

Smart Helmet Detector:

Detecting if construction workers wear helmets using AI.

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Course: ITAI 1378- Comp Vision-Artificial intel



Problem

Many construction workers forget or refuse to wear helmets.

This leads to serious head injuries and even fatal accidents.

Supervisors can't monitor every worker all the time.

We need an automated safety system to detect who is not wearing a helmet.



Proposed Solution

Build an AI-based camera system that:

- Uses object detection to identify people and helmets.
- Alerts supervisors if a worker is seen without a helmet.
- Can be used on construction sites or industrial areas.

Technical Approach



Use YOLOv8 (You Only Look Once) for real-time object detection.



Train the model using helmet detection datasets from Roboflow.

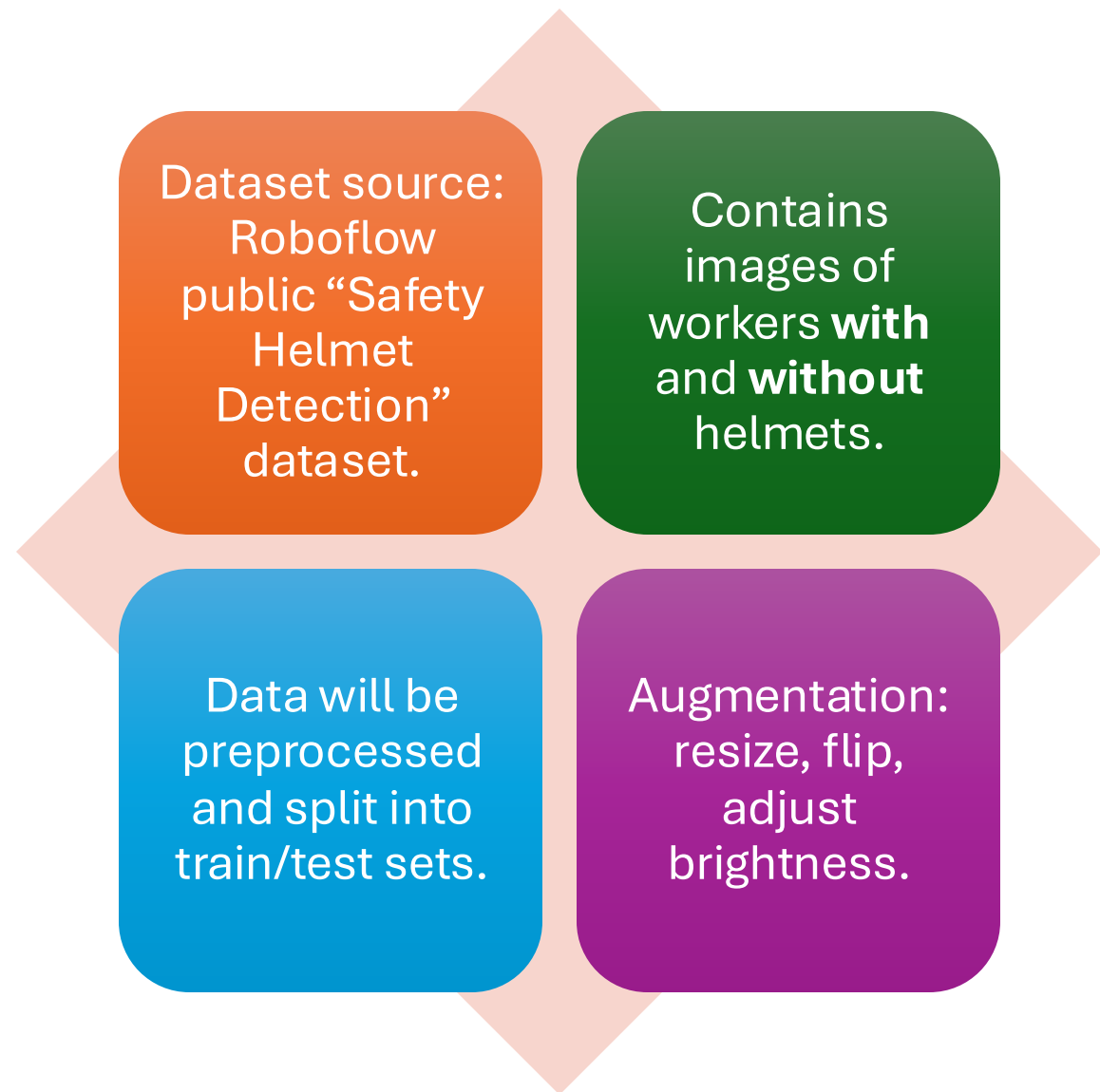


Run and test the model on Google Colab using Python.



Evaluate accuracy and detection speed.

Data Plan



Slide 6: System Diagram

It will be:

Camera → YOLOv8 Model → Detection
→ Alert (No Helmet)

Simple pipeline:

- Capture image/video.
- Detect person and helmet.
- Compare bounding boxes.
- If person has no helmet → send alert.





Success Metrics

- **Accuracy:** at least 85% detection rate.
- **Speed:** real-time detection (under 1 second per frame).
- **Precision:** few false alarms.
- **Reliability:** works in different lighting conditions.

Week-by-Week Plan

- **Week 1:** Research and gather dataset.
Week 2: Set up YOLOv8 in Colab and train on sample data.
Week 3: Evaluate results and test images.
Week 4: Prepare slides, GitHub repo, and finalize project report.



Challenges and Backup Plan

Challenges:

- Small dataset or low accuracy.
- Slow detection on low-end hardware.

Backup Plans:

- Use pretrained YOLO model.
- Reduce image resolution for faster results.
- If data fails, use Kaggle dataset.



Resources Needed

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- Laptop with internet access.
 - Google Colab (free GPU).
 - Roboflow dataset access.
 - YOLOv8 framework (Ultralytics library).
 - GitHub for documentation.