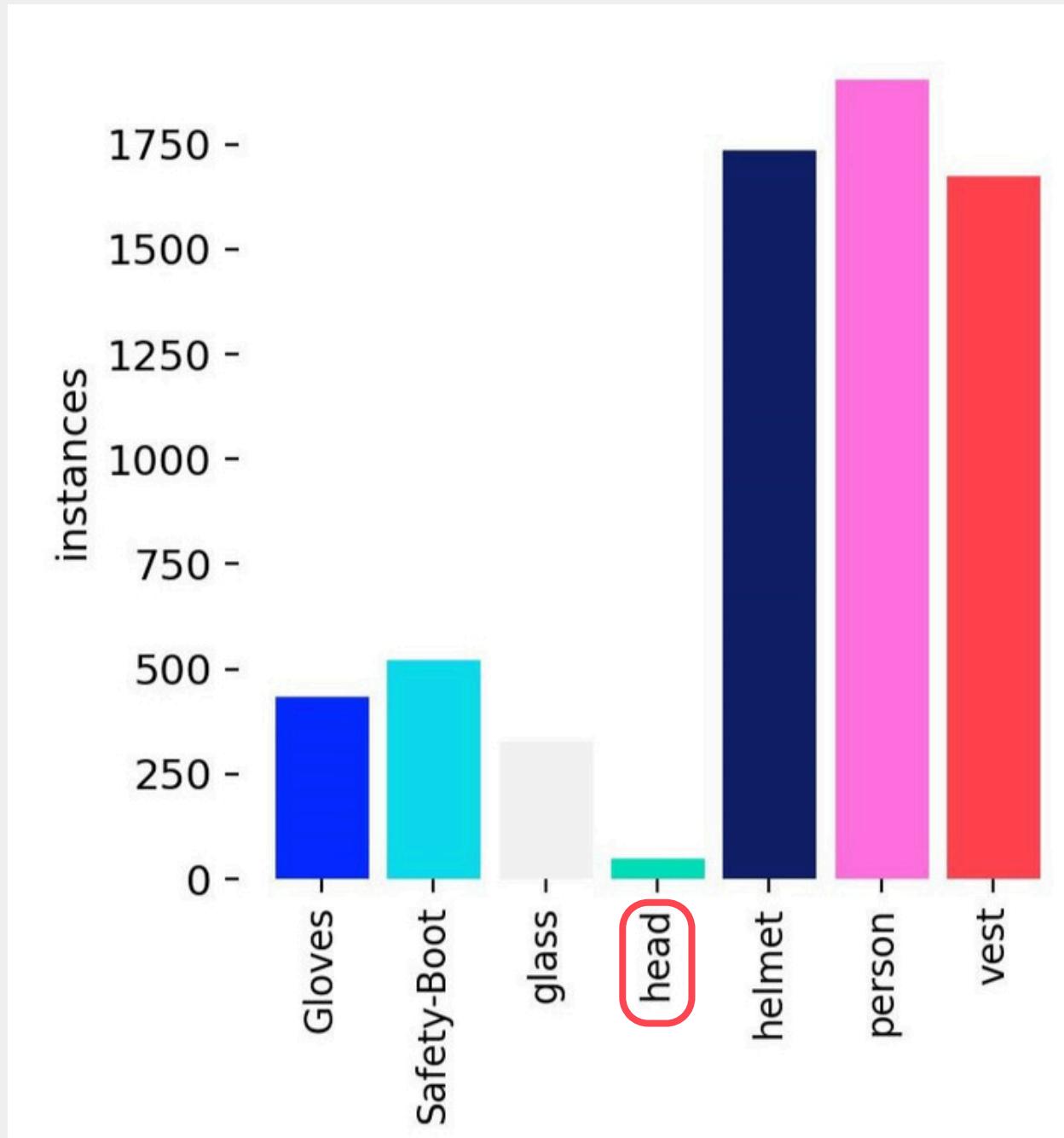
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
62/70	1.81G	0.9916	0.5594	1.196	67	640: 100% ██████████ 147/147 [00:07<00:00, 20.03it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.908)	R 0.889	mAP50 0.942	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.58it/s] 0.665
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
63/70	1.81G	0.9789	0.5447	1.185	52	640: 100% ██████████ 147/147 [00:07<00:00, 20.04it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.916)	R 0.888	mAP50 0.949	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.42it/s] 0.673
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
64/70	1.81G	0.9727	0.5409	1.18	55	640: 100% ██████████ 147/147 [00:07<00:00, 20.13it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.947)	R 0.899	mAP50 0.954	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.59it/s] 0.673
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
65/70	1.81G	0.9716	0.5413	1.178	62	640: 100% ██████████ 147/147 [00:07<00:00, 20.08it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.907)	R 0.931	mAP50 0.951	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.36it/s] 0.675
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
66/70	1.81G	0.9617	0.5359	1.178	52	640: 100% ██████████ 147/147 [00:07<00:00, 20.10it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.928)	R 0.904	mAP50 0.949	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.29it/s] 0.672
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
67/70	1.81G	0.9583	0.5316	1.168	42	640: 100% ██████████ 147/147 [00:07<00:00, 20.09it/s]	
	Class all	Images 234	Instances 1870	Box(P 0.898)	R 0.926	mAP50 0.953	mAP50-95): 100% ██████████ 15/15 [00:00<00:00, 19.69it/s] 0.677

AI Model



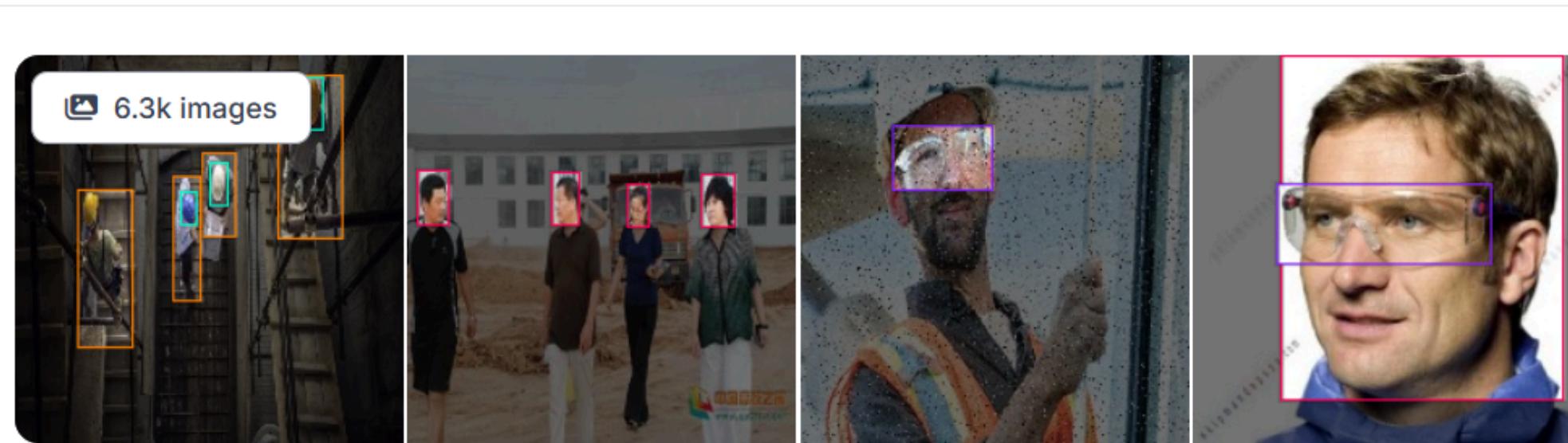
Bad in 'Head' Detection..

