



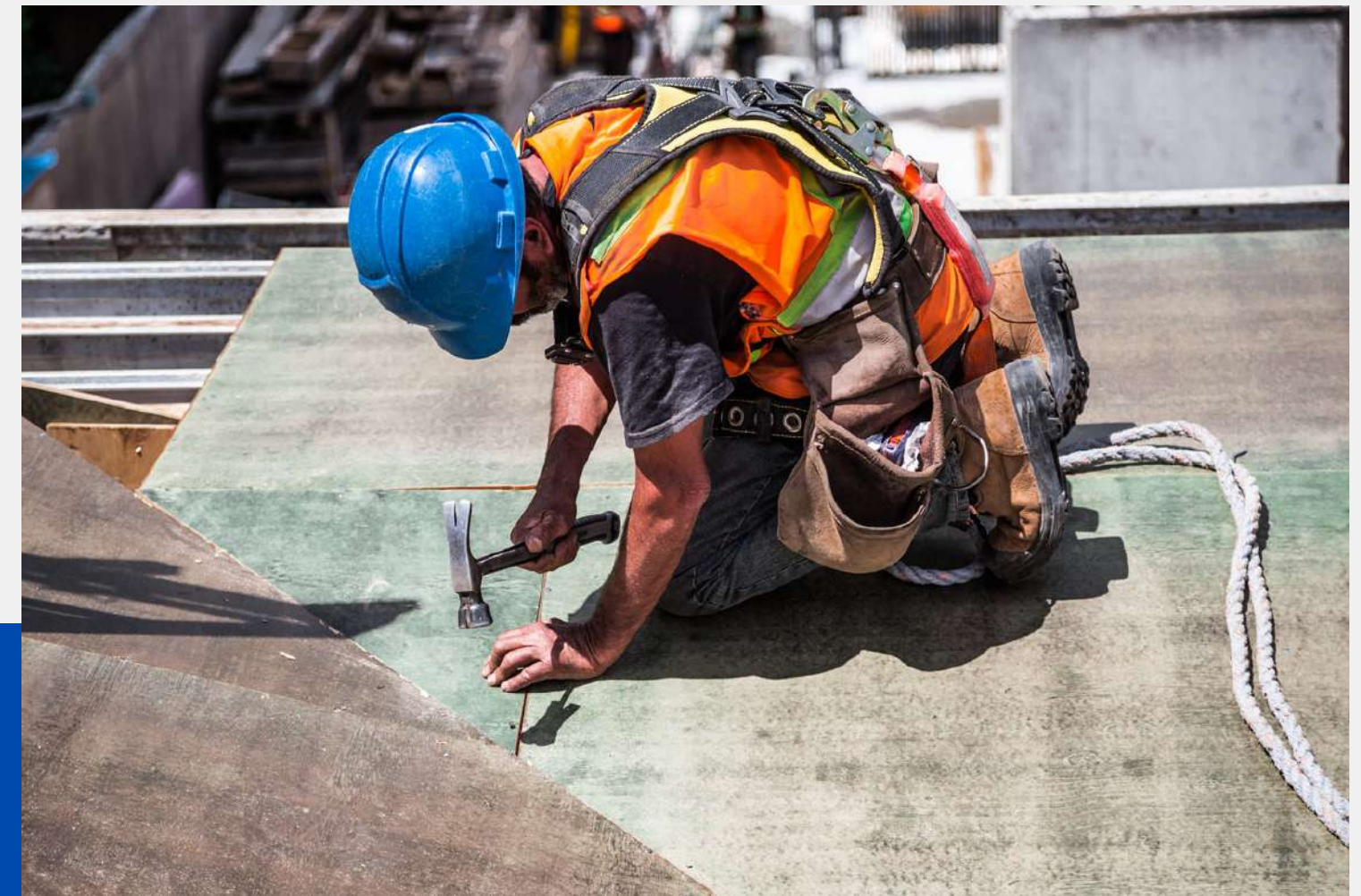
FINAL PROJECT

# AI FOR SAFETY EQUIPMENTS DETECTION IN CONSTRUCTION PROJECTS

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# Problem Statement

Construction sites are among the most hazardous workplaces, making safety compliance a top priority. ISO 45001, the global standard for Occupational Health and Safety Management Systems, emphasizes the need for proactive measures to reduce workplace risks. However, ensuring workers consistently wear protective gear like helmets, vests, and shoes remains a challenge. Manual inspections are labor-intensive and often fail to identify non-compliance in real-time, especially in large projects. This leads to increased accidents, regulatory violations, and financial penalties. To meet ISO 45001 standards and safeguard workers, an automated solution is crucial for QHSE (Quality Health and Safety) improvement.



