Counselling Code: VBIT

VIGNANA BHARATHI Institute of Technology

(A UGC Autonomous Institution, Approved by AICTE, Accredited by NBA and NAAC-A Grade, Affiliated to JNTUH)

MINOR PROJECT

SMART SURVEILLANCE SYSTEM FOR PUBLIC SAFETY

Batch No.**21PA16**

UNDER THE GUIDANCE OF:

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ABSTRACT

- This research proposes a deep learning-based smart surveillance system to enhance public safety by automatically detecting suspicious activities.
- The system leverages advanced techniques like convolutional neural networks (CNNs) , YOLOv8 to analyze video data and identify anomalies such as unattended objects or aggressive behavior.
- By promptly alerting authorities, this system can help prevent potential threats and improve overall security.

Keywords: smart surveillance, deep learning, public safety, anomaly detection, CNNs, video analysis, YOLOv8

INTRODUCTION

- Current systems rely on manual video analysis, which is prone to errors and slow, highlighting the need for automated solutions.
- The system uses CNNs for spatial and RNNs for temporal analysis to detect suspicious activities like violence and theft in real time.
- YOLO enhances the system's speed and accuracy in detecting objects in crowded areas, ensuring real-time monitoring.
- The system sends alerts to security personnel for quick intervention and is scalable for use in various public spaces, supporting smart city initiatives.

LITERATURE SURVEY

REFERENCE PAPER	YEAR OF PUBLISHING	PROS	CONS
REAL-TIME ANOMALY DETECTION FOR PUBLIC SAFETY	2023	robust real-time processing capabilities, efficient feature extraction using CNNs	high computational costs and a dependence on extensive labeled datasets
ANOMALY DETECTION IN PUBLIC SPACES LEVERAGED GENERATIVE ADVERSARIAL NETWORKS (GANS)	2023	identifies anomalies based on deviations from normal behavior patterns	requires significant computation al resources

LITERATURE SURVEY

REFERENCE PAPER	YEAR OF PUBLISHING	PROS	CONS
ANOMALY DETECTION SYSTEM USING SUPPORT VECTOR MACHINES	2020	SIMPLICITY AND MODERATE COMPUTATIONAL REQUIREMENTS	LOWER ACCURACY
K-MEANS CLUSTERING TO DETECT ANOMALIES	2023	INCLUDE UNSUPERVISED LEARNING CAPABILITIES AND REDUCED RELIANCE ON LABELED DATA	BIAS WITH THE DETECTION

CHALLENGES

- **Data Quality**: The availability of high-quality labeled datasets for training deep learning models is crucial.
- **Model Complexity:** Designing and interpreting deep learning architectures for surveillance tasks can be challenging.
- **Privacy Concerns:** The deployment of surveillance systems raises privacy concerns regarding the collection and use of personal data.
- **Lighting Conditions:** Variations in lighting can significantly impact the performance of surveillance systems, making it difficult to detect objects or people accurately.

PROBLEM STATEMENT

- Public safety in urban areas is compromised by the inefficiency of traditional surveillance systems, which are limited in real-time threat detection and response. A Smart Surveillance System can proactively monitor, analyze, and address safety hazards, enhancing emergency response.

OBJECTIVE

To utilize advanced deep learning techniques like CNNs and YOLOv8 to extract meaningful features from video data and ensure real-time detection of suspicious activities.

