

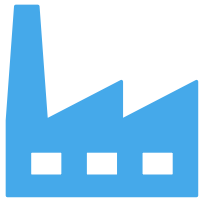


IMPROVING WORKER SAFETY WITH COMPUTER VISION AND AI

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OkyaSoft Pte Ltd**

AGENDA



WORKPLACE SAFETY

Trends in Singapore and across the world



COMPUTER VISION AND AI

Current state and challenges



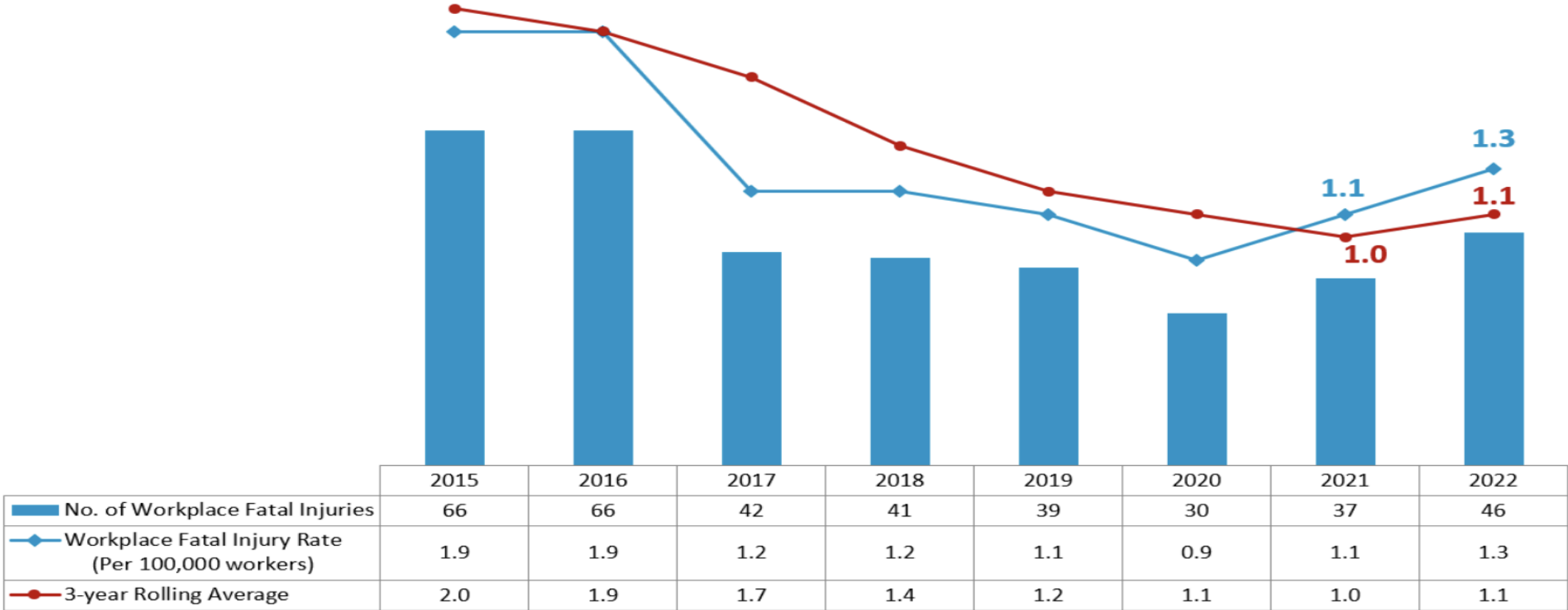
A BETTER SOLUTION

Generative AI and people centric approach

WORKPLACE SAFETY

Trends in Singapore and across the world

WORKPLACE FATALITIES



HEIGHTENED SAFETY PERIOD

Industry	Number of Fatal and Major Injuries, 2022	Change in Monthly Average (Pre-HSP versus HSP)		
		Fatal	Major - Type A <i>(higher fatality risk)</i>	Major - Type B <i>(lower fatality risk)</i>
Overall	660	-2.0	+1.8	+4.4
Construction	171	-1.4	-1.0	-1.0
Manufacturing	129	+0.3	0.0	+0.9
Transportation & Storage	70	0.0	-0.3	+2.0
Administrative & Support Services	57	+0.5	+1.8	+1.9
Accommodation & Food Services	57	-0.3	+0.3	-1.5
Wholesale & Retail Trade	41	0.0	+0.3	+1.4

Legend: (improved during HSP) -  0 + (worsened during HSP)