AI Model



AI Model

Phase 2

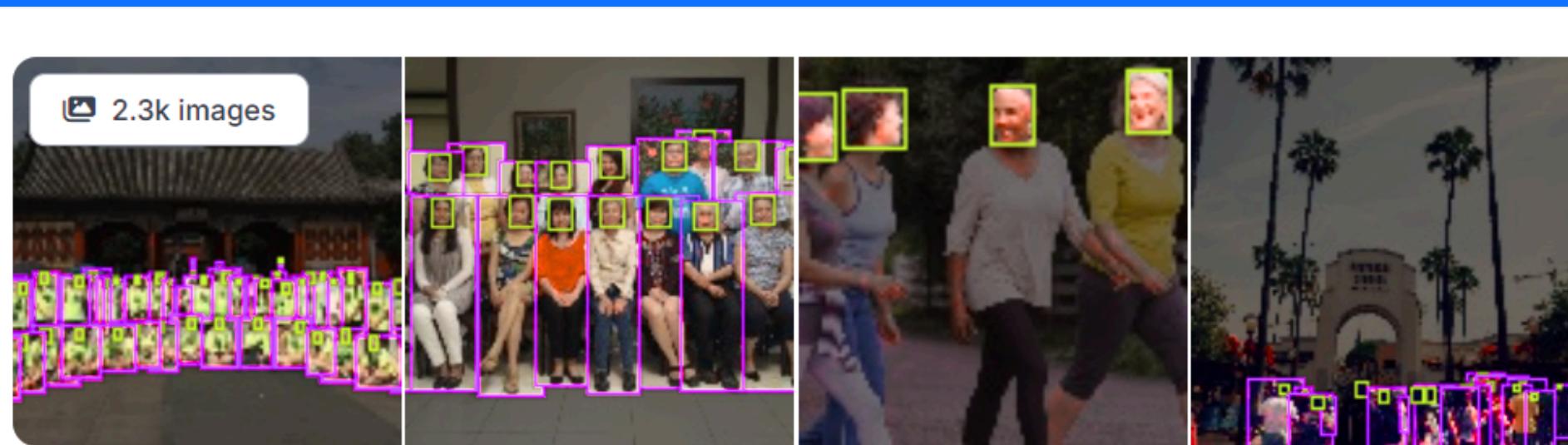


2,551 images

PPE Detection Computer Vision Project

👤 ppe Updated 2 years ago

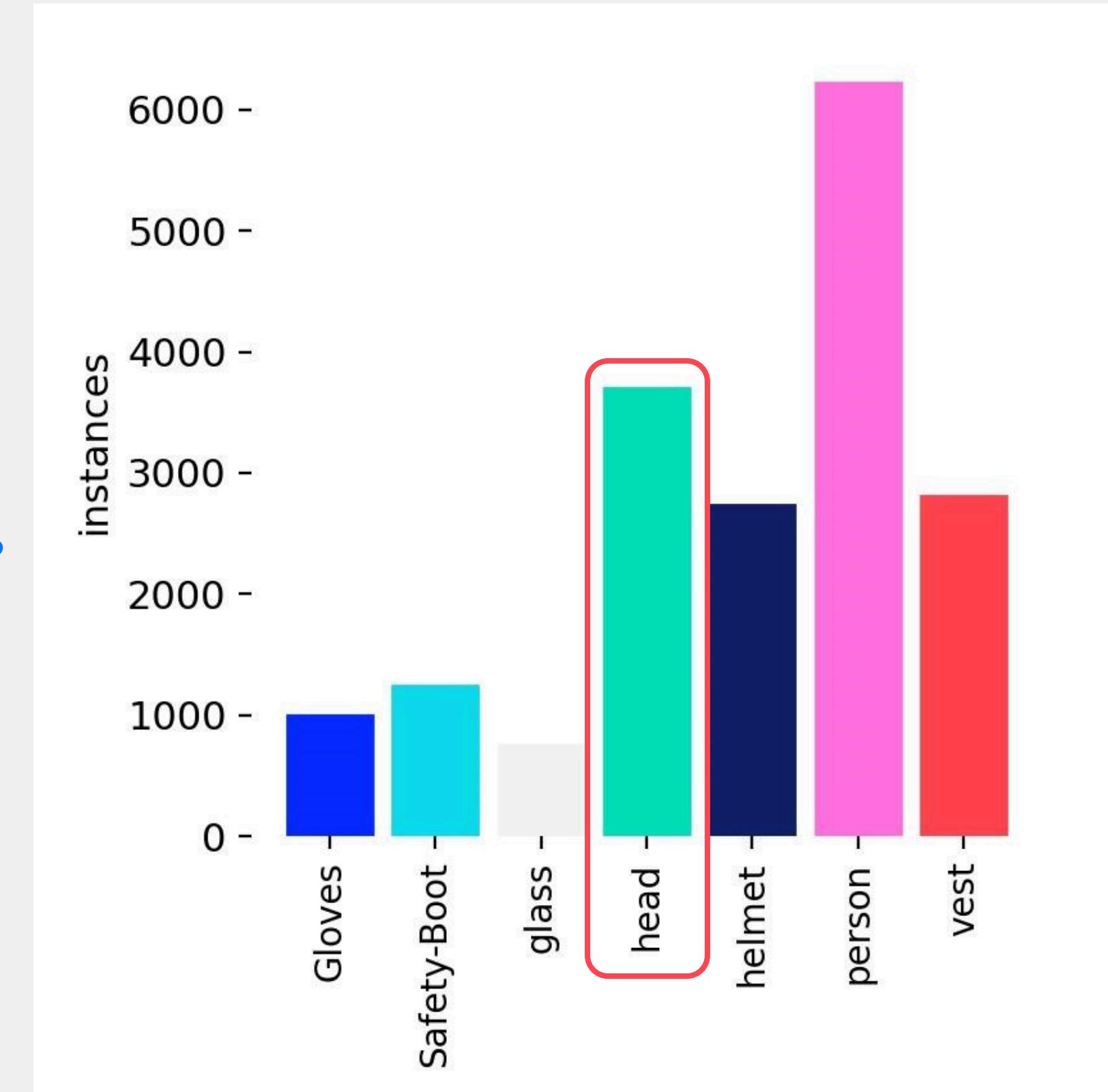
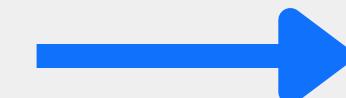
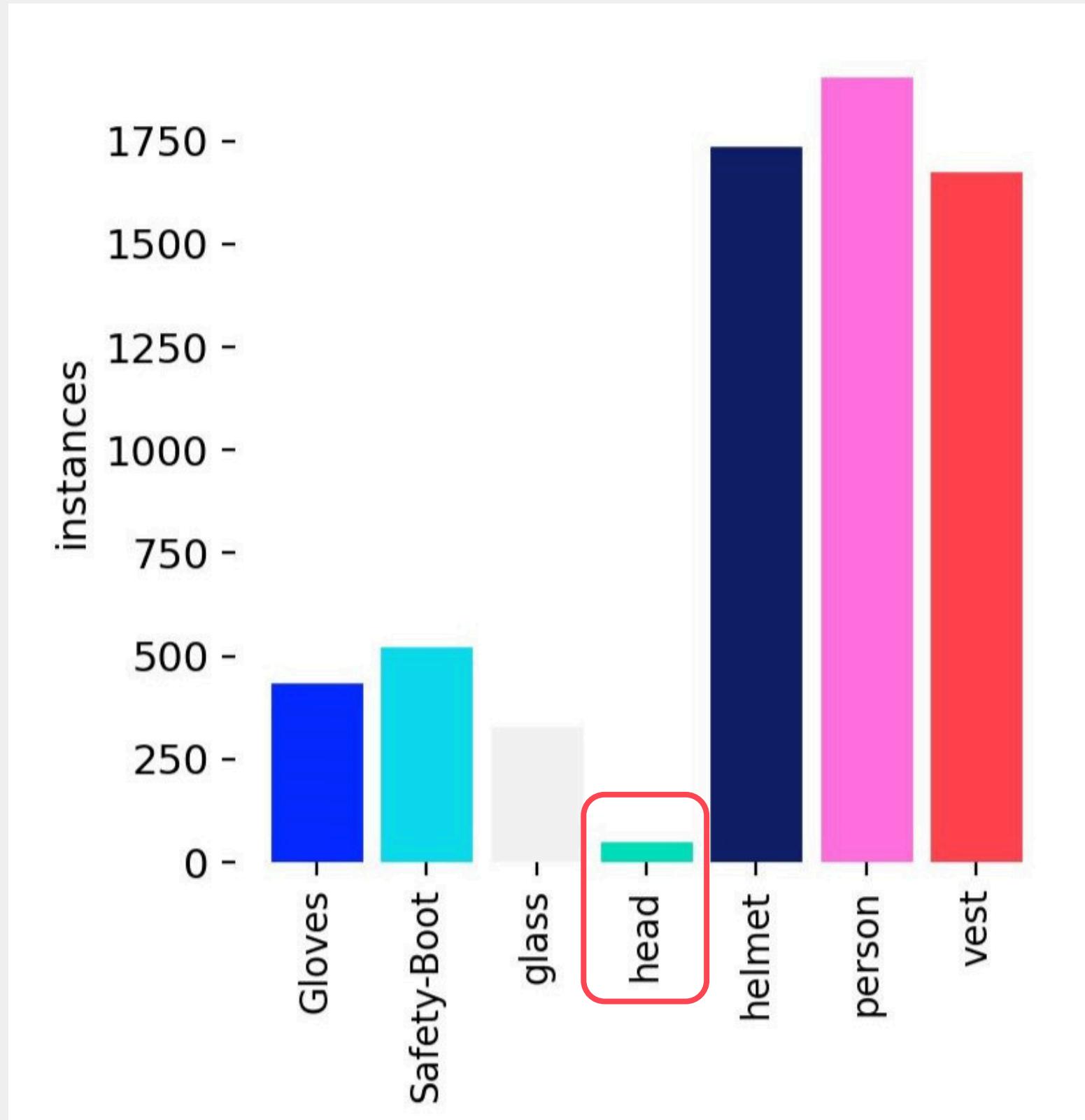
For 'Head' Detection