EXISTING SYSTEM & PROPOSED SYSTEM

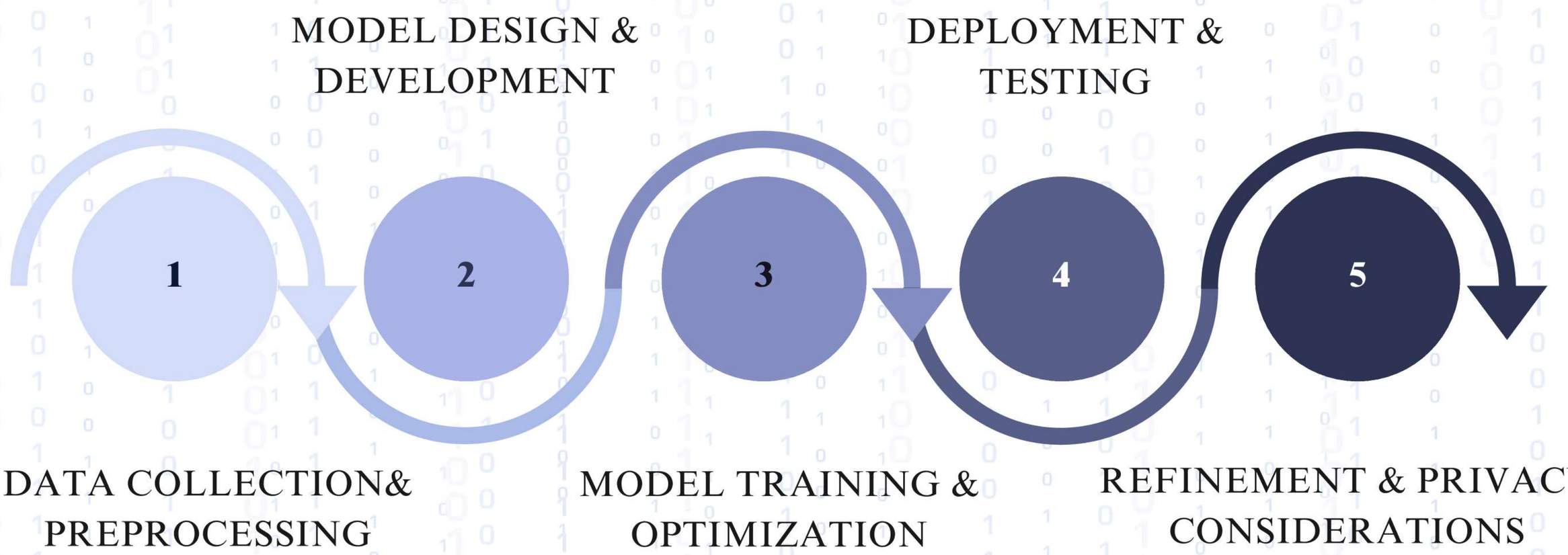
Existing System:

- False Positives/Negatives
- Data Availability and Quality
- Lack of proper notifying ability

Proposed System:

- Deep-Learning will be used to extract deep features from the video frames.
- Incorporates YOLO, a cutting-edge object detection algorithm, to enhance detection accuracy and processing speed, making it ideal for monitoring crowded public spaces.
- The system will notify authorities about detected suspicious activities.

PROPOSED METHODOLOGY



SOFTWARE & HARDWARE REQUIREMENTS

Software:

- Deep learning frameworks (TensorFlow, PyTorch)
- Computer vision libraries (OpenCV)
- Programming languages (Python)
- Windows 10/11 OS

Hardware:

- High-performance computing systems (CPU intel core i5/i7, GPUs, TPUs)
- RAM-8/16 GB

IMPLEMENTATION

1.Setup and Imports:
Required libraries such as OpenCV, YOLOv8, and PyTorch are installed and imported. The YOLO model (yolov8n.pt) is loaded for object detection.

2. Upload and Process Video: A video file is uploaded from the local machine, and YOLO performs object detection on each frame of the video. Detection results, including bounding boxes for objects, are saved in a directory.

IMPLEMENTATION

3.Detection and Rule-Based Analysis:

Each detected frame is analyzed for specific objects (e.g., person, knife). If a potential threat (e.g., violence) is detected, a message is generated for the frame.

4.Frame to Video Conversion:

The saved detection frames are reassembled into a video. A text label indicating violence detection or absence is overlayed on each frame, and the final video is saved.

