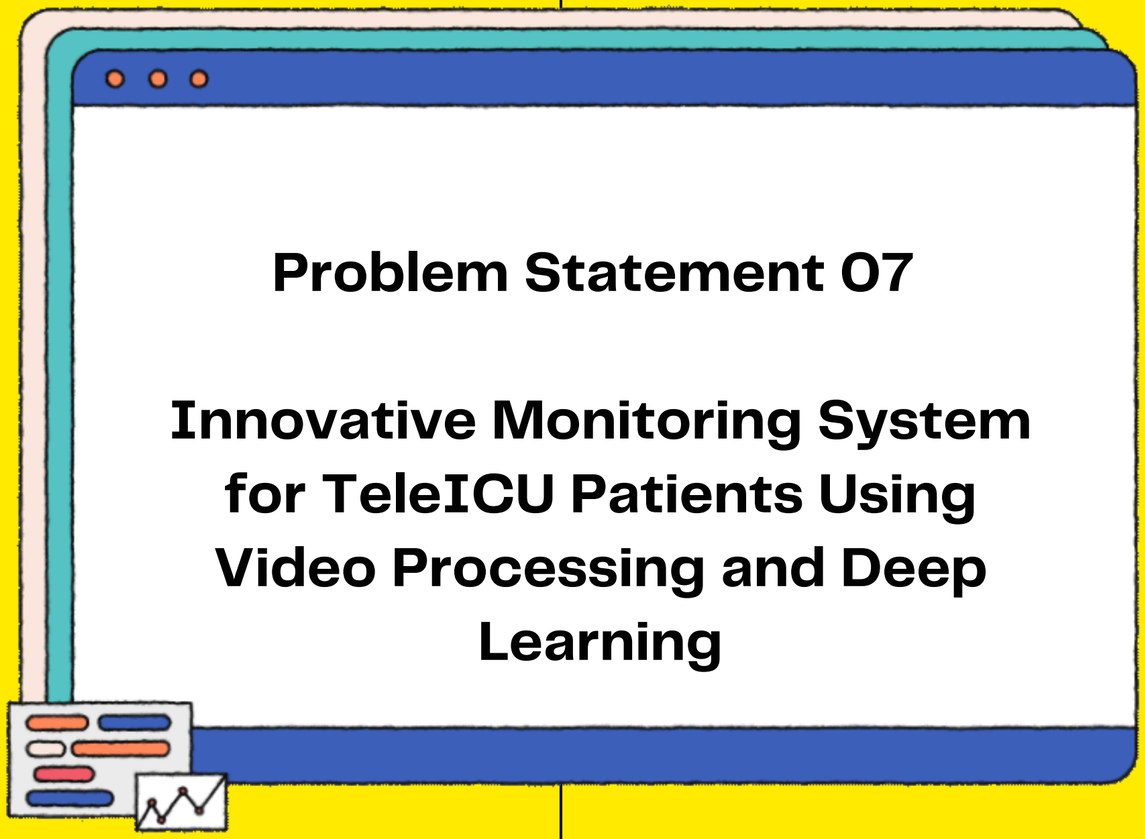
TeleICU Project



Problem Statement 07

Innovative Monitoring System for TeleICU Patients Using Video Processing and Deep Learning

TEAM NAME: BELIEVERS

TEAM MEMBERS:

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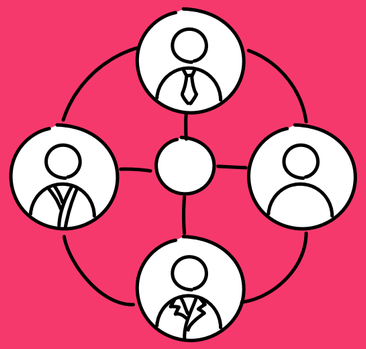
Unique Idea brief solution

- Splitting the Model for Reduced Inference Time into Person classification model and patient’s activity classification model
- Implemented frame skipping during inference to speed up the process in both the models
- Due to lack of quality and quantity of data for action classification we took the approach of classification with keypoints detection. By this approach we can baisically overcome the need of hospital patient data.
- The graph is introduced to help visualize the confidence and distribution of actions throughout the video feed.