# Project Objective

This project aims to harness AI technology to revolutionize safety compliance monitoring on construction sites, particularly in large-scale projects such as skyscrapers and expansive project areas. The solution can automatically identify whether workers are wearing essential safety equipment, reducing reliance on manual inspections and minimizing the need for numerous safety officers. Designed for internal use, this system not only enhances operational efficiency but also improves the company's reputation and value in the eyes of project owners by demonstrating a commitment to safety and innovation.



## Core Objective

Develop AI-Powered Model solution to automatically detect personal protective equipment compliance on construction site



## Key Goals

- Automate real time identification of safety gear
- Reduce workplace accidents
- Improve accuracy and efficiency in safety monitoring process



**01**  
**Dataset**

**369**  
Photos

**02**  
**Model**

**YOLO**  
**V5**

**03**  
**Classes**

**6** Classes

- Helmet
- No Helmet
- Safety Vest
- No Safety Vest
- Shoes
- No Safety Shoes

# Methodology



## Data Collecting

Model was build from 369 photos taken in construction sites

## Data Labeling

Data labeled to 6 classes with bounding box in Roboflow

## Training

Using YOLO V5 Model to train the dataset

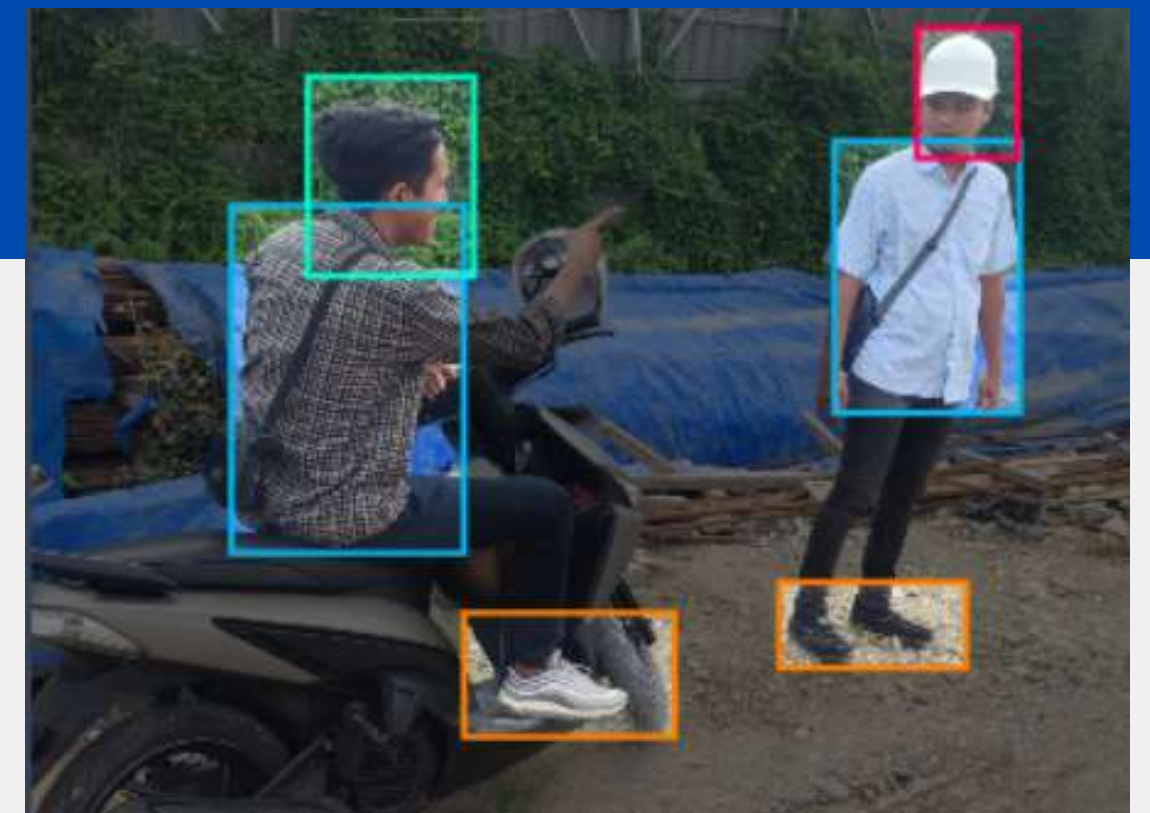
## Build API

Build API with FastAPI

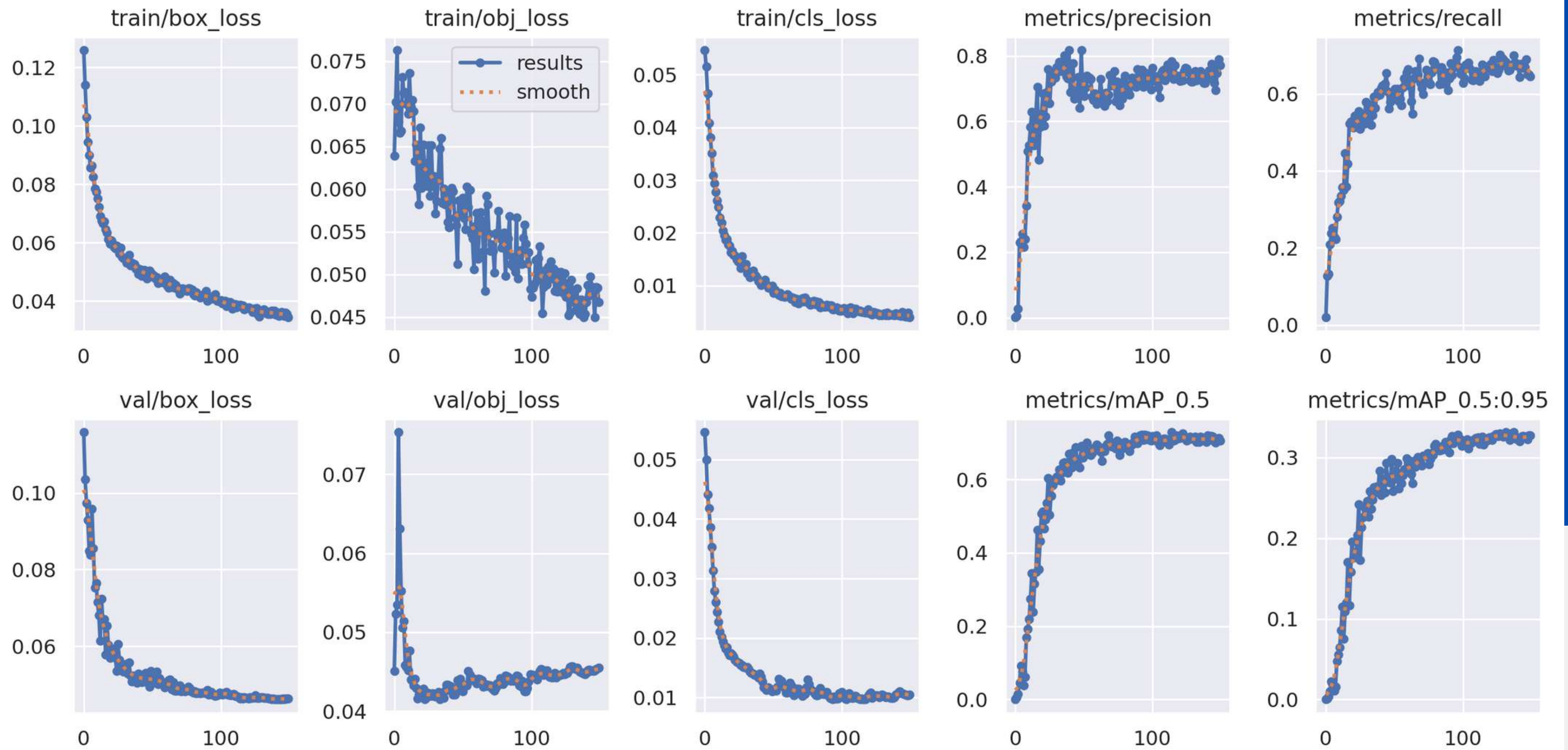
## Testing

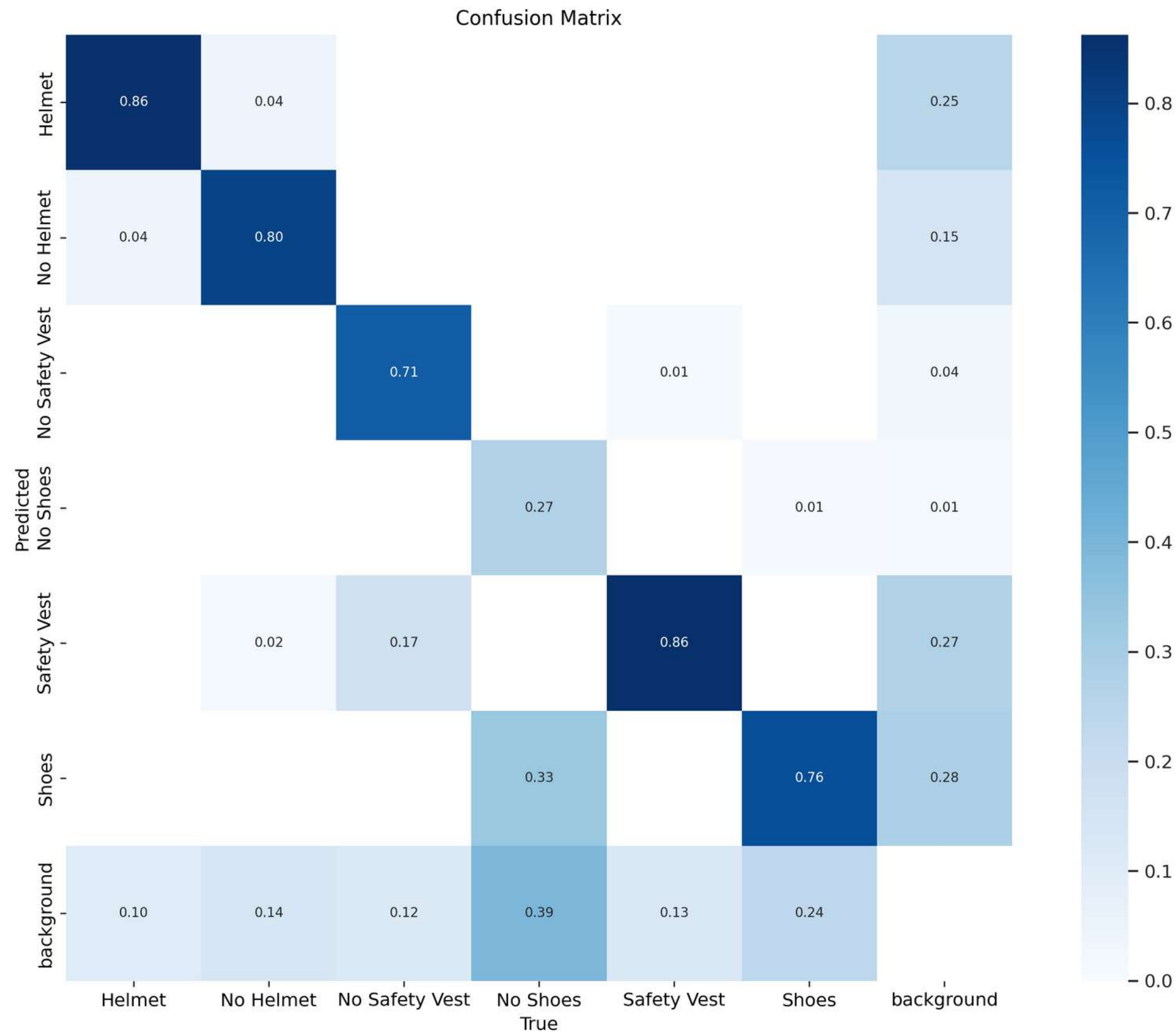
Take best model from training, and upload an image to test the result