GLOBALLY

7,500 workers die on the job every day

3 million lives are lost due to unsafe and unhealthy working conditions

374 million people suffer injuries or health complications

WHY

Migrant worker groups urge Government for timeline to stop transporting workers in lorries



Business groups cite 'complexities' in letter to Govt after calls to ban lorries ferrying workers



COMPUTER VISION AND AI

Current state and challenges

A BRIEF HISTORY

First Investigation of computer vision methods for the building construction process. (Wallace, Donald J, 1988)



CAD-based computer vision: from CAD models to relational graphs. (Flynn & Jain 1989)

1980s

1990s

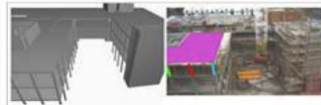


BUILD-IT: a computer vision-based interaction technique of a planning tool for construction and design. (Rauterberg, Matthias, et al. 1997)



Investigation of the dynamic characteristic of bridge structures using a computer vision method (Olaszek, Piotr. 1999)

A framework for automatic progress assessment on construction sites using computer vision (Trucco and Kaka- 2004)



Computer vision techniques for automatic structural assessment of underground pipes (Sinha et al 2003)

2000
-
2005

Visual Representation of Construction Progress Monitoring Metrics on Time-Lapse Photographs (Fard et al 2007)

Towards automated progress assessment of workpackage components in construction projects using computer vision. (Ibrahim et. al 2009)



D4AR—a 4-dimensional augmented reality model for automating construction progress monitoring data collection, processing and communication (Fard et al 2007)

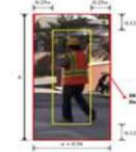
2005
-
2010

A vision-based motion capture and recognition framework for behavior-based safety management (Han and Lee 2013)



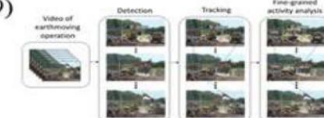
Appearance-based Material Classification for Monitoring of Operation Level Construction Progress Using 4D BIM and Site Photologs. (Han and Fard 2015)

Hardhat-wearing detection for enhancing on-site safety of construction workers (Park et.al. 2015)



2010
-
2015

End-to-end vision-based detection, tracking and activity analysis of earthmoving equipment filmed at ground level (Dominic and Fard. 2019)



Human-object interaction recognition for automatic construction site safety inspection. (Tang et. al 2020)



Real-time vision-based worker localization & hazard detection for construction. (Jeelani et. al 2021)

2015
-
2021

MARKET MAP

 intenseye

 Protex AI

 **GOARC**

 viAct

 **INVIGILO**

 **VOXEL**

 **Surveily**[®]



Ailytics

 **NEWMETRIX**

MYTH OF EXPECTATIONS

SAFETY PYRAMID

It is far better to be reporting and learning from Near Misses, Minor Incidents and Hazards, where there is little or no loss, than to be reporting actual serious losses.

