

ShopIntel: Autonomous AI for Shoplifting Detection

A Project-Based Learning initiative by

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Introducing ShopIntel

ShopIntel is a Streamlit-based Python system that uses real-time computer vision to identify suspicious actions inside retail stores. It's a modern AI solution for retail safety and theft prevention.

How ShopIntel Works



Real-time Detection

Uses YOLO, pose estimation, and object tracking to detect item hiding, unusual hand movements, and shelf-to-body interactions.



Instant Alerts

Captures frames, logs timestamps, and emails alerts with suspect snapshots to store security when high-risk events occur.



Agentic Guidance

Powered by Google Gemini, it guides staff on appropriate actions, ensuring faster and smarter decision-making.

The Retail Security Challenge

Despite existing measures, retail stores face significant challenges in preventing shoplifting.



Unnoticed Behaviors

Suspicious actions often go unnoticed due to staff workload or blind spots.



Inconsistent Monitoring

Manual surveillance is prone to human error and lacks consistency.



Delayed Intervention

Security teams often receive alerts too late for effective intervention.



Addressing Key Pain Points

Automated Evidence

Lack of automated evidence collection like timestamps, snapshots, and incident logs.

No Intelligent Assistant

Absence of guidance for staff on appropriate responses in different risk scenarios.



Our Solution: Autonomous, Agentic AI

"How can we develop an autonomous, agentic AI system that can accurately detect shoplifting-related suspicious behavior, capture real-time evidence, and guide store staff with timely alerts—reducing losses while improving retail security?"

Methodology: A Three-Pillar Approach



Real-Time Vision Detection

YOLO-based vision pipeline analyzes CCTV footage for suspicious behaviors.



Automated Alert & Evidence Capture

High-risk events trigger instant frame capture, timestamping, and email alerts.



Agentic Assistant (Gemini)

Gemini provides real-time guidance to staff based on event severity.

Technology Stack Powering ShopIntel



Frontend/UI

Streamlit (Python-based interactive dashboard)



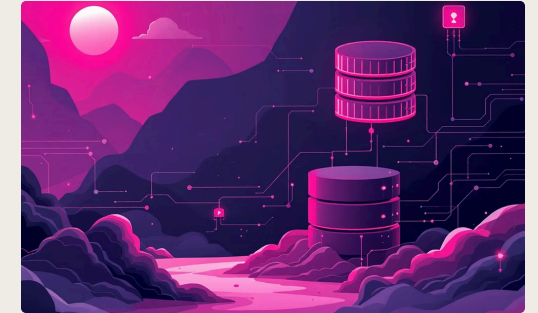
Computer Vision

YOLOv8/YOLOv10 for detection



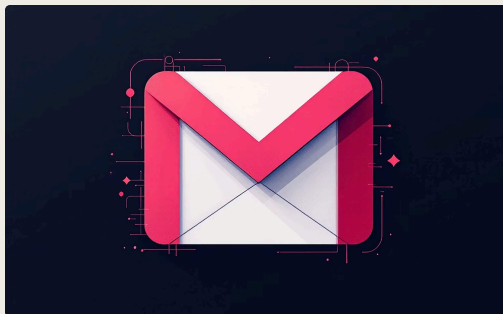
Agentic AI Layer

Gemini API for guidance & decision assistance



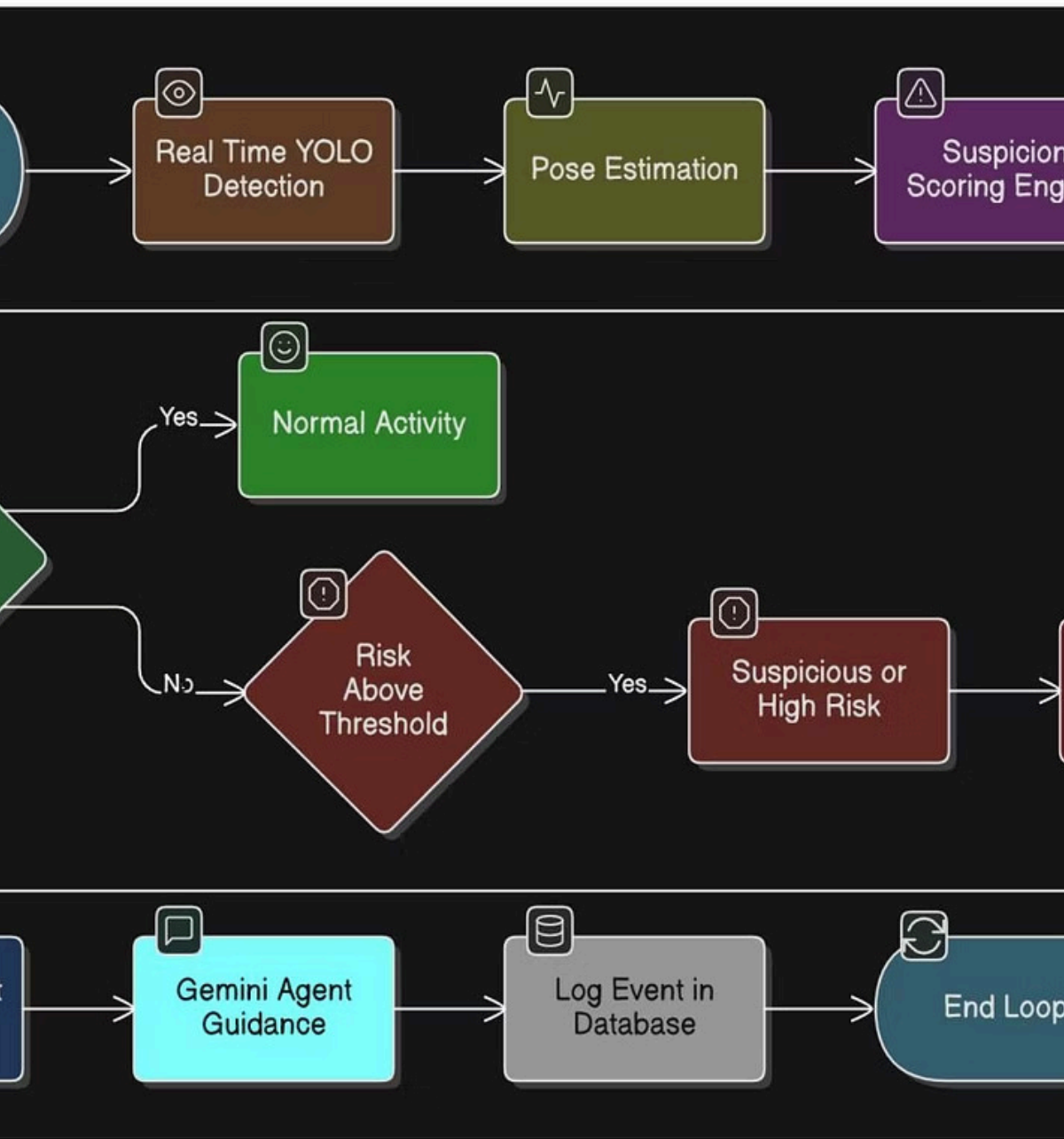
Storage

Local directory/SQLite for event logs & captured frames



Email Alerts

Gmail API for automated real-time notifications



ShopIntel System Flow

The flowchart illustrates the seamless integration of real-time vision, automated alerts, and intelligent guidance within the ShopIntel system.



Key References

- [YOLO Object Detection – Ultralytics Documentation](#)
- [Streamlit – Python App Framework Documentation](#)
- [Google Gemini API – Official Developer Guide](#)