IMPLEMENTATION

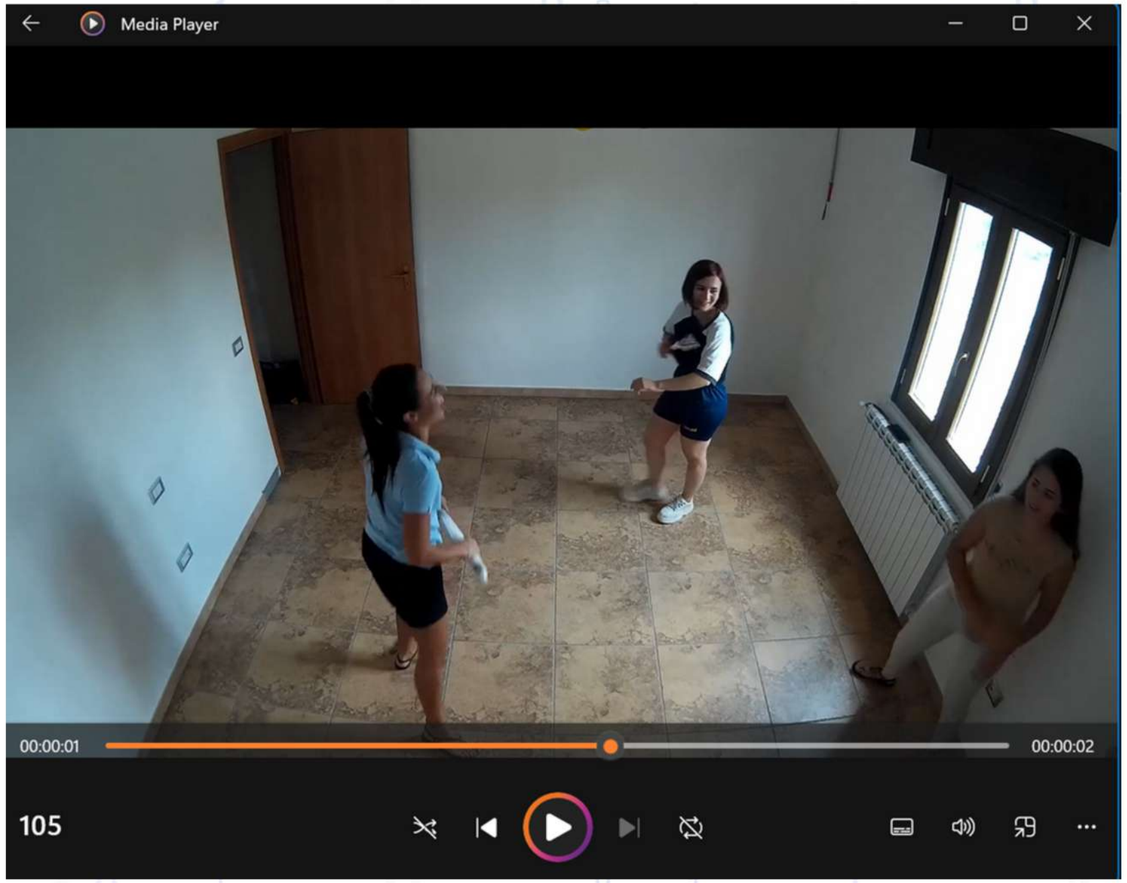
5.Display and Download:

The generated video is displayed within the Colab environment using HTML. The final video file is then prepared for download to the user's local system.

Implementation:

