



WALCHAND COLLEGE OF ENGINEERING SANGLI

(An Autonomous Institute)

Department of Computer Science and Engineering

A Mini-Project Report on

“Human Activity Recognition Based Child Monitoring System”

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Under the guidance of

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Walchand College of Engineering, Sangli

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**Department of
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CERTIFICATE

This is to certify that the project Report entitled,
“**Human Activity Recognition based Child Monitoring System**”,

Submitted by,

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to Walchand College of Engineering, Sangli, India, in a partial fulfillment of the completion of 6th semester of B.Tech course during the year 2018-19. The project has been approved as it satisfies the academic requirement with respect to the project work prescribed for above said course.

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Place: Sangli

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Introduction

Parents play a pivotal role in shaping the lives of their children. With the advent of the family style where both the parents are at work, raising a child has become a difficult. Nuclear families have mushroomed and increased all over the country, leaving working parents with almost no family member to leave their child with.

So, to address this issue, we propose a child monitoring system based on human activity detection with video surveillance.

In today's digital world among all the media types available, video is the most generated and consumed format but still the least processed. Human activity detection for video surveillance system is an automated way of processing video sequences and making an intelligent decision about the actions in the video. It is one of the growing areas of computer vision and artificial intelligence. Today it is quite easy to equip the homes with cameras for surveillance of kids, but the surveillance is done by a human, and it is done only if there is a report of anomaly behaviour, otherwise, the videos are kept as archives, and never used. Developing algorithms for automatic detection of human movements, and updating the parent with the child's activities whenever necessary, will result in real-time processing of activities of the child at home.

Problem Statement

Developing an efficient and effective child monitoring system based on human activity detection to help the working parents keep a track of their child's activities and get notified about inappropriate activities.

Objectives

1. To develop a system to monitor activities of a child
2. To use deep learning techniques effectively to recognize the activities of the child throughout the day.
3. To develop a system that would enable real-time monitoring through video.

Technology

Hardware Specifications

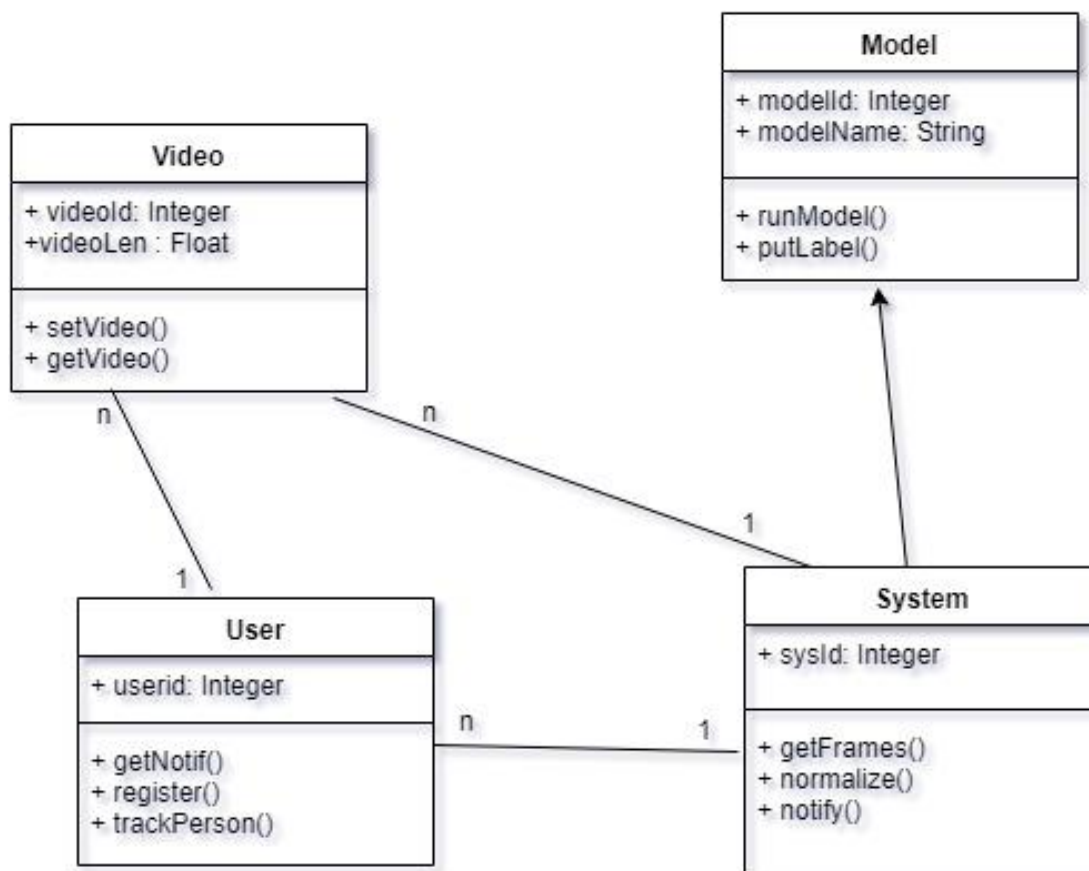
- Camera (Webcam/CCTV)