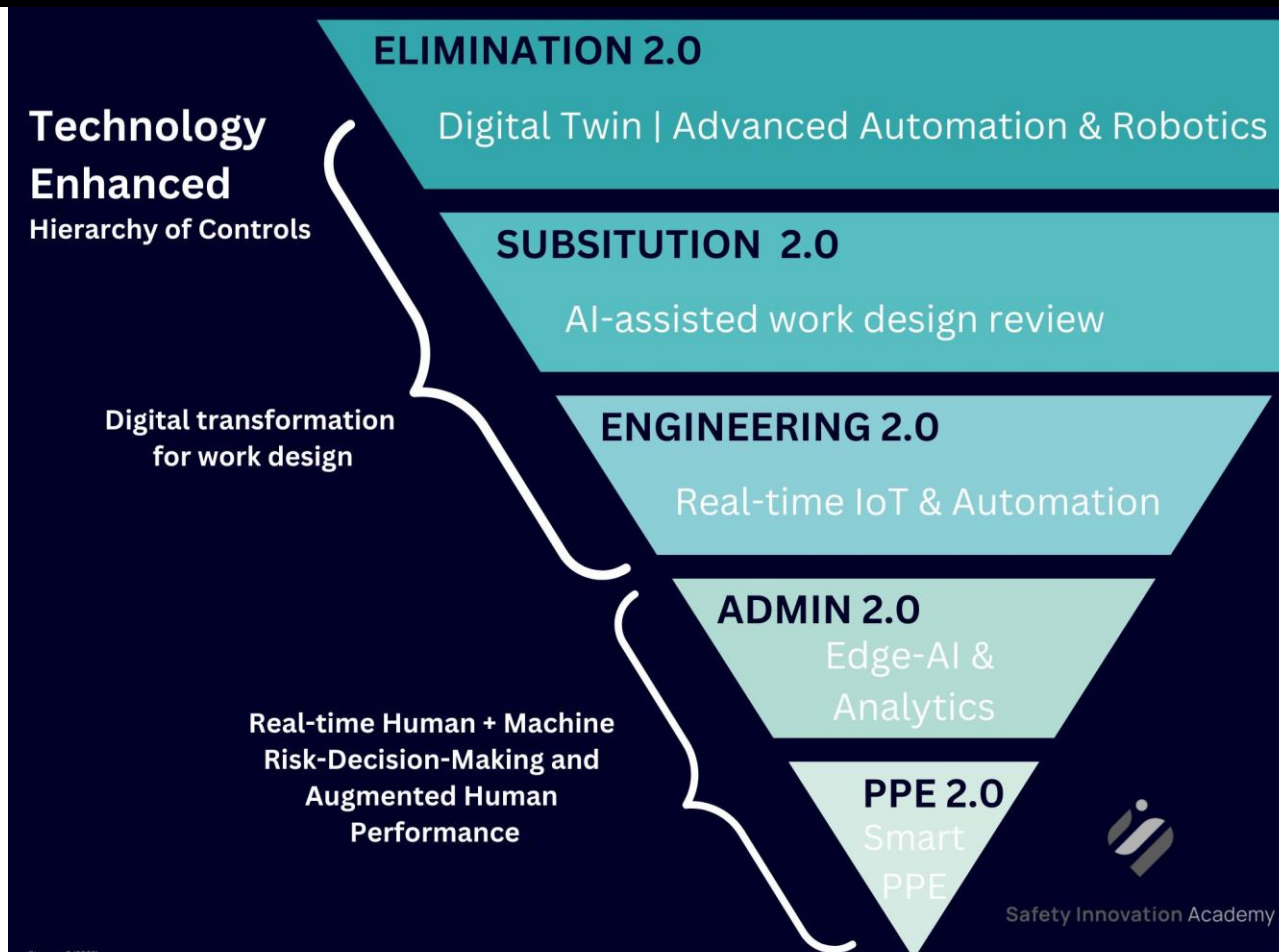


Prevent fatalities without dealing with unsafe acts

Highly accurate alerts without dealing with false positives

Single implementation without dealing with changes

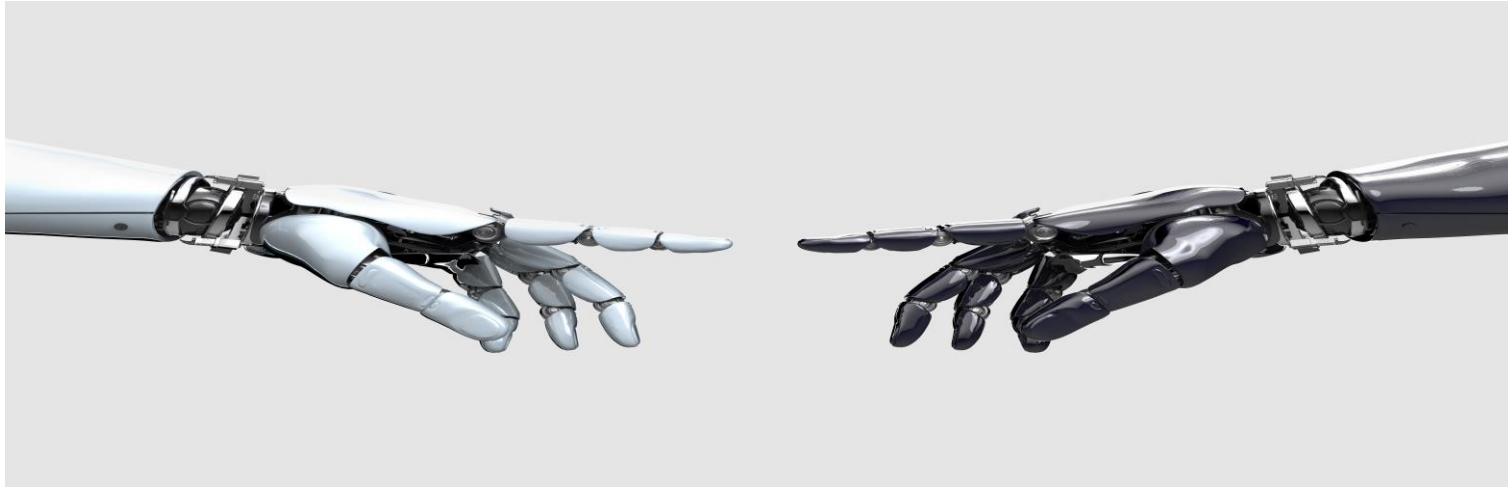
HIERARCHY OF CONTROLS



Video analytics is just one of the controls

Need to integrate with existing processes and systems

Empower the humans and not replace them



CHALLENGES