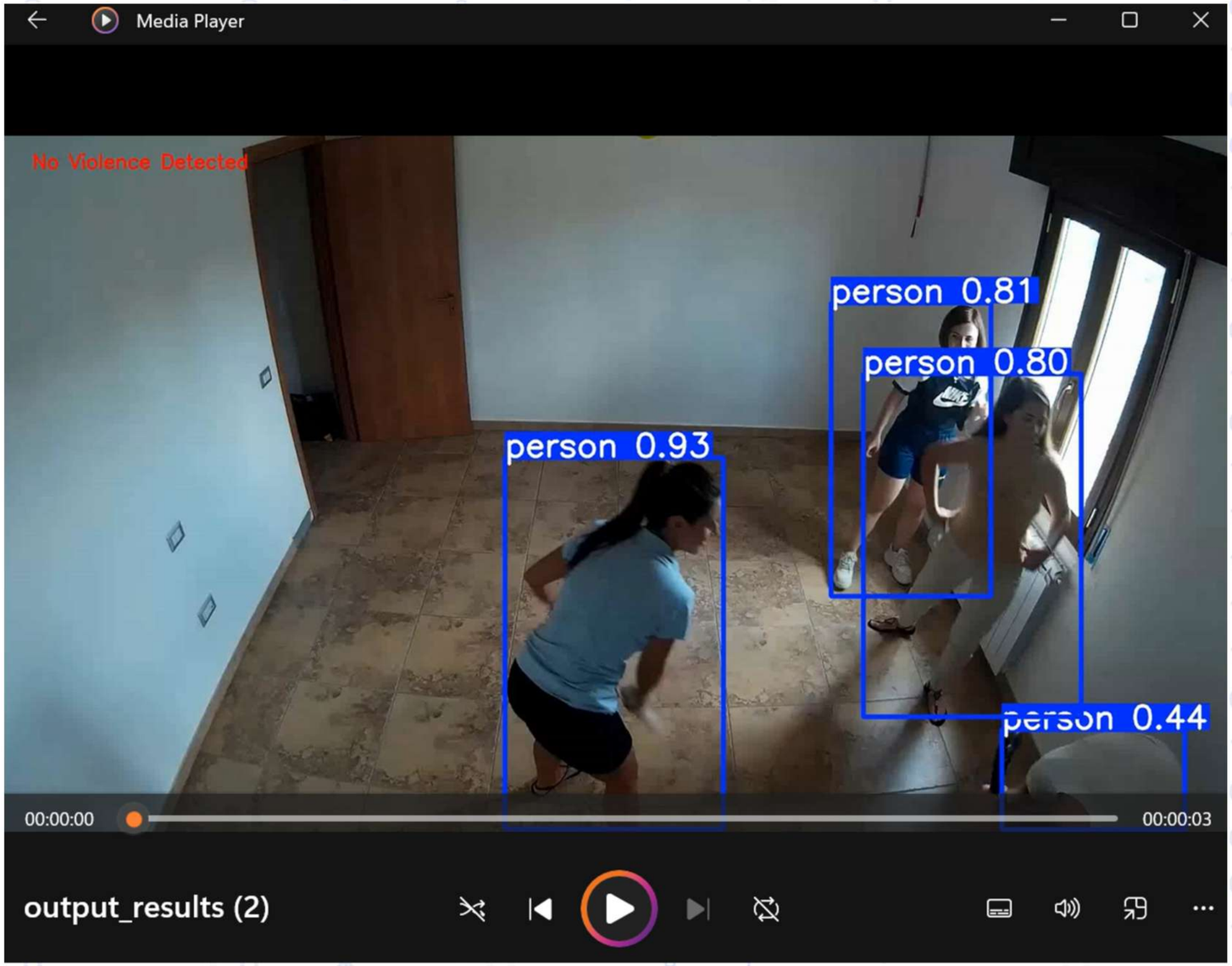
- https://github.com/jahnaviakurathi/machinelearning/blob/main/sss3.ipynb
- https://youtu.be/Bg2Yduq-GLs?si=t9DR4zTA8jrOf6dB