Human 4 Computer Vision Project

👤 Crowd Human Updated 4 years ago

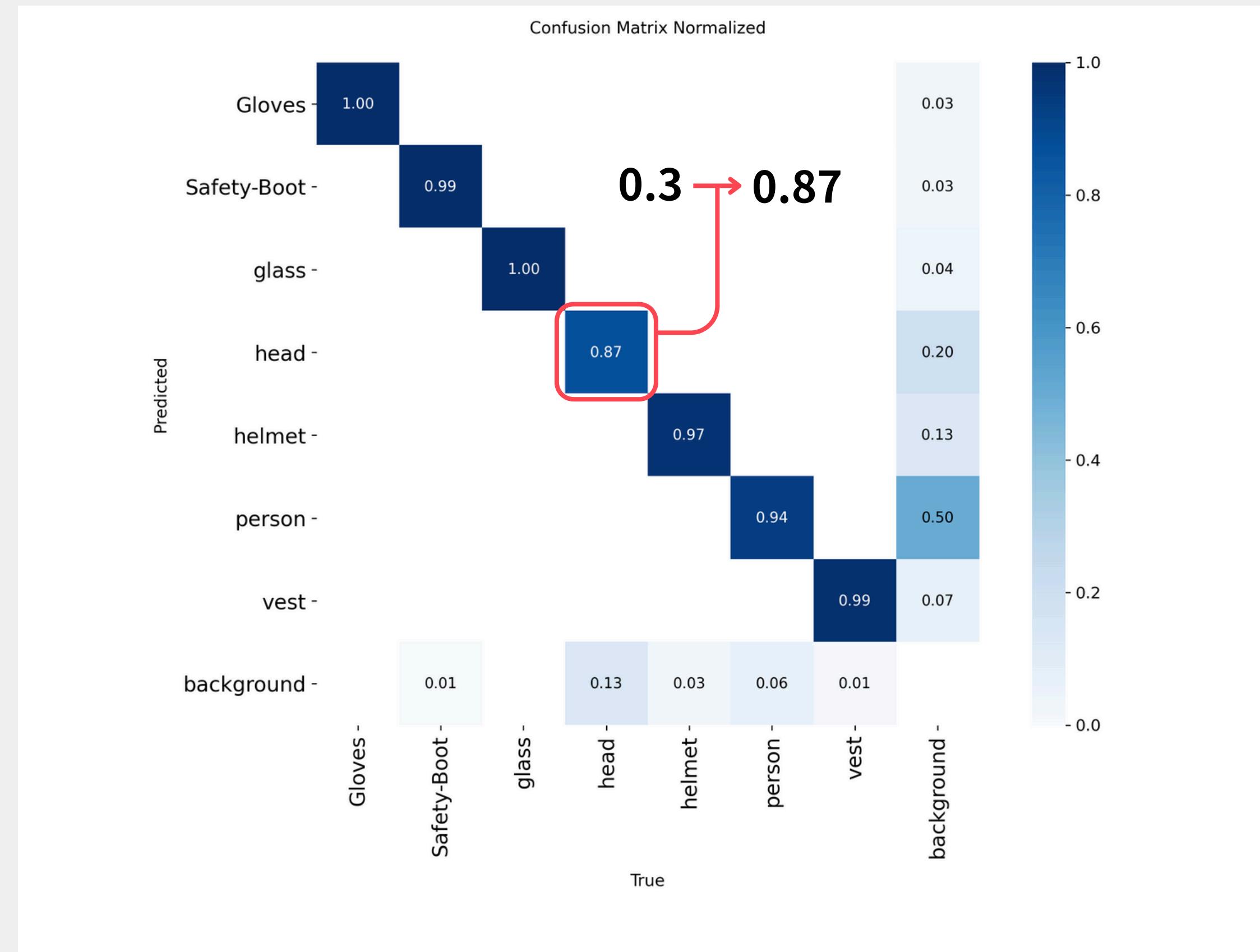
AI Model



AI Model

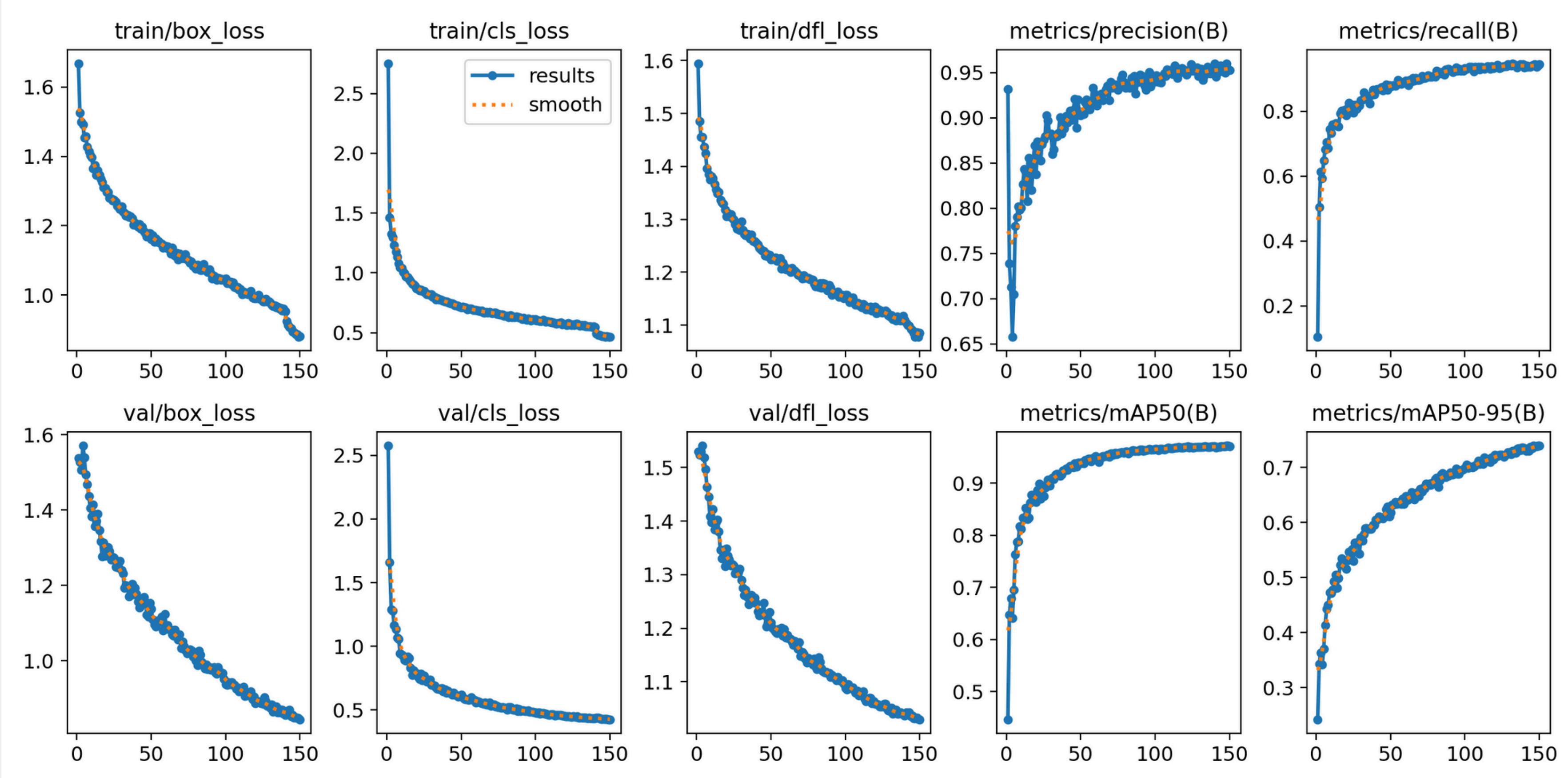
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
142/150	10.9G	0.9128	0.4842	1.1	107	640: 100% ██████████ 59/59 [00:07<00:00, 7.69it/s]	
	Class all	Images 390	Instances 4001	Box(P 0.951)	R 0.936	mAP50 mAP50-95): 100% ██████████ 7/7 [00:01<00:00, 5.80it/s]	
						0.97 0.731	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
143/150	10.9G	0.9076	0.4808	1.1	139	640: 100% ██████████ 59/59 [00:07<00:00, 7.69it/s]	
	Class all	Images 390	Instances 4001	Box(P 0.951)	R 0.939	mAP50 mAP50-95): 100% ██████████ 7/7 [00:01<00:00, 5.77it/s]	
						0.969 0.73	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
144/150	10.9G	0.9038	0.4781	1.093	123	640: 100% ██████████ 59/59 [00:07<00:00, 7.62it/s]	
	Class all	Images 390	Instances 4001	Box(P 0.957)	R 0.937	mAP50 mAP50-95): 100% ██████████ 7/7 [00:01<00:00, 5.74it/s]	
						0.971 0.737	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
145/150	10.9G	0.8937	0.4728	1.09	146	640: 100% ██████████ 59/59 [00:07<00:00, 7.59it/s]	
	Class all	Images 390	Instances 4001	Box(P 0.955)	R 0.941	mAP50 mAP50-95): 100% ██████████ 7/7 [00:01<00:00, 5.67it/s]	
						0.971 0.735	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	
146/150	11G	0.8917	0.4705	1.085	160	640: 100% ██████████ 59/59 [00:07<00:00, 7.63it/s]	
	Class all	Images 390	Instances 4001	Box(P 0.951)	R 0.943	mAP50 mAP50-95): 100% ██████████ 7/7 [00:01<00:00, 5.74it/s]	
						0.971 0.739	

