CENTRE FOR ARTIFICIAL INTELLIGENCE
AND
MACHINE LEARNING
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Problem statement:

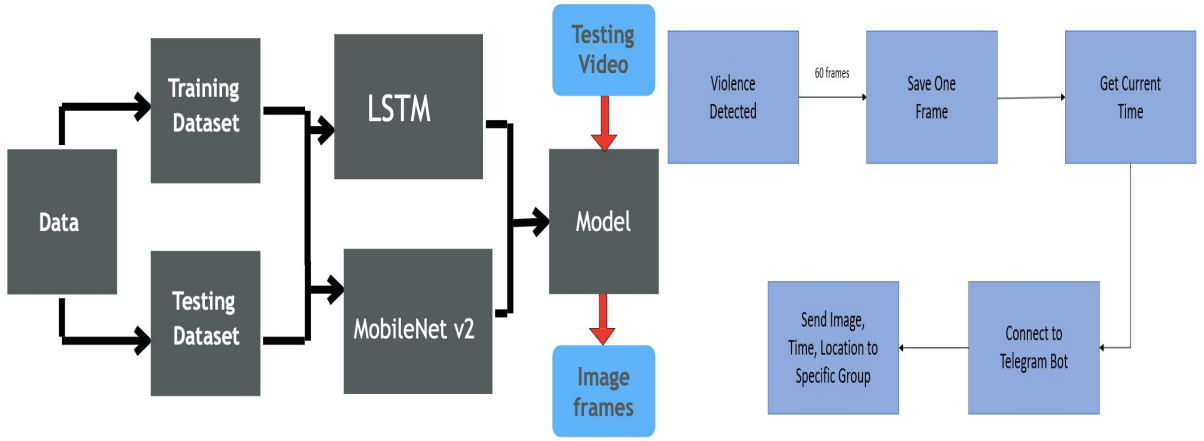
Video-Based Violence Detection System

Introduction: *Surveillance has become a critical aspect of maintaining safety in public spaces, schools, and workplaces.*
Traditional monitoring methods are manual and often inefficient in real-time scenarios.
By combining MobileNetV2 and LSTM, the system can accurately classify activities as "Normal" or "Violence."
To ensure timely intervention, a Telegram bot sends instant alerts with relevant details and evidence to authorities.

Dataset: *SmartCity CCTV Violence Detection Dataset (SCVD) used. Train and Test folders with three classes: Normal, Violence, and Weaponized.*
Sample videos per category visualized for understanding.

Preprocessing and Cleaning:
Extracting a subset of frames (15 frames) per video, due to computational constraints.
Resizing each frame to a uniform size of 128x128 pixels.

This project uses a deep learning architecture combining MobileNetV2 for spatial feature extraction and LSTMs for temporal sequence analysis. Preprocessed video frames are passed through MobileNetV2 within a TimeDistributed layer to extract features, followed by LSTMs to model temporal dependencies. Dense layers classify actions as normal or violent. The system includes real-time inference and a Telegram bot for alert notifications.Training incorporates early stopping and model checkpoints, achieving robust performance.



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Training and validation: *Model built using LSTM layers on extracted frame features for sequence analysis. Hyperparameters: Adam Optimizer: with a learning rate of 1e-3. Binary Cross Entropy Loss function(for binary classification).*

Evaluation Metrics: *Confusion Matrix to illustrate classification accuracy.Classification Report with precision, recall, and F1-score.*

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15/15 ━━━━━━━━━━━━━━━━━━━━ 47s 3s/step
              precision    recall  f1-score   support

           0       0.98      1.00      0.99       169
           1       1.00      0.99      0.99       308

    accuracy                           0.99       477
   macro avg       0.99      0.99      0.99       477
weighted avg       0.99      0.99      0.99       477
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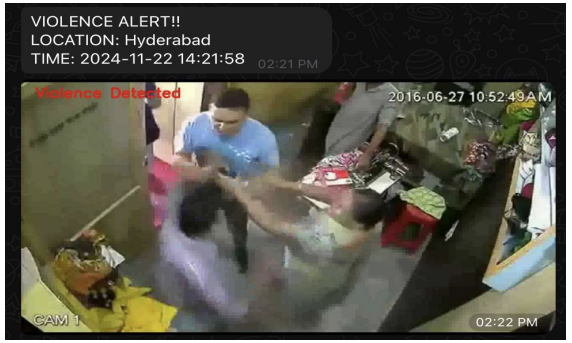
Results: *The model achieves high accuracy in detecting violence from video clips.the Telegram bot successfully delivers alerts.*



Conclusion: *The project successfully implements a deep learning-based system to detect violent activities in videos using MobileNetV2 and LSTM, achieving high accuracy in classification. Integration with a Telegram bot enables real-time alerts, making it practical for surveillance applications*