



Guide :

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Team Members :

70 - Rajeev R

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Introduction

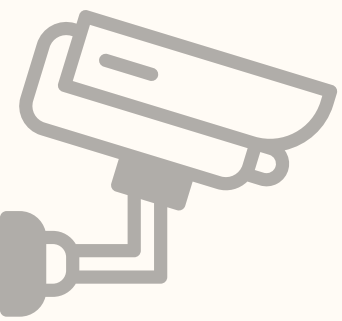


- **The Information Void:** Public safety agencies generate massive volumes of data—from historical police logs to live CCTV feeds but struggle to convert this into timely, actionable intelligence.
- **The "Passive" Trap:** Traditional security is fundamentally reactive. Static maps only visualize where crime has occurred, while standard surveillance systems merely record incidents after the fact rather than proactively detecting threats.

Introduction



- **Fragmented Tools & Cognitive Overload:** Decision-makers are overwhelmed by disconnected tools. There is a critical missing link between analyzing long-term crime trends and responding to immediate, on-the-ground emergencies.
- **The Solution - CrimeLens:** A unified, AI-powered intelligence platform that bridges this gap. CrimeLens transitions public safety from reactive reporting to real-time defense, combining predictive historical analytics with active, live-stream crime monitoring.



Objectives



1. Real-Time Crime Monitoring & Active Surveillance

Deploy state-of-the-art computer vision models to monitor live CCTV and webcam feeds. Utilize YOLO architectures to instantly detect lethal weapons and Spatiotemporal networks (MobileNetV2 + LSTM) to identify violent physical altercations, shifting security from passive recording to active intervention.

2. Comprehensive Historical Analysis & Forecasting

Develop a robust machine learning engine (using XGBoost and Facebook Prophet) to identify spatial crime clusters, classify severity risks, and forecast future crime volumes for long-term strategic planning.



Objectives



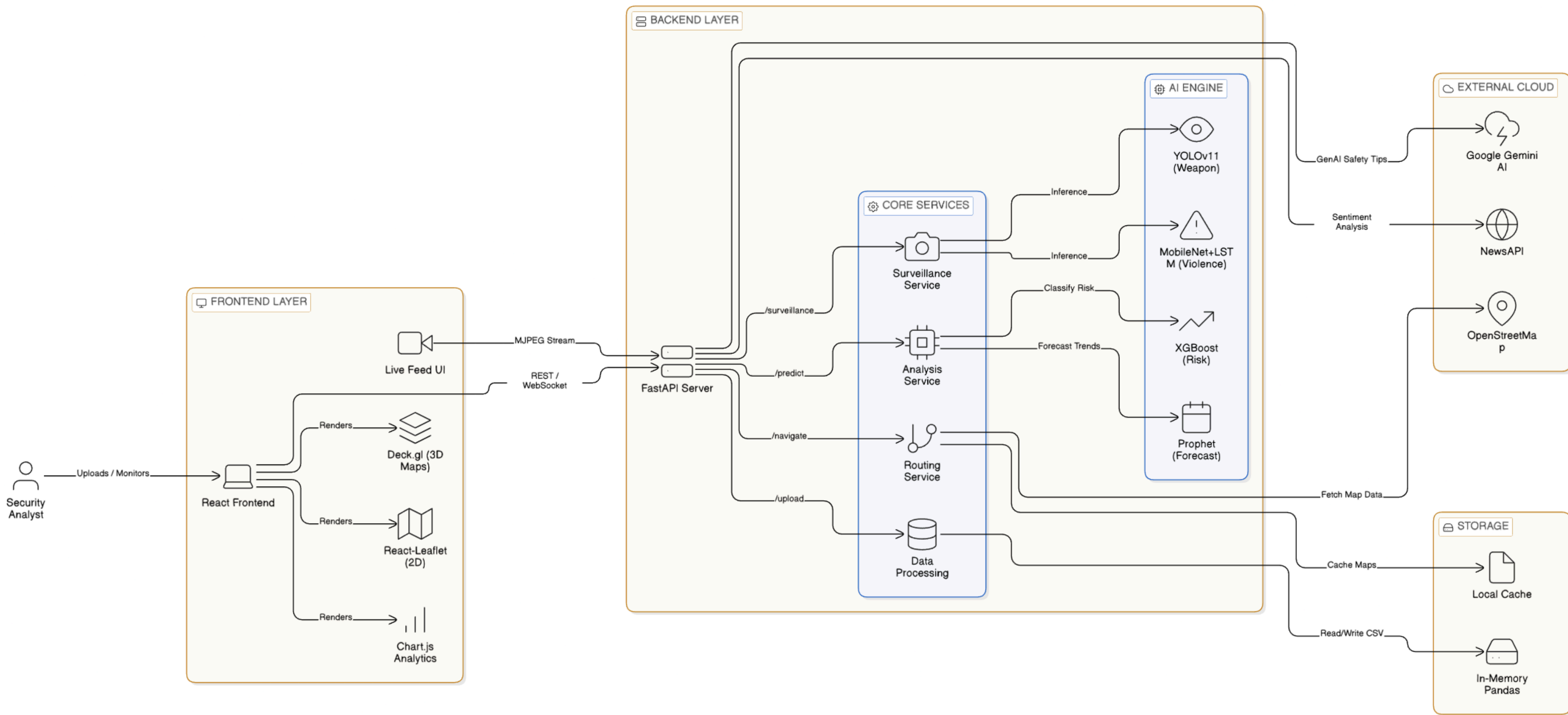
3. High-Performance Geospatial Visualization