AI Model



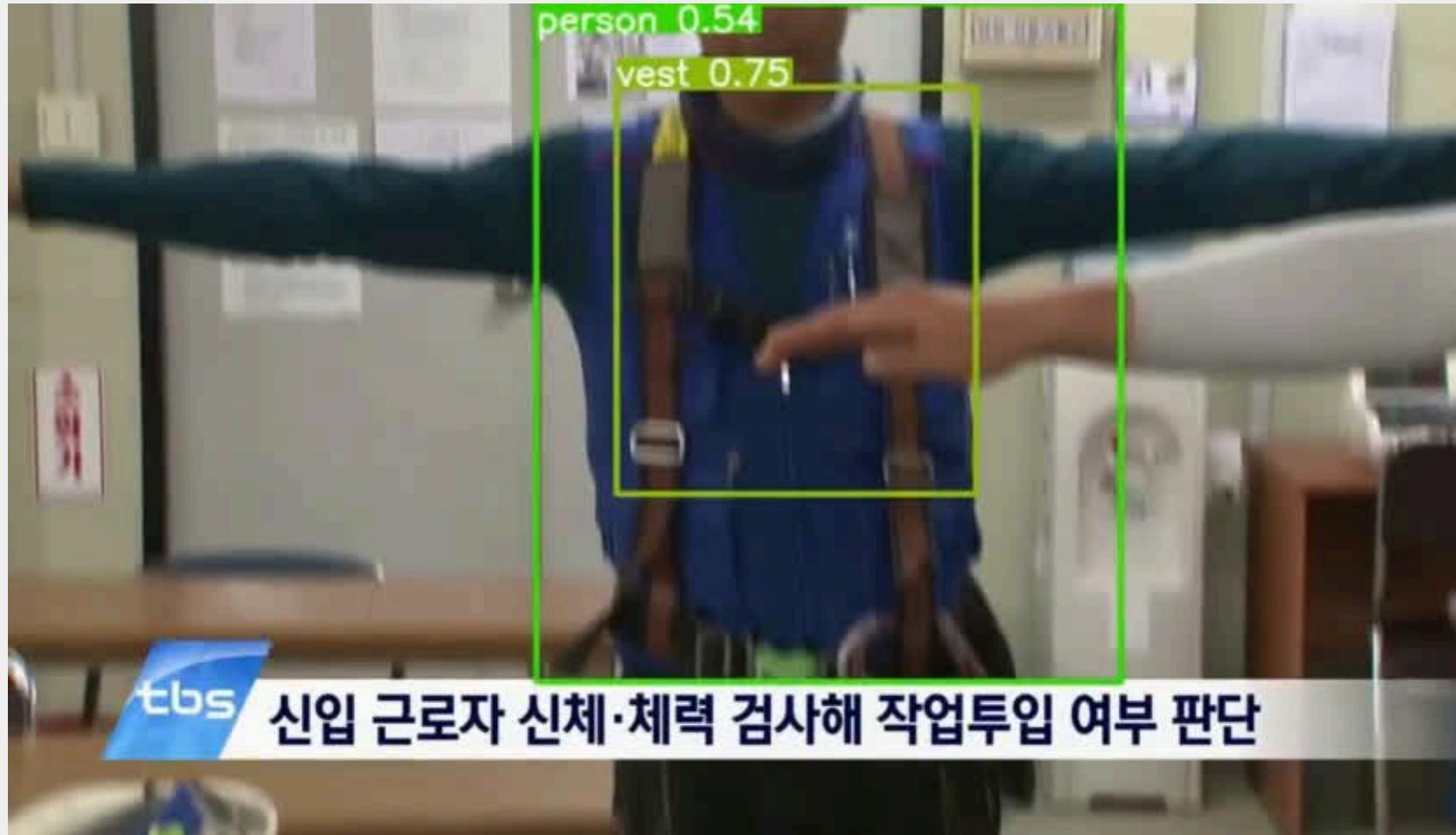
AI Model

Confusion Matrix Normalized

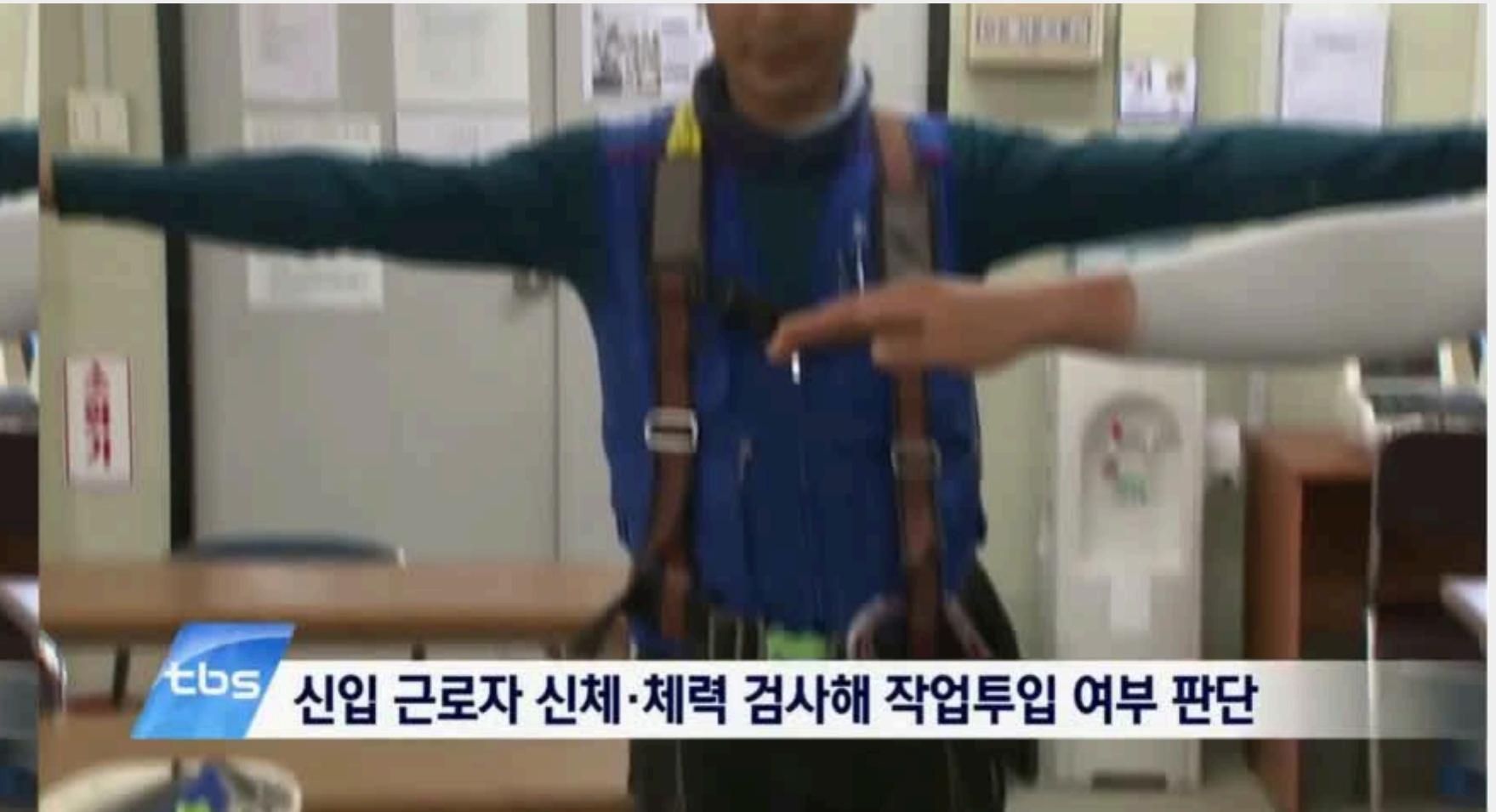


AI Model

Before