Software Specifications

- Tensorflow
- OpenCV
- Deep Learning (Faster RCNN)
- Python
- Android application
- Firebase

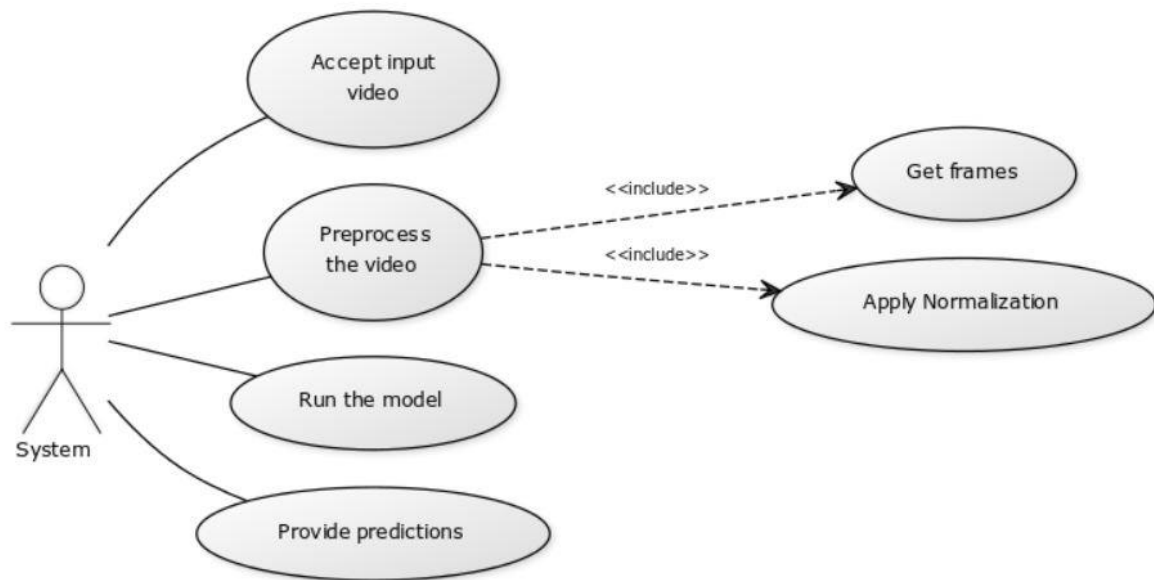
Diagrams

Class Diagram

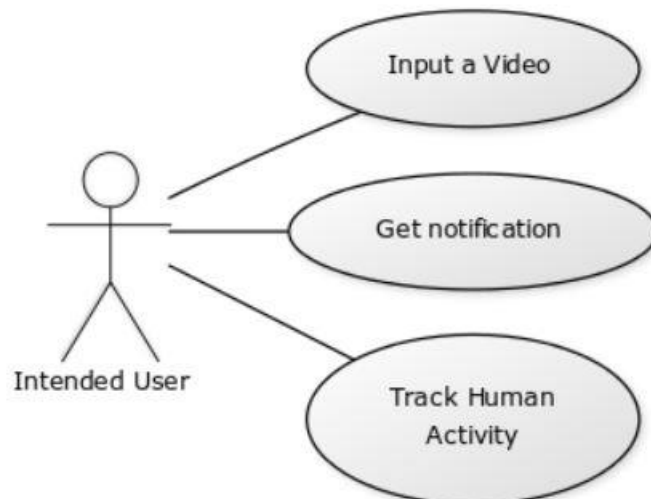


Usecase Diagrams

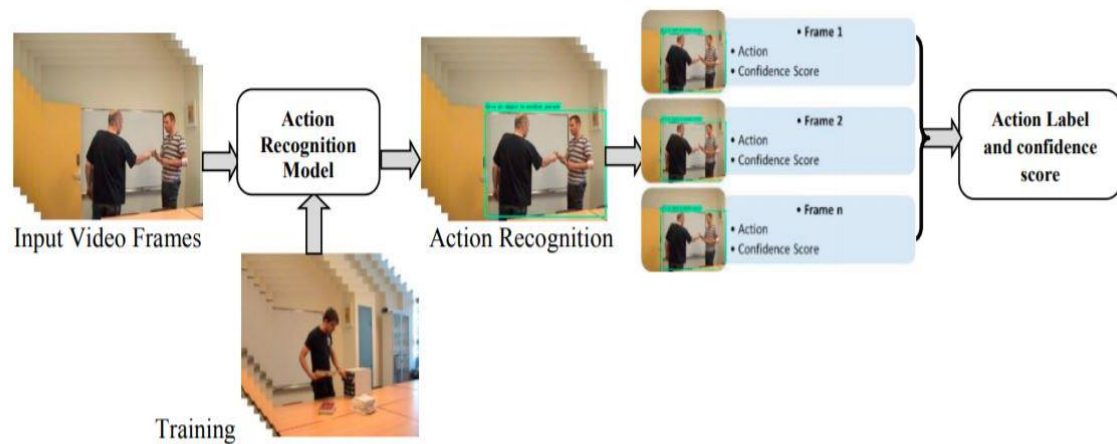
System



User



Implementation



Our approach to develop the Human Activity Detection based Child Monitoring System can be summarised in the following steps:

1. Labelling Dataset and creating xml files for training.
2. Applying the designed algorithm to our model to train the model and generate weight files and checkpoints.
3. Using the trained model, develop the system consisting of an Android application and a messaging module.

Dataset:

- Stanford40
- Images from Internet
- Real-time Camera Images

Sr. no.	Action class	Label
1	Reading	Reading
2	Watching Television	In front of Screen
3	Using Computer/Laptop	In front of Screen
4	Fighting	Fighting

Table 1. – The action categories and labels in the dataset.



(1)



(2)