INPUT VIDEO

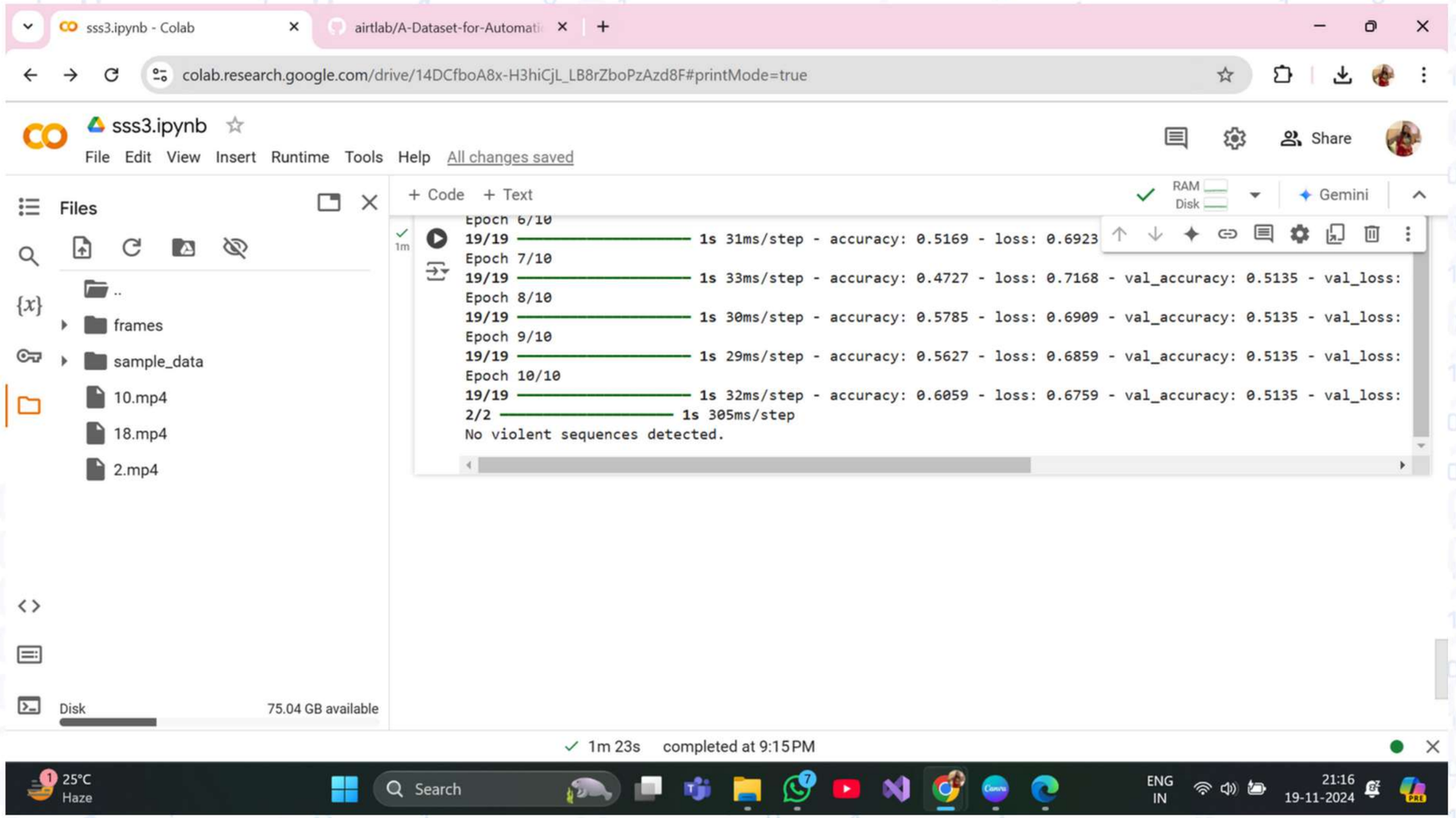


A FRAME FROM ONE OF THE VIDEO DEPICTING VIOLENT BEHAVIOUR

RESULTS


Media Player
No Violence Detected
person 0.81
person 0.80
person 0.93
person 0.44
00:00:00
00:00:03
output_results (2)