After

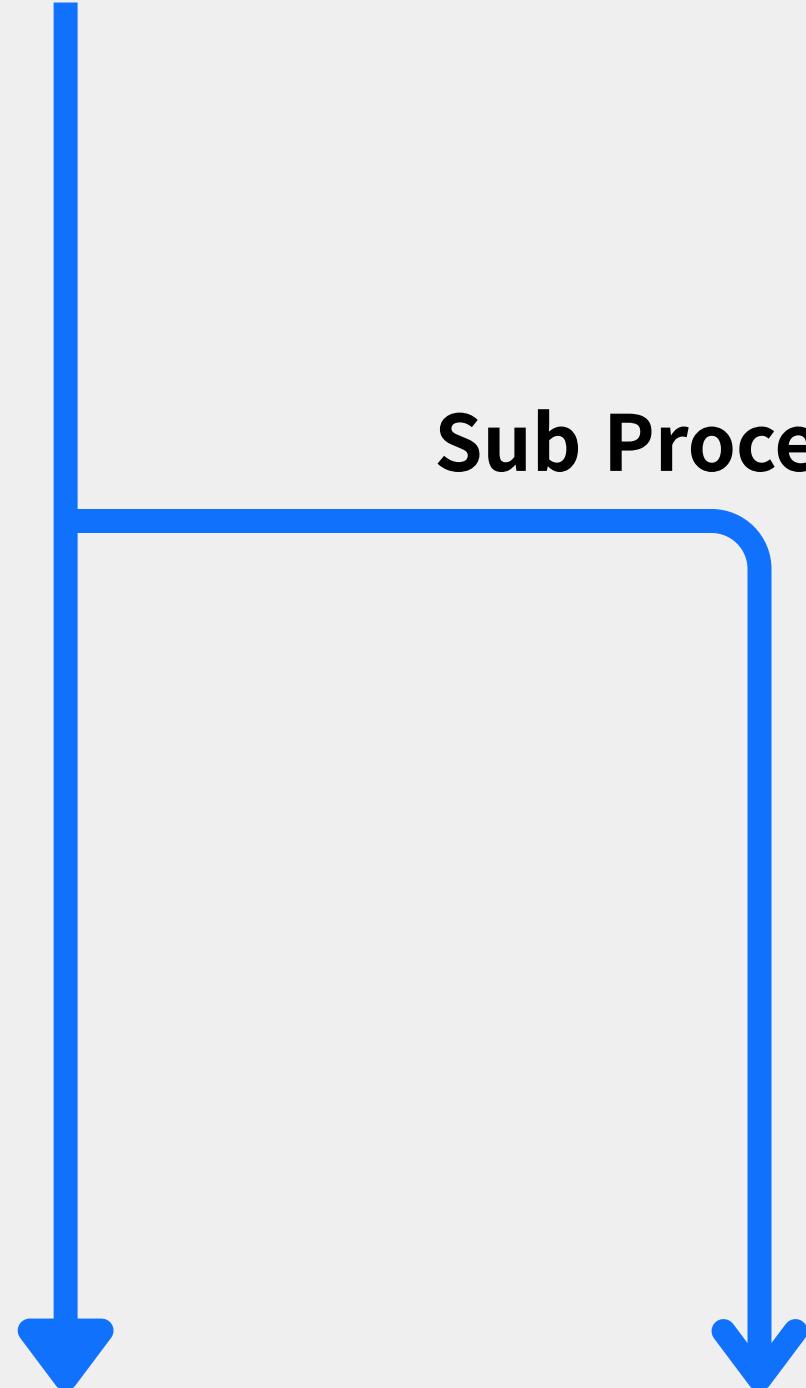


tbs 신입 근로자 신체·체력 검사해 작업투입 여부 판단

AI Model

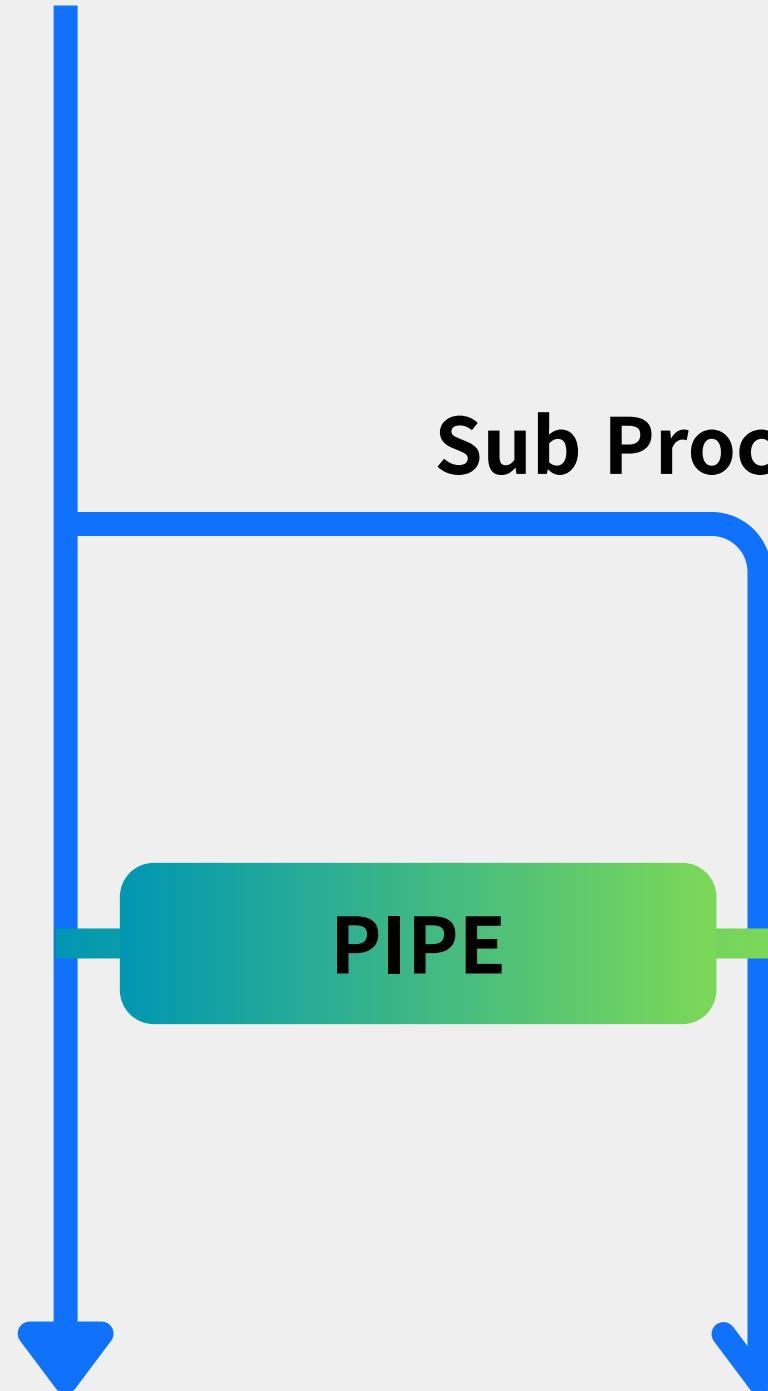
Main(Server)