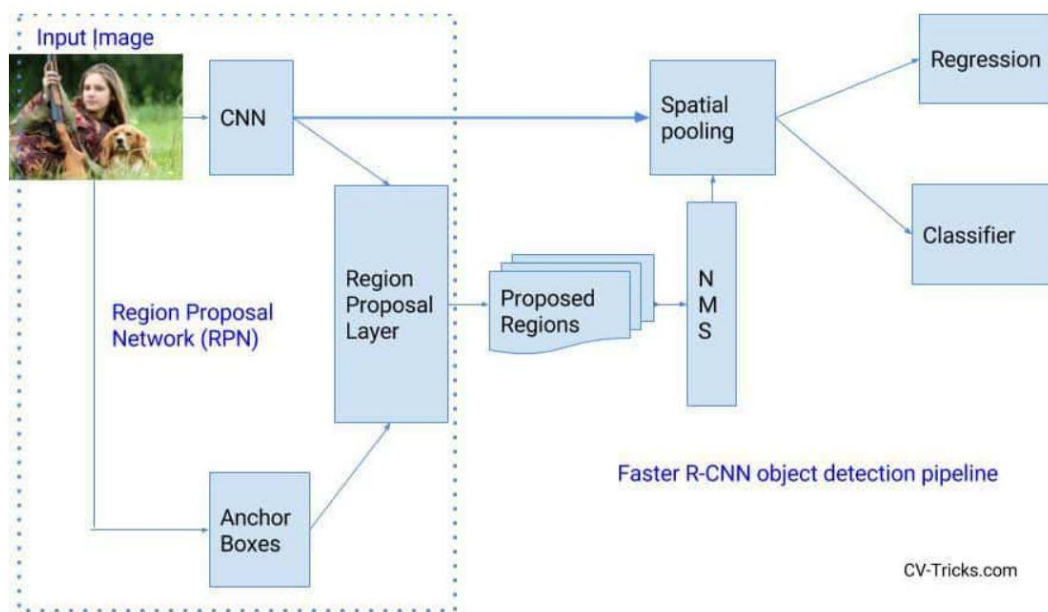
(3)



(4)

Fig. –Dataset images- (1) Reading (2)In front of Screen (3)In front of Screen (4) Fighting

We have used **Faster RCNN Algorithm** to train our model.



The working of Faster RCNN is as follows:

1. Take an input image and pass it to the ConvNet which returns feature maps for the image
2. Apply Region Proposal Network (RPN) on these feature maps and get object proposals
3. Apply ROI pooling layer to bring down all the proposals to the same size
4. Finally, pass these proposals to a fully connected layer in order to classify and predict the bounding boxes for the image.

Android Application:

We have developed an android application through which the registered parent can receive notifications regarding the child's activities.

We have implemented a geo-fencing like concept in the application so as to ensure that when the parent is home, he/she doesn't receive any notifications.

In case of some harmful activity, the parent receives text message.