# Labeling Process



# Results



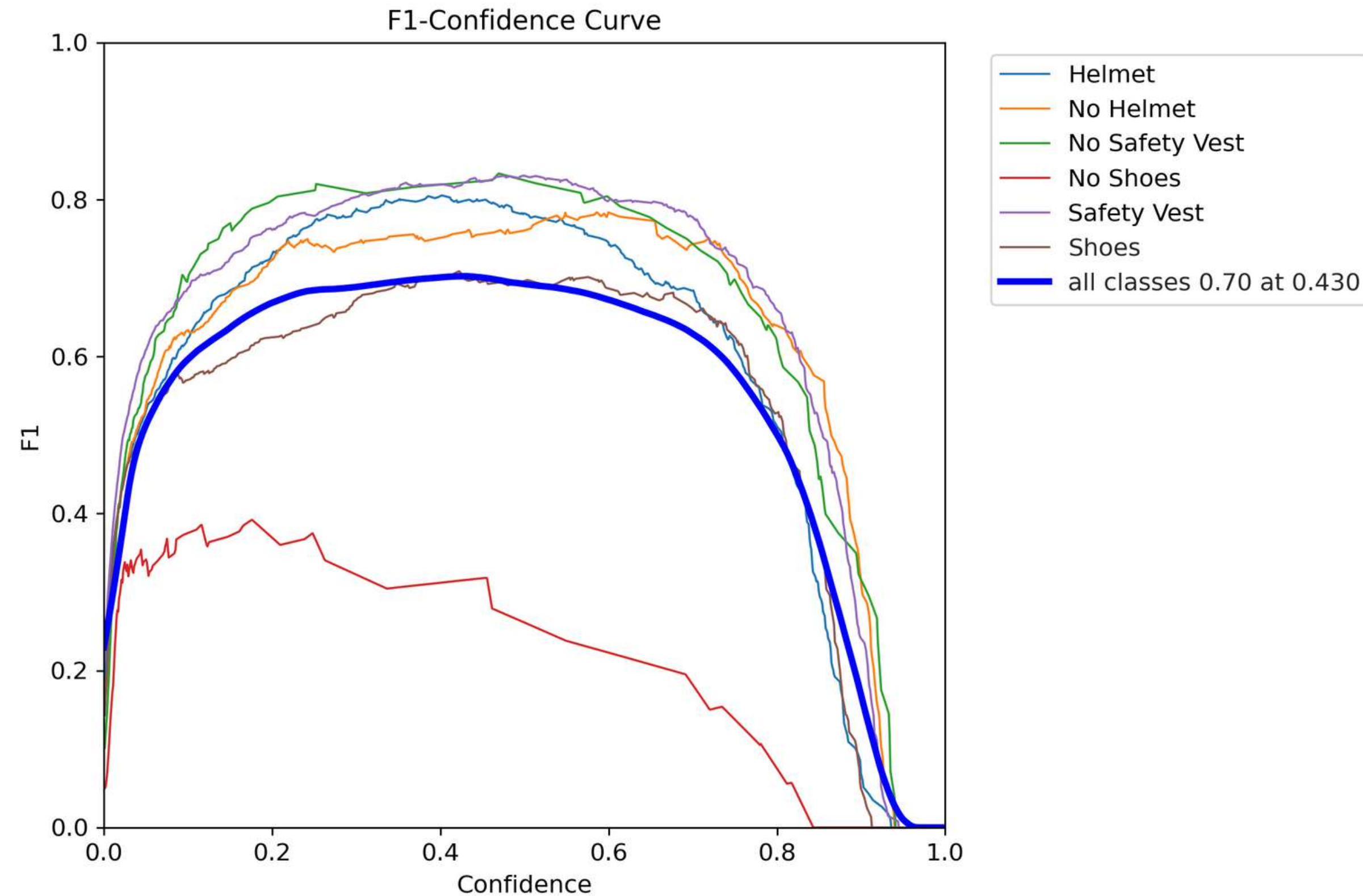


# Confusion Matrix

No Shoes class has the lowest accuracy of predicted, due to ambiguous shape of class