Sub Process(AI)



AI Model

Main(Server)



Sub Process(AI)

PIPE

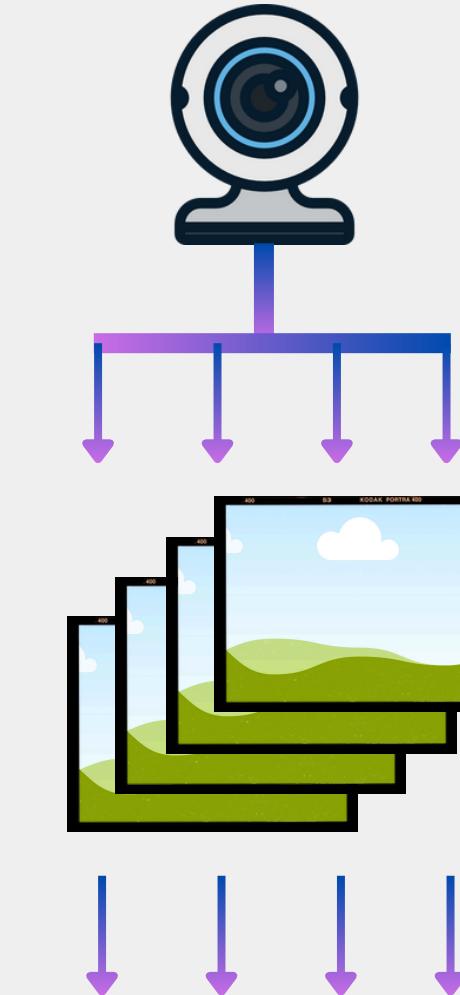
AI Model

Main(Server)

Sub Process(AI)

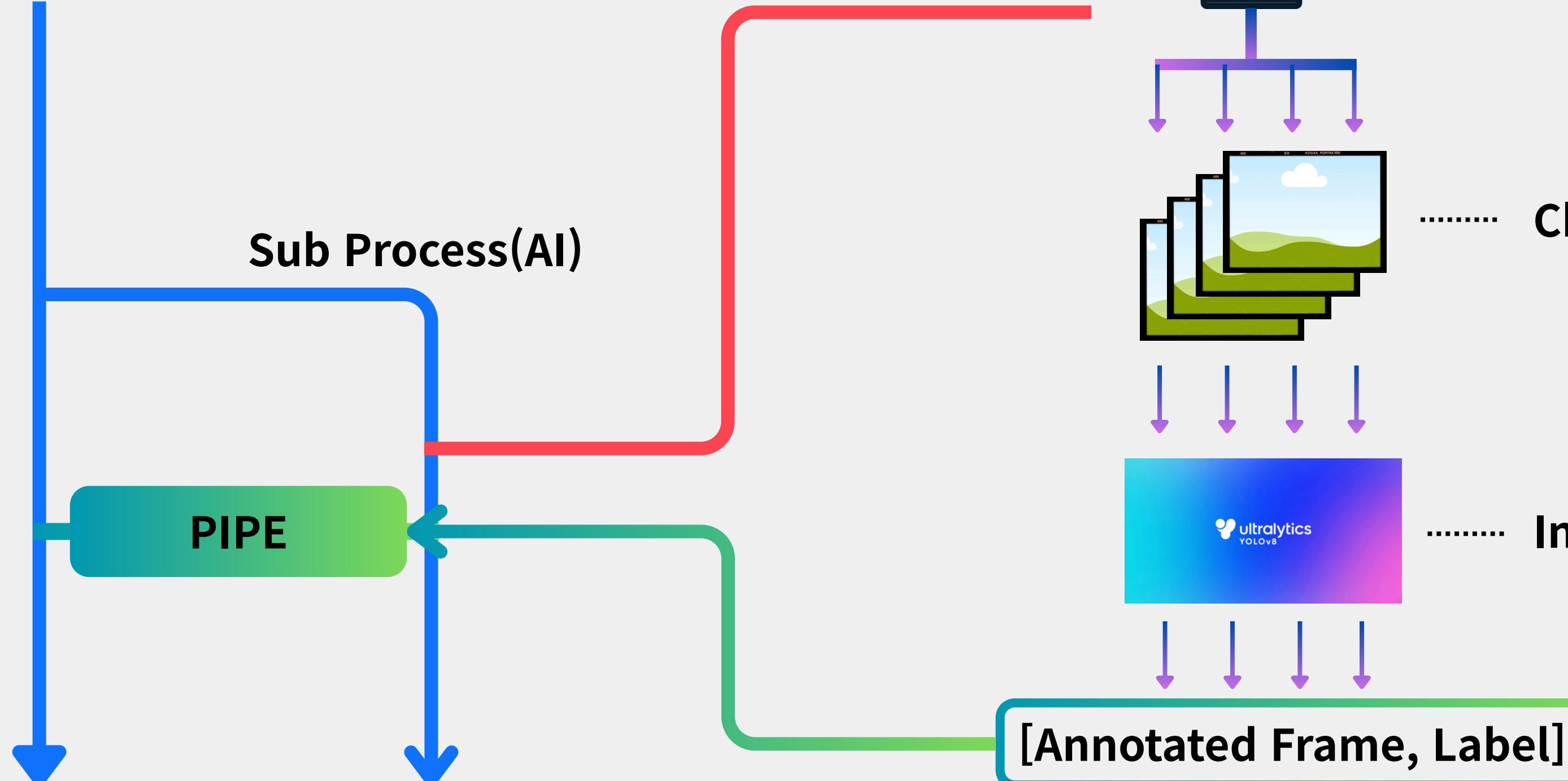
PIPE

[Annotated Frame, Label]