Features Offered

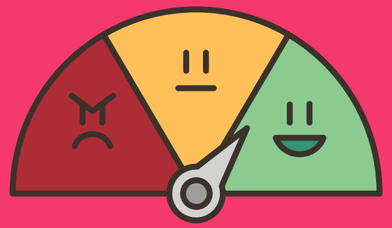
People Detection and Classification

Utilizes a YOLOv8 model trained on a manually annotated ICU dataset to categorize individuals in video frames as doctors, patients, or other personnel, and extracts portions containing patients to create a separate video.



Patient Action Detection

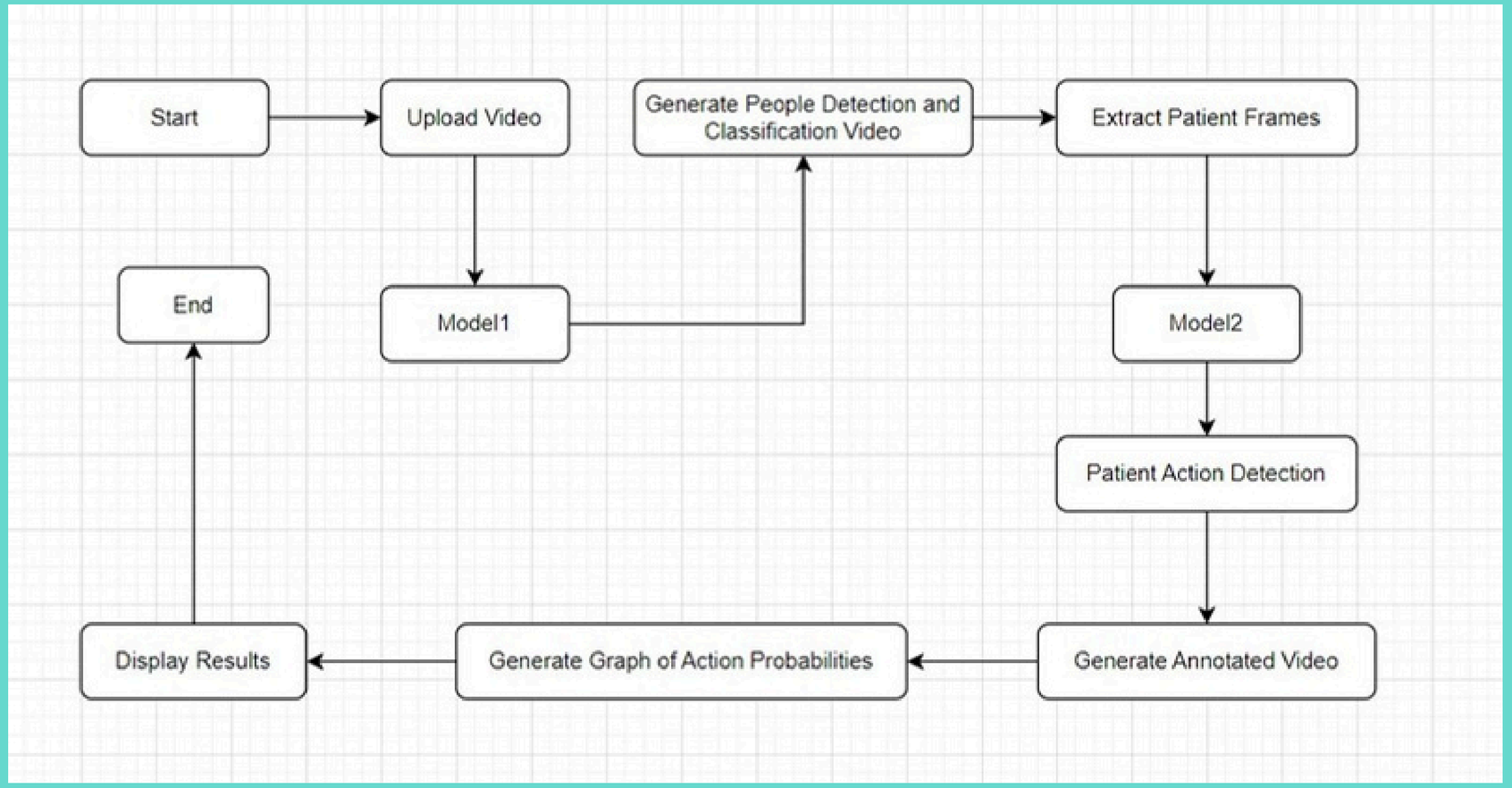
Uses an LSTM-based action detection model to classify patient actions from the extracted video, detecting actions like clapping, sitting, standing still, and walking, and generates a final video with detected actions and a graph of action probabilities over time.