- Lack of customization
- Slow implementation
- High cost

A BETTER SOLUTION

Generative AI and people centric approach

PEOPLE CENTRIC APPROACH



Worker Will

Safer



Supervisor Sally

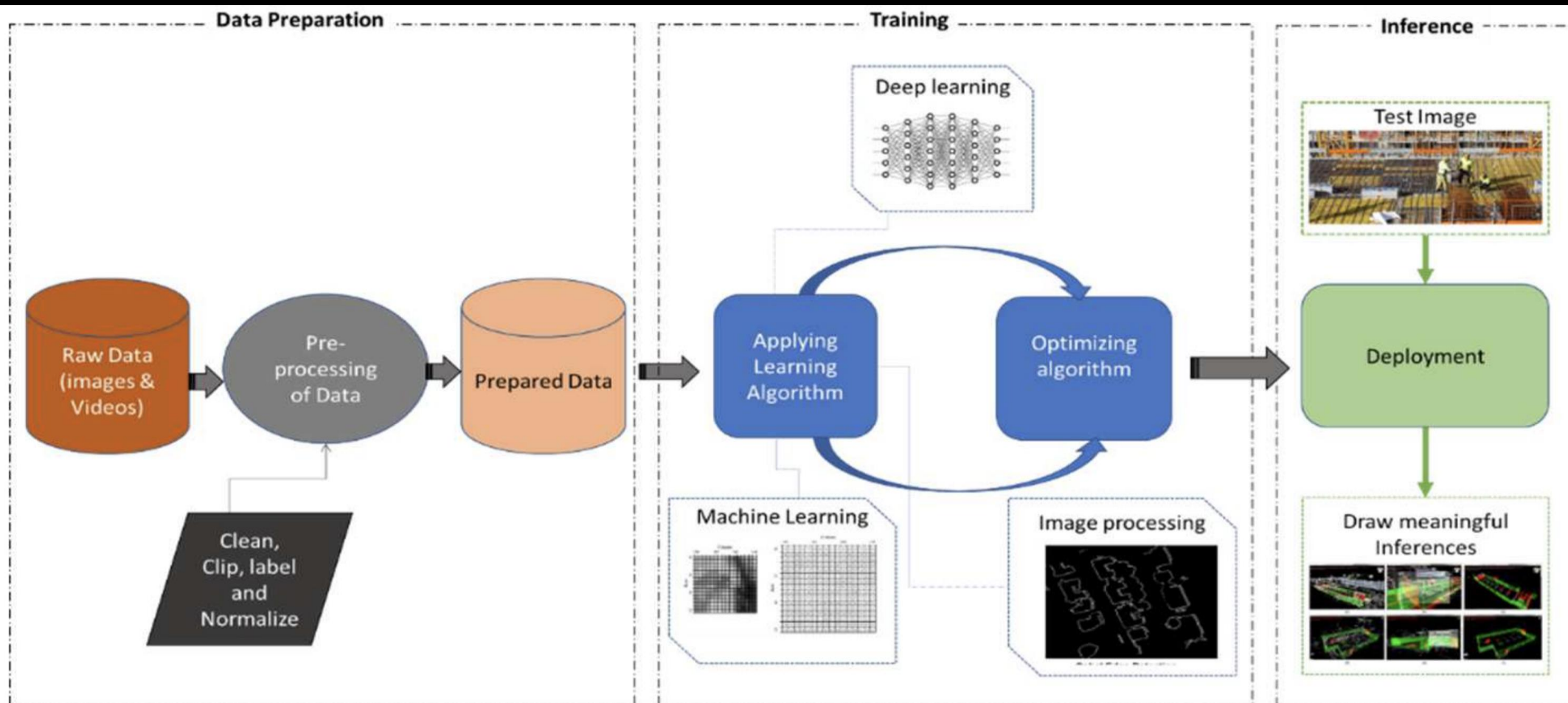
More productive



Manager Mike

More efficient

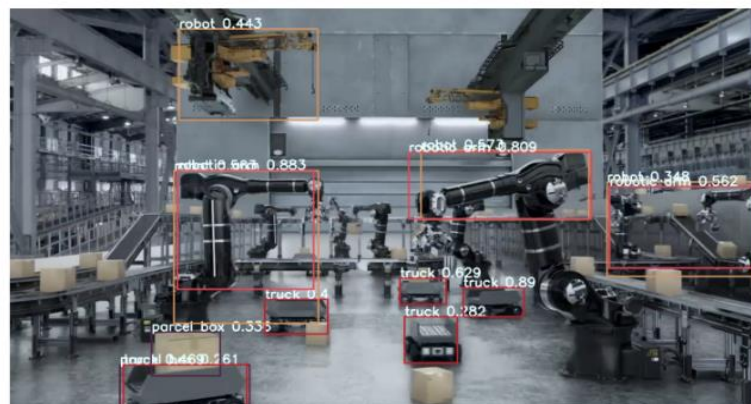
TYPICAL MODEL TRAINING



GENERATIVE AI



Camera/Video



Key frame extraction

Visual prompting

Zero shot object detection