Chop

Inference



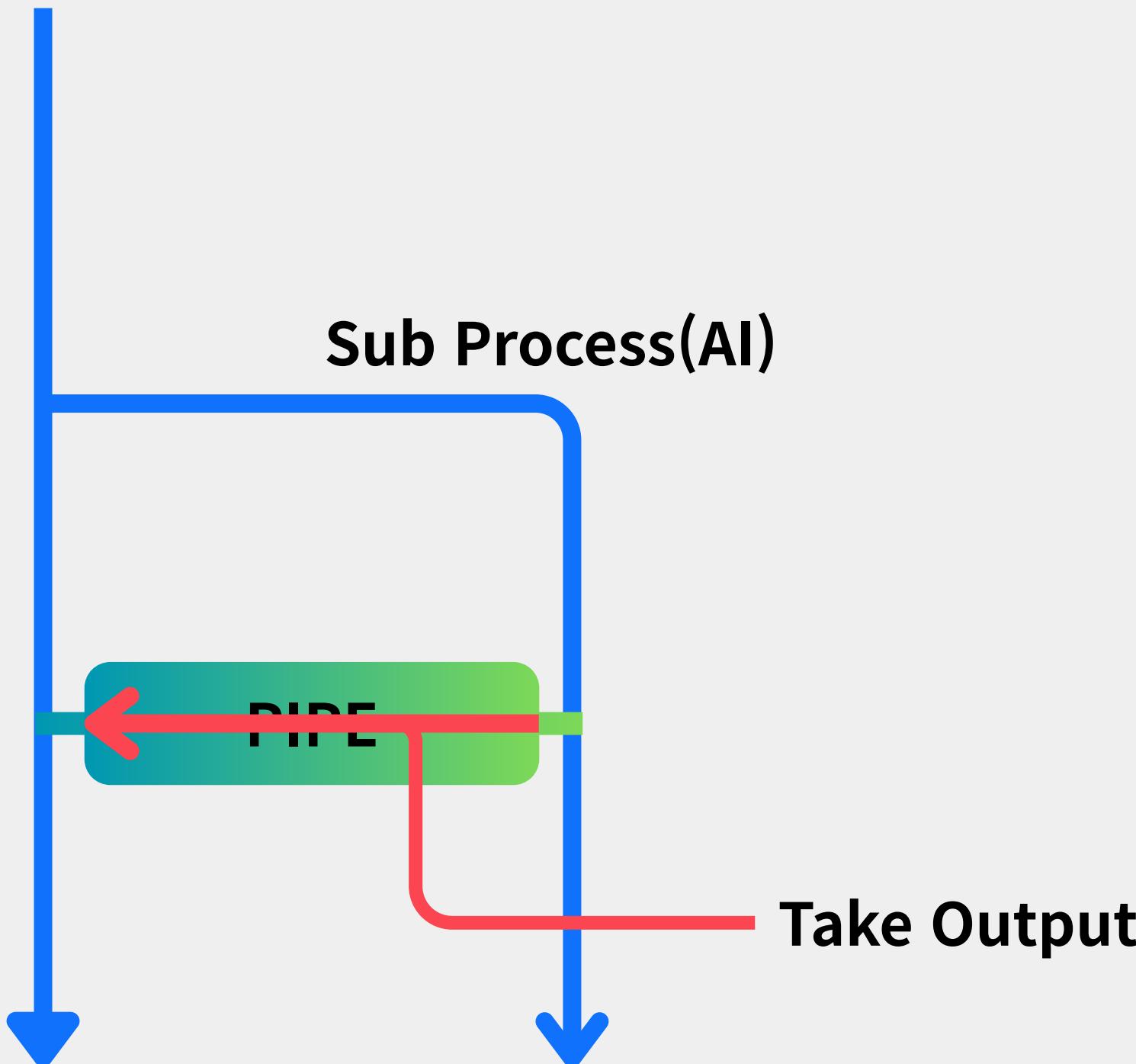
Backend & DB

Development

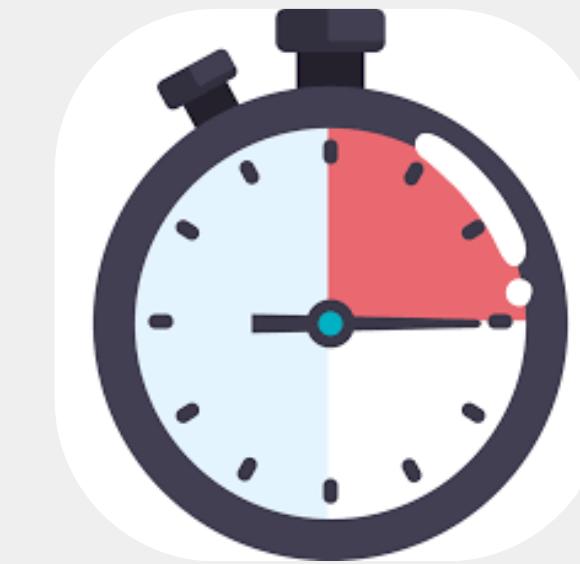
AI Model

Main(Server)

Sub Process(AI)



Back End



Detect!



wait(20s)



Back End

RTSP

Real-Time Streaming Protocol

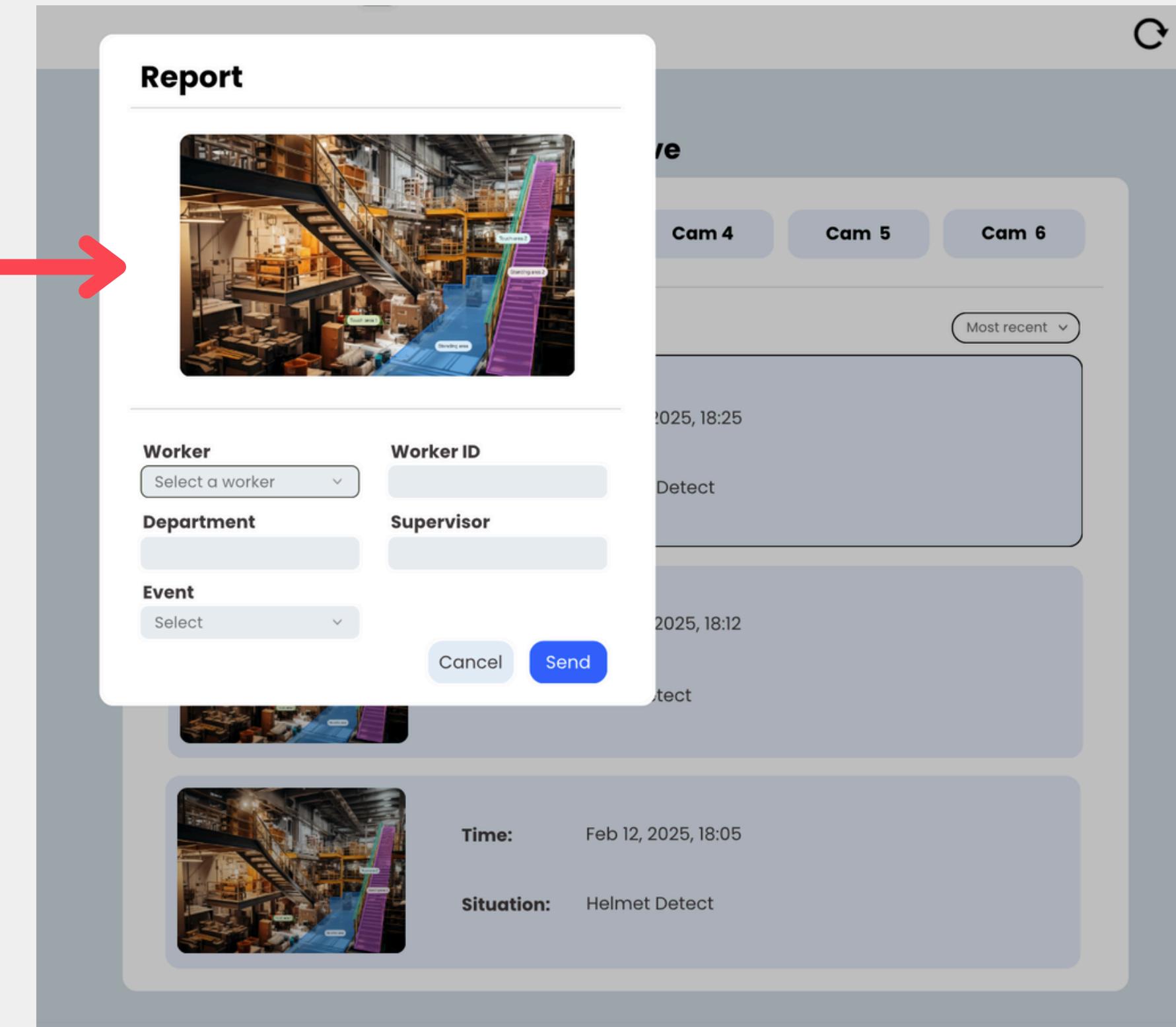
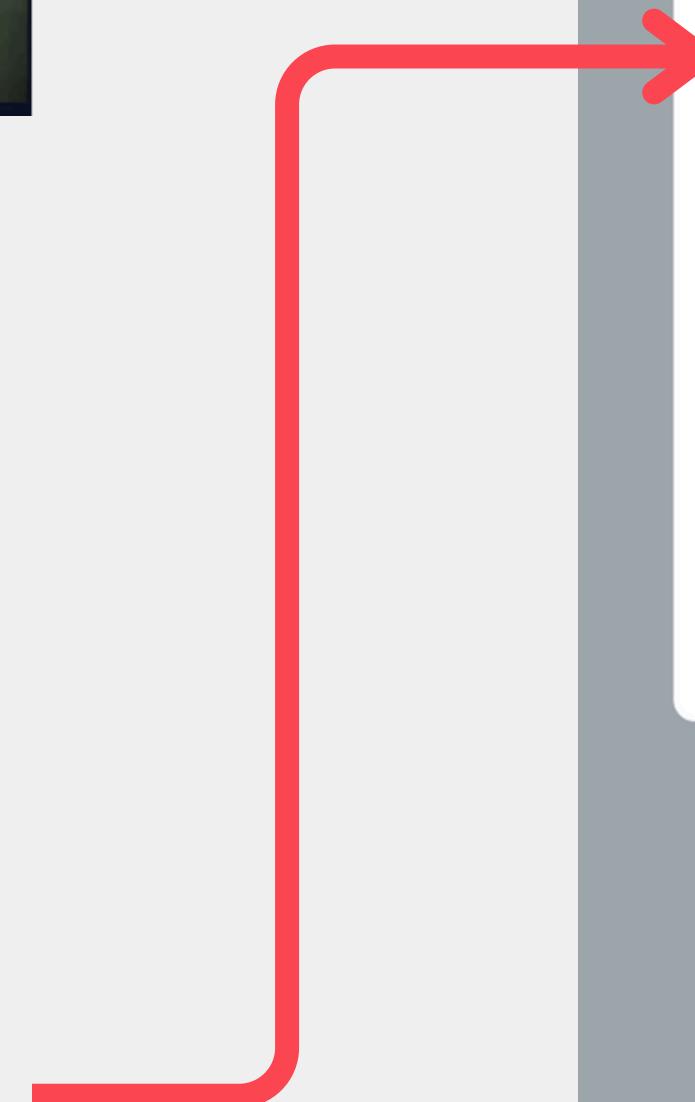
Back End →