Graphical Representation of actions

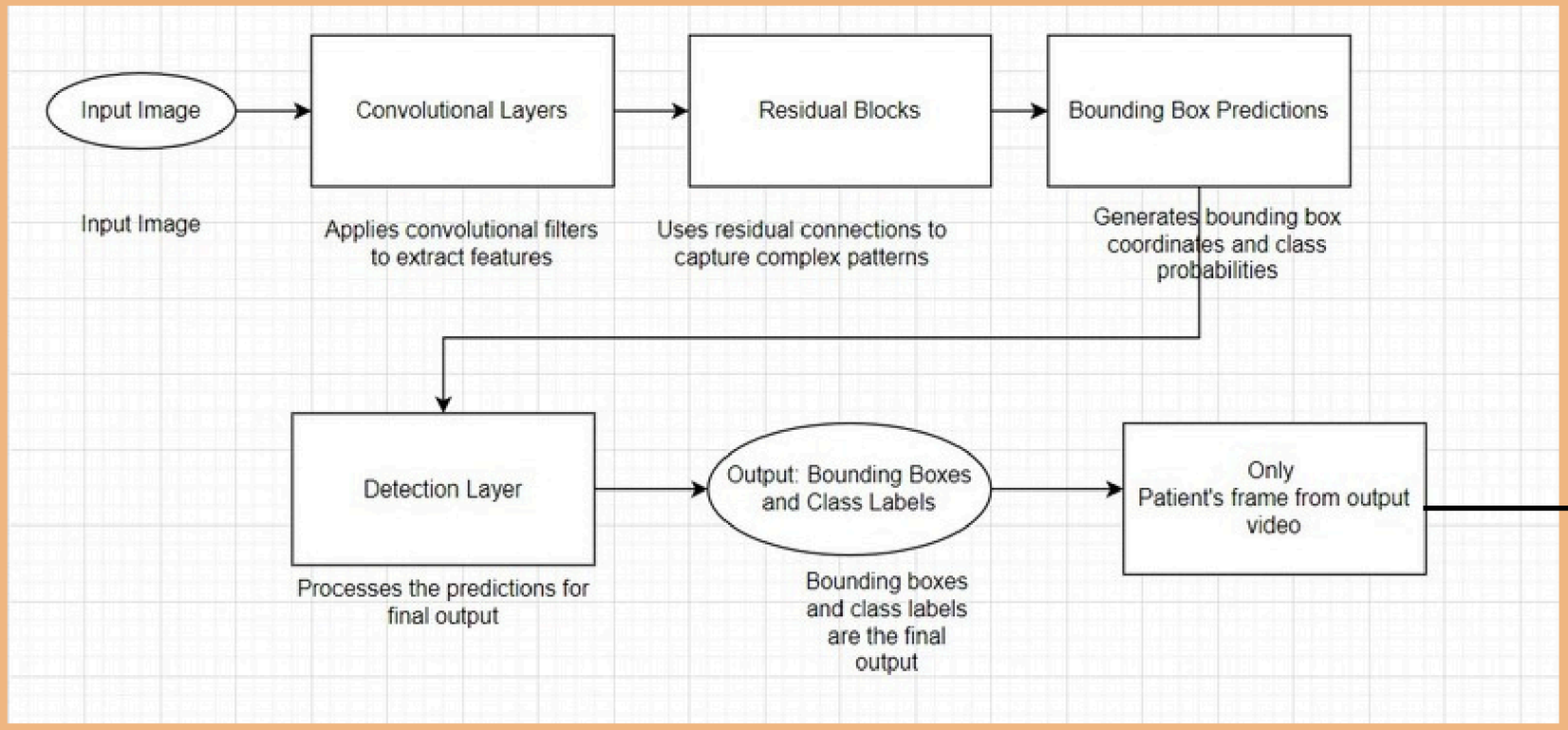
Displays a graph with timestamps on the x-axis and activity percentages on the y-axis, plotting points for the highest probability action at each timestamp using unique colors for different actions.