Significance of Project

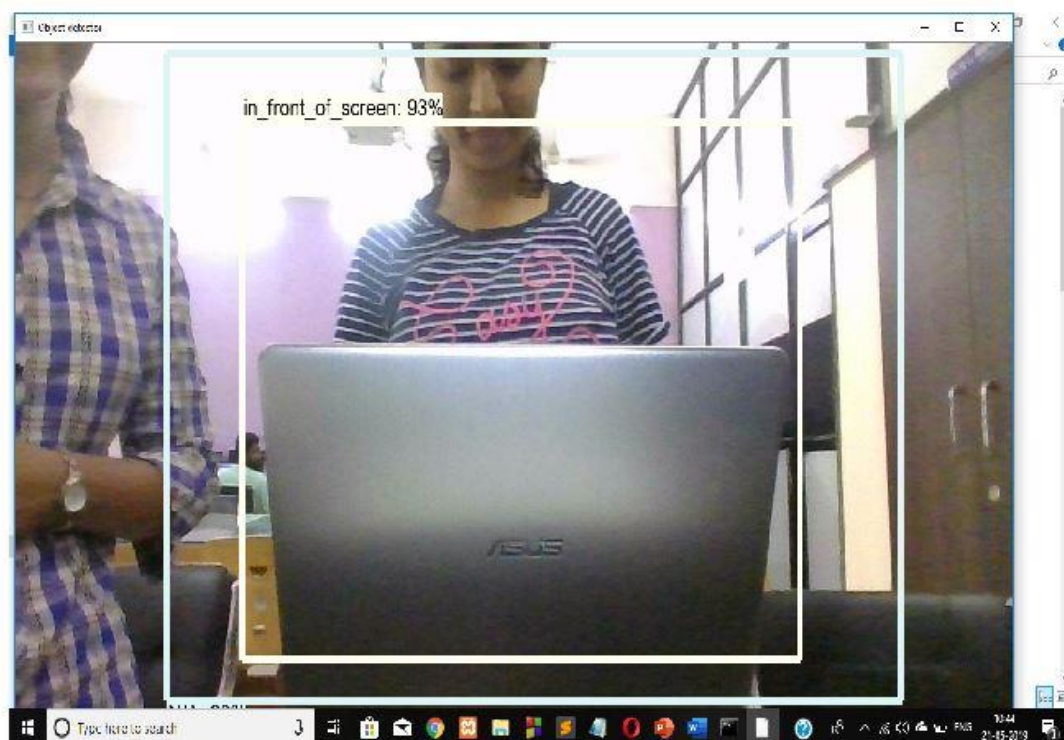
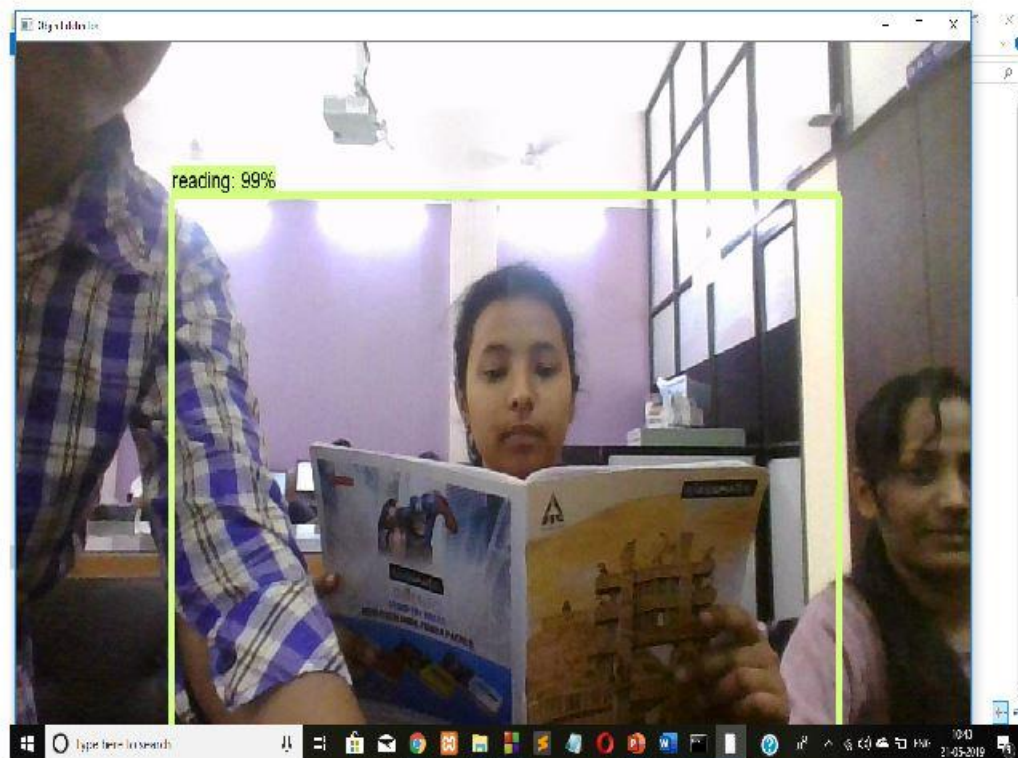
Currently, most of the human activity detection based systems work on accelerometer data recorded by specialized harnesses or smart phones to detect known well-defined movements. Thus there is need of specialized hardware to monitor any person. In the child monitoring system scenario the use of such specialized hardware to track the activities of the children is infeasible.