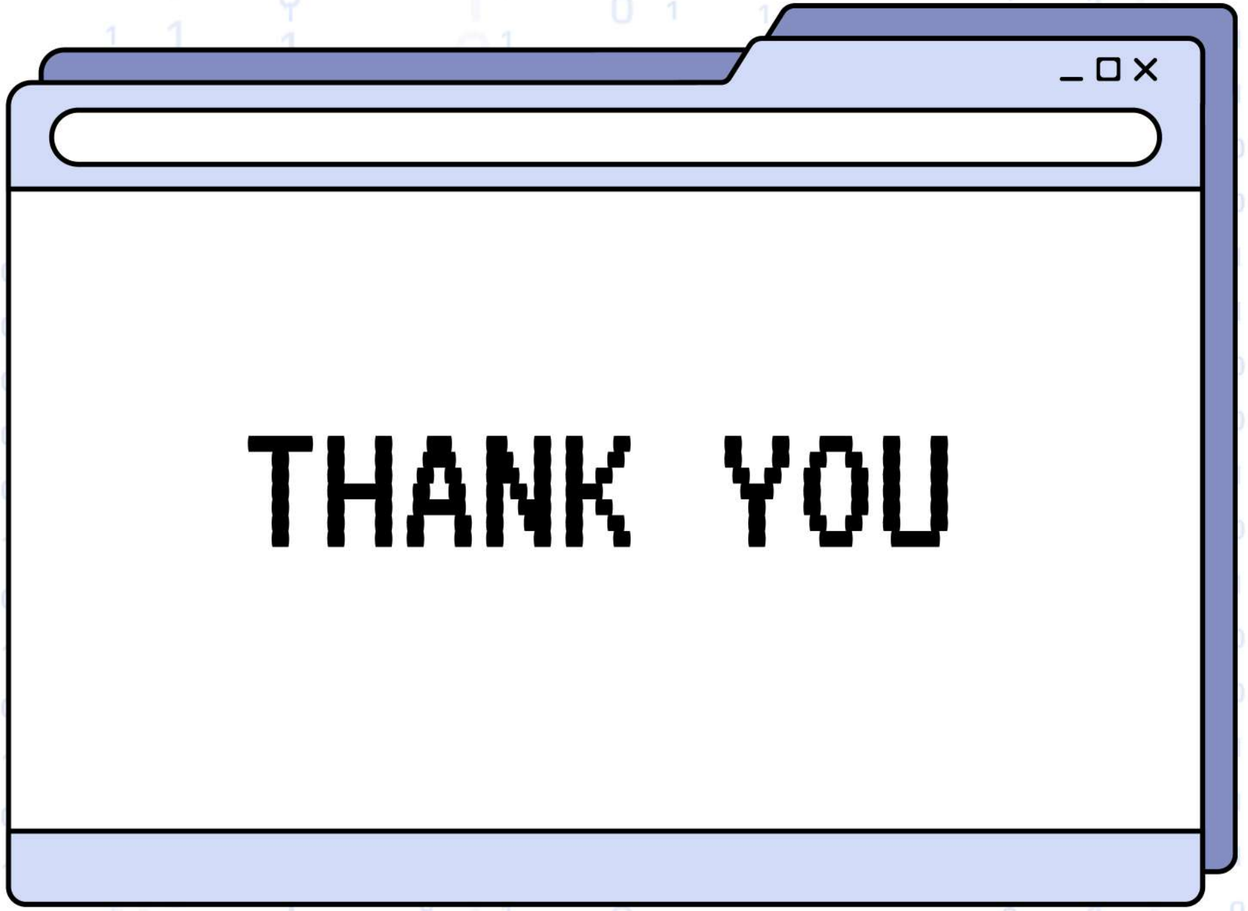
RESULTS



OUTPUT OF A TESTING VIDEO(NON VIOLENT)

REFERENCES

- REVIEW 1:https://youtu.be/VotaFQEx2MU?si=JKY08E62cH93Owxr
- https://ieeexplore.ieee.org/document/9318134
- https://ieeexplore.ieee.org/document/9112527
- https://ieeexplore.ieee.org/abstract/document/8806120
- https://ijarsct.co.in/Paper5319
- https://github.com/airtlab/A-Dataset-for-Automatic-Violence-Detection-in-Videos


THANK YOU