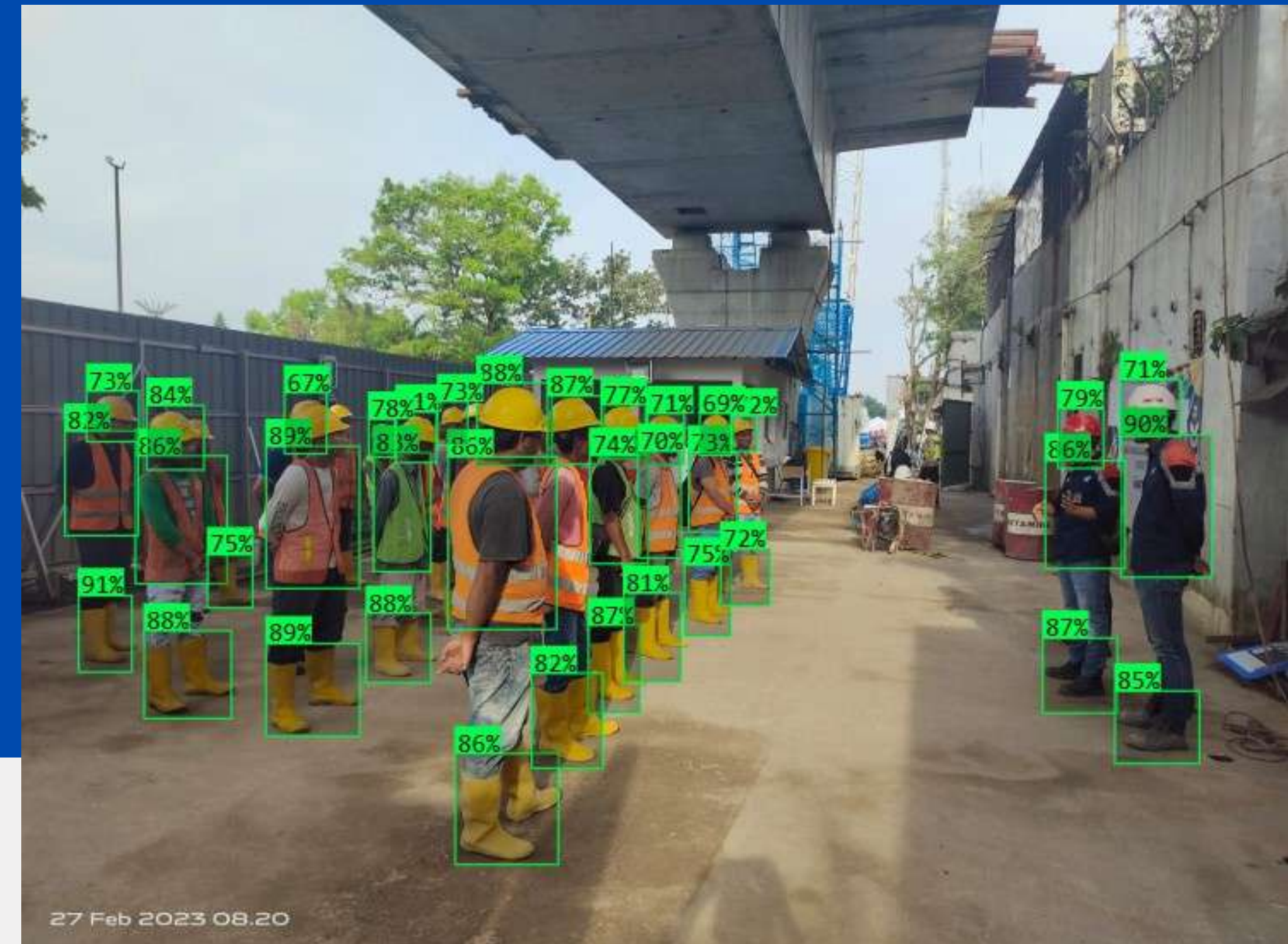
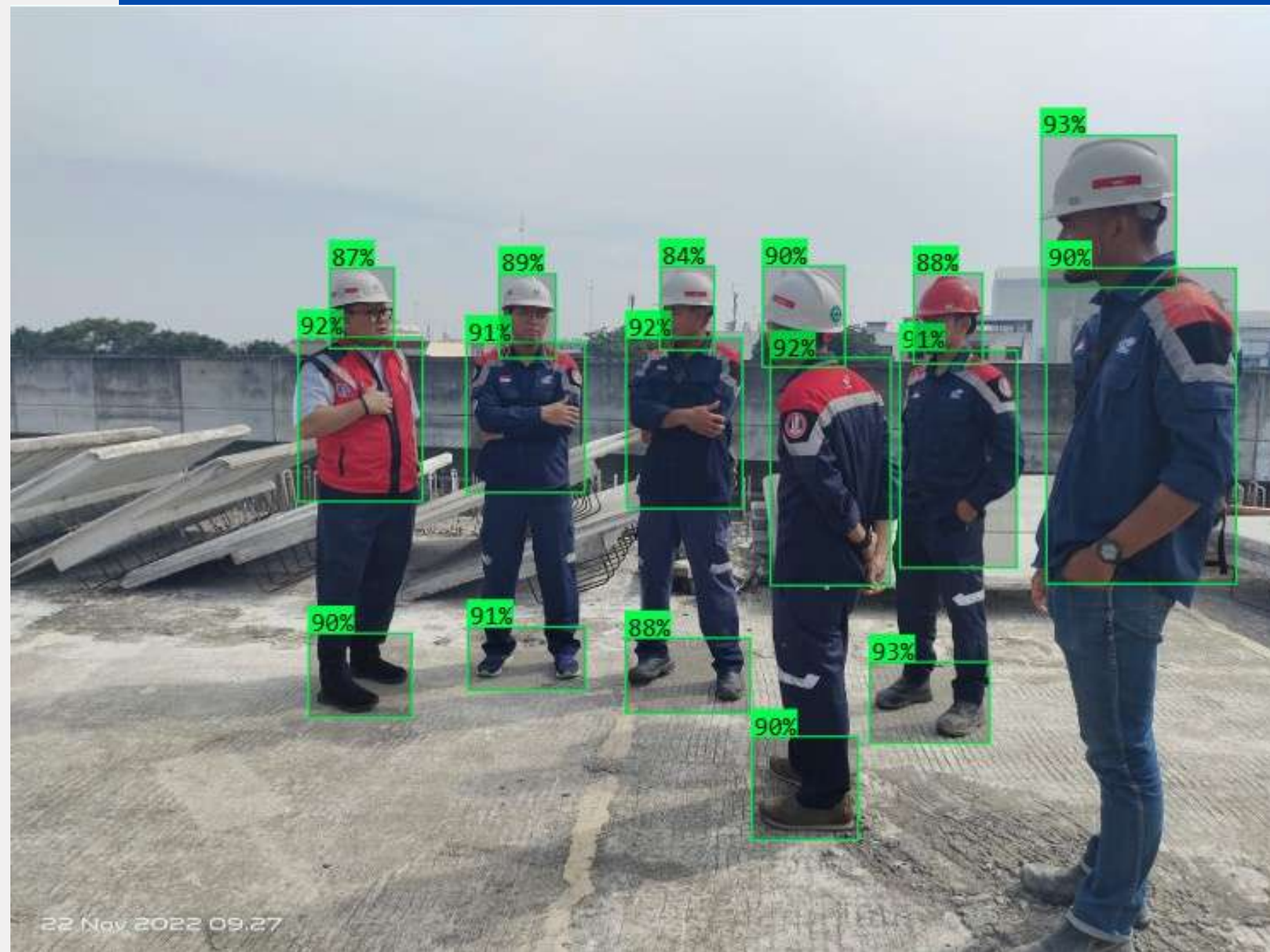
**Completed On Time**

# F1-Confidence Curve



Model has good performance in 5 classes, but for “no shoes” class not as good as the other classes

# Model Demo



# Model Demo



# Wanna Try ?



[Our Github Link](#)





P R E S E N T A T I O N

**THANK YOU FOR  
YOUR  
ATTENTION**