Empower users with immersive, interactive dashboards. Move beyond traditional 2D heatmaps to 3D density maps (via Deck.gl) that provide a clear visual hierarchy of crime intensity across urban environments.

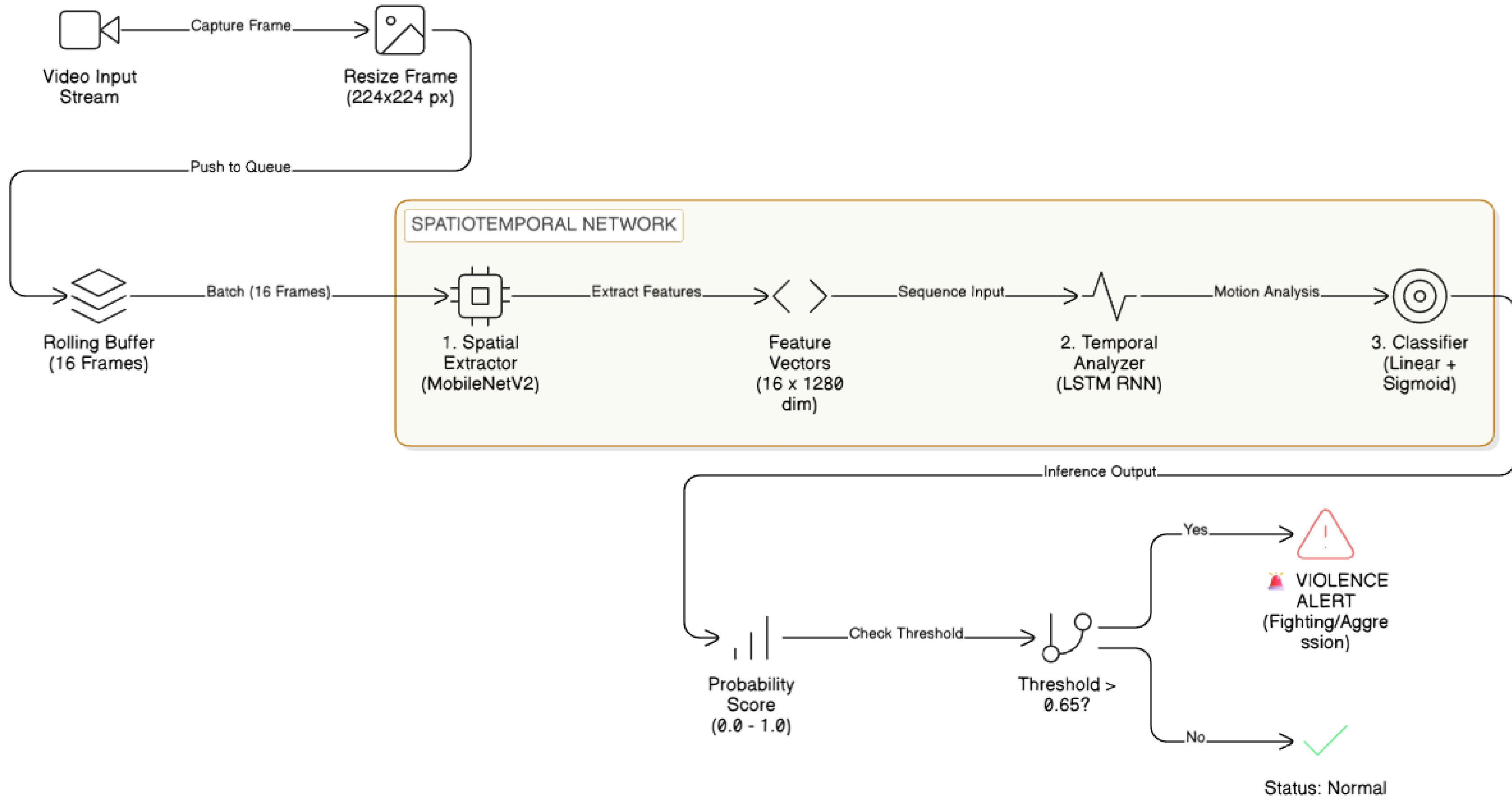
4. Unified Intelligence & Public Sentiment

Create a cohesive command center that merges "Hard Data" (tactical alerts and statistics) with "Soft Data" (an NLP-driven Public Fear Index derived from local news), complete with an AI Assistant to provide context-aware safety guidance.