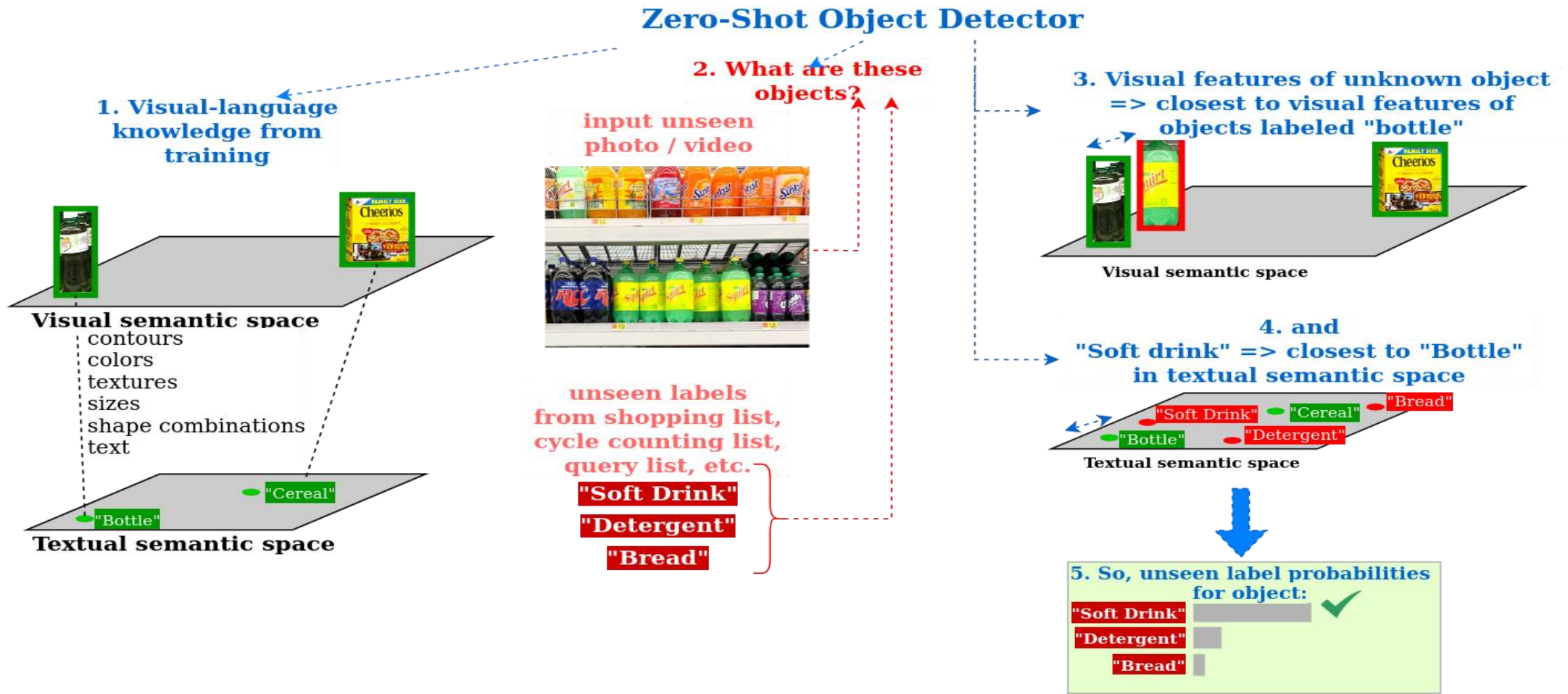
Generate initial training data

Fine-tune a new model

Augmentation

Generative AI

ZERO SHOT OBJECT DETECTION





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BENEFITS

- **Easier Customization (a unique model per camera feed)**
- **Faster Implementation (days instead of weeks)**
- **Lower Cost (> 500% ROI)**

THANK YOU



Questions



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