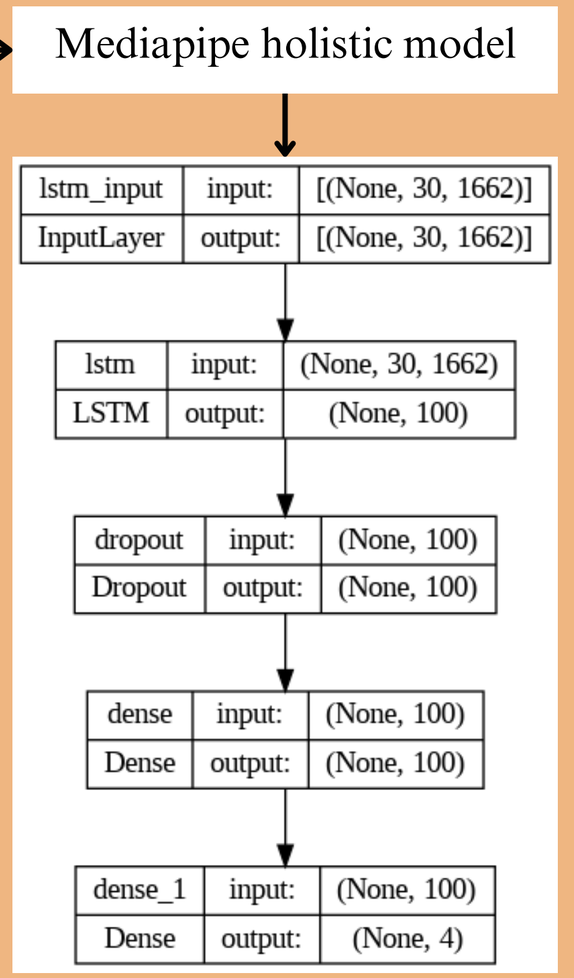
Process flow



Architecture Diagram

Person classification & patient activity detection





Technologies Used

Python

Streamlit

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Tensorflow

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YOLO

YOLOv8

MediaPipe

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Label Studio

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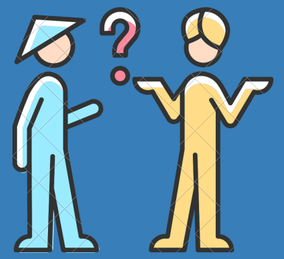

Team members and contributions

Jagdish Suthar

- Developed the model for people detection and classification into doctors, patients, and family members.
- Prepared the dataset and trained it using the YOLO model.
- Integrated both detection and activity recognition models.
- Created the Streamlit interface for the project.

Manmeet Patel

- Took charge of developing model for patients' activity recognition and classification into four categories: 'standing,' 'sitting,' 'walking,' and 'clapping.'
- Used MediaPipe for keypoints detection and LSTM for real-time action classification.
- Worked on the project's documentation.

Conclusion

- The ICU Video Analysis System demonstrates the potential of using machine learning for automating the analysis of ICU videos. Despite the current limitations in action detection accuracy, the system lays a strong foundation for future improvements. With better datasets and optimized models, the system can provide accurate and real-time insights into patient activities, aiding in effective ICU monitoring and management.

- We hope this project serves as a valuable step towards enhancing ICU monitoring systems and invites further research and development in this critical area. Contributions and feedback are welcome to improve the system's performance and capabilities.