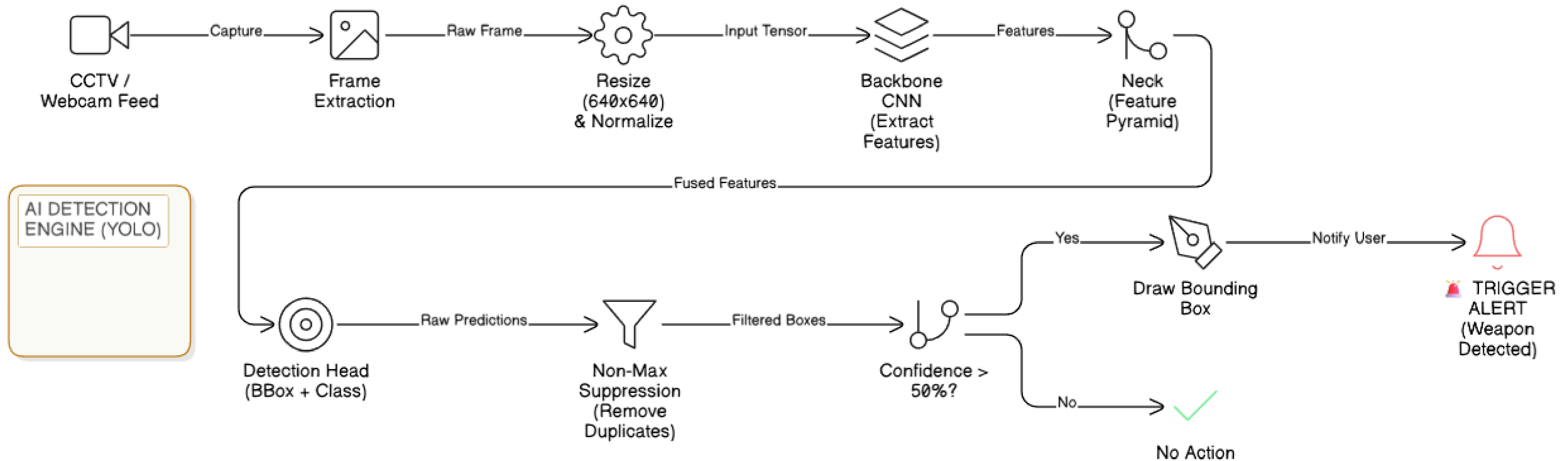
SYSTEM ARCHITECTURE



VIOLENCE DETECTION WORKFLOW



WEAPON DETECTION WORKFLOW



Weapon & Violence Detection Output



“Real-time AI surveillance outputs demonstrating the system's ability to instantly detect firearms (left) and flag physical altercations or violent behavior (right).”

Literature Survey

SI NO.	TITLE	OBSERVATIONS
1	A CNN-RNN Combined Structure for Real-World Violence Detection in Surveillance Cameras	<ul style="list-style-type: none">• Proposes a hybrid deep learning architecture combining CNN (ResNet50) for spatial feature extraction and ConvLSTM for temporal modeling.• Highlights effectiveness of integrating spatial and temporal learning for accurate violence detection in complex environments.• CNN extracts frame-level visual features, while ConvLSTM captures motion patterns across frames to detect violent events.
2	Detecting Violence in Video Based on Deep Features Fusion Technique	<ul style="list-style-type: none">• Proposes a violence detection approach using a fusion of two CNN models (AlexNet and SqueezeNet) to extract complementary spatial features.• Each CNN is followed by ConvLSTM to capture temporal dynamics and produce robust video representations.• The final hidden states from both networks are fused and passed through max-pooling and fully connected layers for classification.

Literature Survey

SI NO.	TITLE	OBSERVATIONS
3	Real-Time Weapon Detection Using YOLOv8 for Enhanced Safety	<ul style="list-style-type: none">• Proposes a real-time weapon detection system using YOLOv8 for identifying firearms and sharp weapons in surveillance video.• Achieves high detection performance measured with precision, recall, F1-score, and mAP, while maintaining fast processing speed.• Suitable for deployment in real-world security environments to improve public safety through automated monitoring.
4	H-SGE: A Hybrid Model Based on Scene Graph Enrichment for Automated Handgun Detection in Security Surveillance	<ul style="list-style-type: none">• Integrates multiple YOLO variants (YOLOv5, YOLOv7, YOLO10, YOLO11) in a unified detection pipeline to leverage complementary strengths.• Multi-YOLO detection combined with fusion significantly improves performance, achieving up to 96.9% mAP@0.5 and high precision.• Maintains real-time capability ($\approx 47\text{--}51$ FPS) while reducing false positives through YOLO-based ensemble detection.

