Final Project Report: RailGuard

Team: Meta Minds
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Problem Statement: Using existing CCTV networks for crowd management,crime detection and prevention and work monitoring for Railway Stations

Technical Approach: We developed a crowd and anomaly detection tool using deep learning techniques like CNN and LSTM models to accurately identify overgrowth of crowds and record anomalous incidents. Our system employs:
- **Data Collection:** Acquired a large dataset of labeled crowds and anomaly sets and implemented a secure and efficient API integration for real-time analysis.
- **Model Training:** Trained a Long Short-Term Memory (LSTM) convolutional neural network model to detect any kind of mishap or anomalies that might occur at the railway platform. Also trained a yolov7 model with defined weights and classes for proper identification of the crowd.
- **Preprocessing and Feature Engineering:** Cleaned and preprocessed data sets extracting relevant features like fighting, boxing or any other kind of offensive or suspicious activity for improved model accuracy.
- **Visualization and Actionable Insights:** Planned to develop interactive dashboards displaying crowd trends over time, displaying occurring anomalies at particular time instants based on analysis along with the monitoring of on-ground staff.

Results:
- Improved Crowd Understanding: Businesses can now accurately identify over crowd and manage it effectively through alerts, enabling targeted responses.
- Enhanced Safety of people: Proactive anomaly analysis and detection that allows businesses to address the mishap and compel the railway staff and authorities to take action and prevent physical and infrastructural damage.
- Better visualization and Work Monitoring: Graphical display and analysis of crowd,anomaly trends over time.Also keeping an eye on increasing the efficiency of the physical level authorities for prompt actions.

Challenges and Future Work:
- Scalability: Optimizing our solution for scalability and robustness to handle increasing volumes of data from a growing number of CCTV cameras.
- Enhanced detection: Further refining the machine learning models to improve its accuracy and efficiency.
- Collaboration with Transportation Authorities: Collaborating with transportation authorities and railway operators to deploy our solution across multiple stations or within entire railway networks

Conclusion: Our crowd and anomaly detection analysis tool offers an optimal and efficient solution for businesses to leverage this tool by making a greater use of the CCTV networks at the railways ultimately bridging the gap between customer incidents and on-ground authorities. We are committed to continuous improvement, working to address challenges and bring in new compatible features.