→ Front End

Back End



11101110
01100100
11001001
11101110
01100100



Report

2025, 18:25

2025, 18:12

Time: Feb 12, 2025, 18:05

Situation: Helmet Detect

Worker: Select a worker

Worker ID:

Department: Supervisor

Event: Select

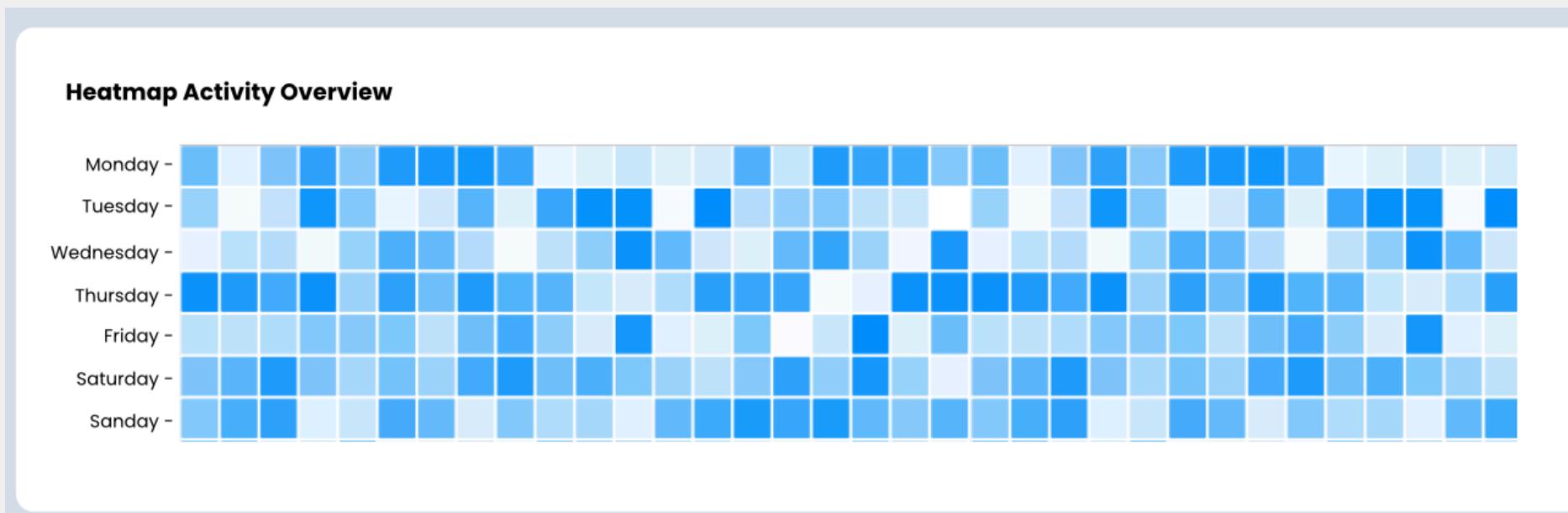
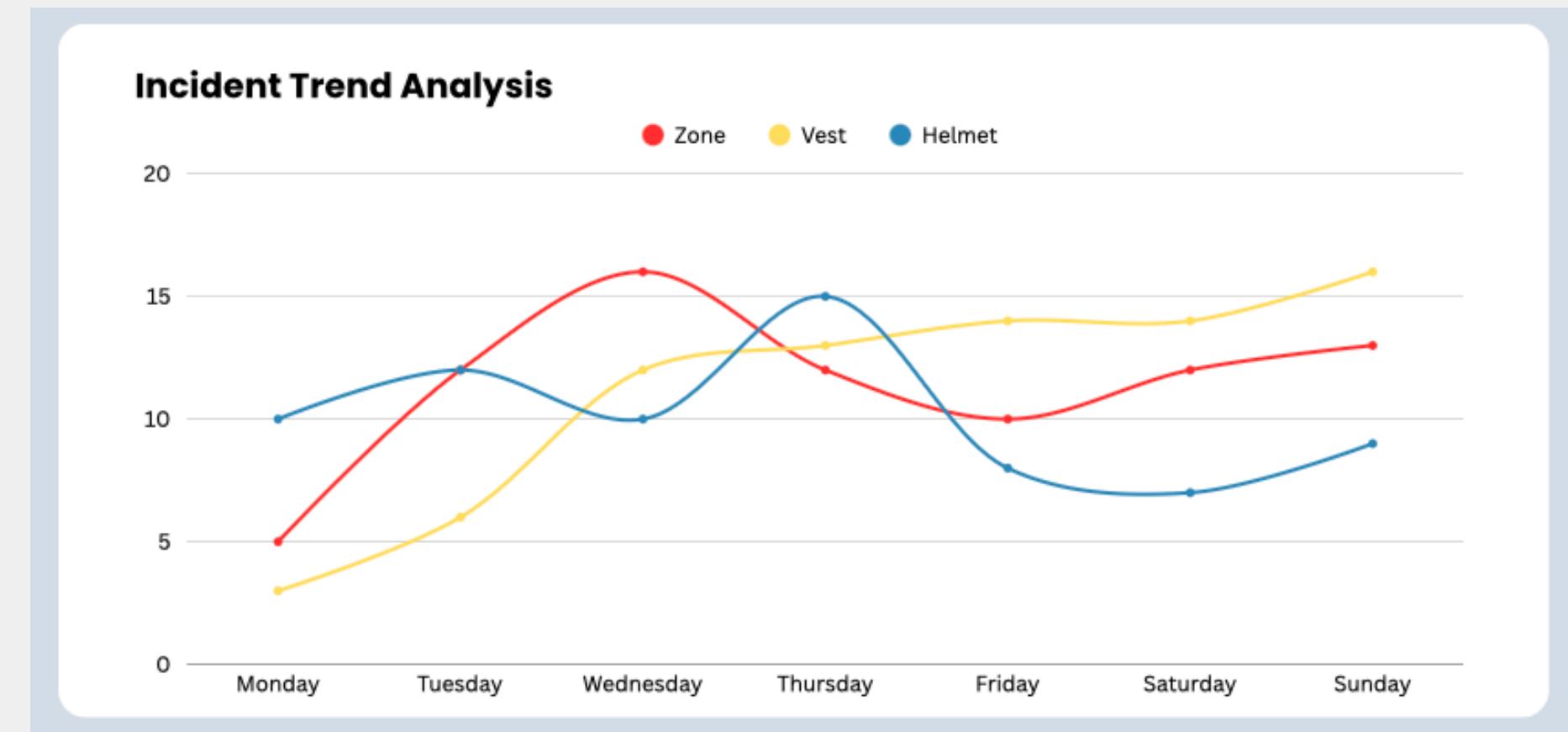
Cancel Send

Back End

Detected Data

Sort with Date and Time

Detected Data`



Thank You

Q & A

https://github.com/abbosaliboev/Web_Software_Project.git