Task Distribution



Rajeev R

- Frontend development (React)
- Weapon & violence detection models (Computer Vision)
- Crime prediction model (XGBoost)
- 3D geospatial layer implementation
- Dashboard logic
- Data visualization (charts, maps)

Phoenix Lal P T

- Backend development (FastAPI)
- Data preprocessing
- API integration
- Sentiment analysis module

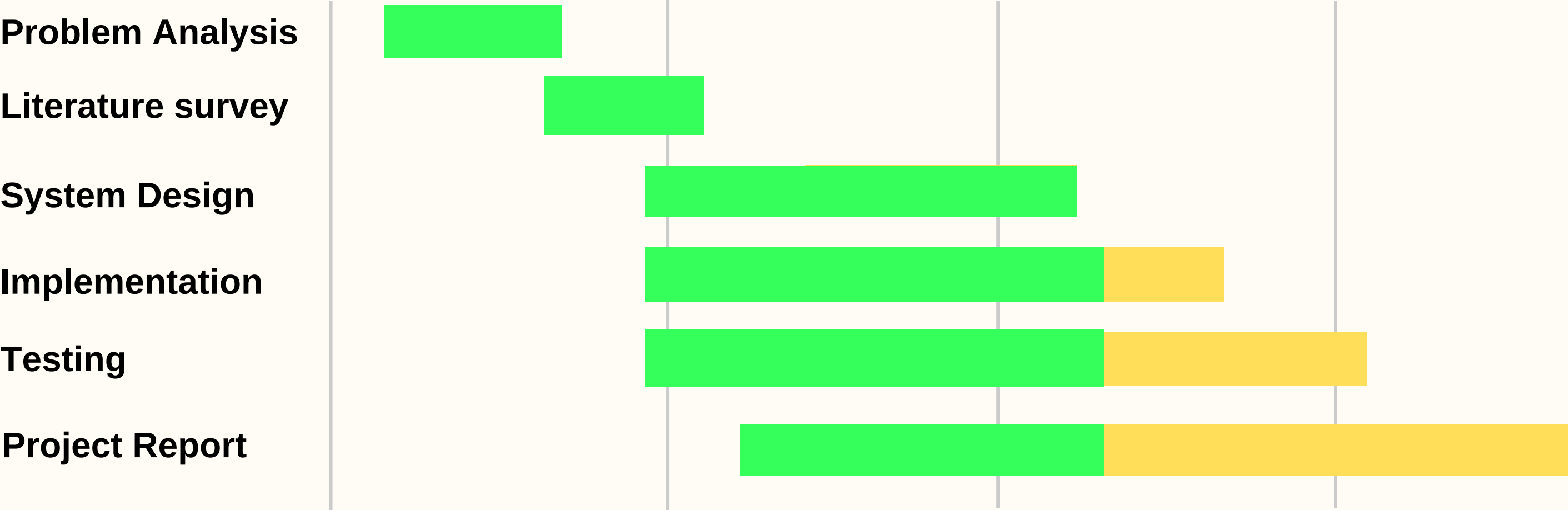
Vaisakh V

- Backend development (FastAPI)
- API integration
- Time-series forecasting
- Weapon & violence detection models (Computer Vision)

Completed

Pending

PROJECT PHASE - II



Conclusion



- **A Complete Shield:** CrimeLens has evolved from a simple data visualization tool into a comprehensive security suite.
- **Proactive Defense:** By integrating Weapon and Violence detection, we provide security personnel with the "digital eyes" needed to respond during a crime, not just report on it after.
- **Future Scope:**
 - Integration of the Shoplifting model into the main stable branch.
 - Connecting detection alerts to the "Incident Reporting" system for automated logging.

References



1. Vosta, S., & Yow, K. C. (2022). A CNN-RNN Combined Structure for Real-World Violence Detection in Surveillance Cameras. *Applied Sciences*, 12(3), 1021.
2. Jahlan, H. M. B., & Elrefaei, L. A. (2022). Detecting Violence in Video Based on Deep Features Fusion Technique. arXiv preprint arXiv:2204.07443.
3. Thakur, A., et al. (2024). Real-Time Weapon Detection Using YOLOv8 for Enhanced Safety. arXiv preprint arXiv:2410.19862.
4. Jawaid, N., et al. (2025). H-SGE: A Hybrid Model Based on Scene Graph Enrichment for Automated Handgun Detection in Security Surveillance. *Signal, Image and Video Processing*.



THANK YOU