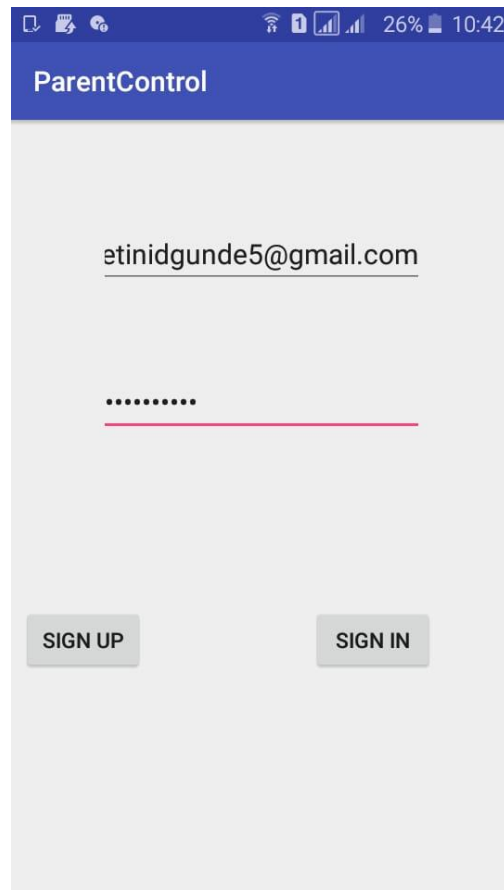
The proposed system in this project provides the following advantages-

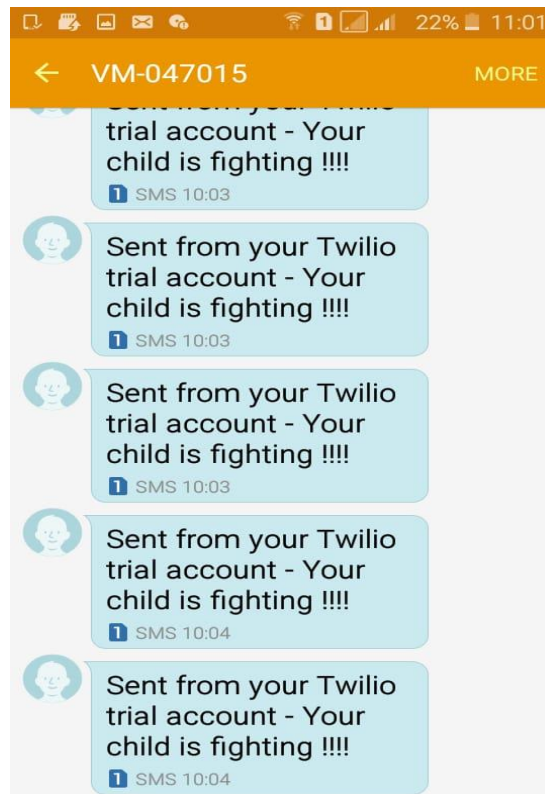
- The system reduces the negative impact of lack of interaction between the working parents and their kids to a great extent.
- Real-time monitoring of the children is possible.
- No need of expensive and specialized hardware.
- Easy to install system.
- The android application enables the parents to get to know the activity of their child at any time.
- User friendly.
- Parents can receive a notification in case the child engages in any kind of inappropriate activities.

Results

The proposed system can detect various activities like reading, in front of screen, etc and notify the parent accordingly.







Conclusion

We proposed a system for real-time human activity recognition based on faster RCNN and employed the system for child monitoring. Our future scope involves exploring other methods for vision based human activity recognition, increasing the range of activities to be recognized and providing more interactive features in the application.

References

- “YOLO based Human Action Recognition and Localization” -Shubham Shinde, Ashwin Kotharia, Vikram Gupta, International Conference on Robotics and Smart Manufacturing (RoSMa2018)
- “Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks” - Shaoqing Ren*, Kaiming He Ross, Girshick Jian Sun