

# **ABSTRACT**

This project provides the insights of a real-time video surveillance system capable of automatically detecting drowning incidents in a swimming pool. Drowning is the 3rd reason for the highest unintentional deaths, and that's why it is necessary to create trustable security mechanisms. Currently, most of the swimming pool's security mechanisms include CCTV surveillance and lifeguards to help in drowning situations. But this method is not enough for huge swimming pools like in amusement parks. Nowadays, some of the security systems are using AI for drowning detection using cameras situated underwater at a fixed location and also by using floating boards having a camera mounted on the bottom side so that underwater view can be captured. But the main problems in these systems arise when the pool is crowded and vision of cameras is blocked by people. In this project, rather than using underwater cameras, we are using cameras situated on top of the swimming pool to get an upper view of the swimming pool so that entire swimming pool will be under surveillance all time.

# **INTRODUCTION**

## **1.BACKGROUND AND MOTIVATION**

Drowning is the 3rd reason for the highest unintentional deaths, and that's why it is necessary to create trustable security mechanisms. Currently, most of the swimming pool's security mechanisms include CCTV surveillance and

lifeguards to help in drowning situations. But this method is not enough for huge swimming pools like in amusement parks.

Some of security systems are using AI for drowning detection using cameras situated underwater at a fixed location and also by using floating boards having a camera mounted on the bottom side so that underwater view can be captured. But the main problems in these system arises when the pool is crowded and vision of cameras are blocked by people. In this project, rather than using underwater cameras, we are supposed to use cameras situated on top of the swimming pool to get an upper view of the swimming pool.

## **II. INTRODUCTION**

Drowning is the 3rd reason for the highest unintentional deaths, and that's why it is necessary to create trustable security mechanisms. This project aims to create a system that will be able to automatically detect drowning incidents in the swimming pool using human action detection. The drowning detection model will be used to process and classify video that will be given to the system which will be recorded using live surveillance cameras. The system will break this video in image frames and apply model over it and if the early actions of drowning like hand waving, water splashing or diving is detected then the system will set the alarm so that the lifeguards can initiate their rescue operations. The classifier model is trained using a Long-term Recurrent Convolutional Network which is a combination of convolutional neural network and recurrent neural network which is suitable for large-scale visual understanding tasks such as activity recognition and image captioning.

# PROPOSED METHODOLOGY:

In particular, a specific type of neural networks called Convolutional Neural Networks (CNNs) is best suited for the task of image recognition. So implementation of Long Term Recurrent Convolution Network (LRCN) approach suitable for Video Classification & Action Recognition.

The Long Term Recurrent Convolution Network methodology is a combination of Convolutional Neural Network (CNN) & Recurrent Neural Network (RNN). LRCN is end-to-end trainable and appropriate for vast visual understanding tasks such as video description, activity recognition and image captioning. The main idea is to learn visual features from video frames with the help of CNN & then use LSTM layers to transform a sequence of image embeddings into a class label, sentences, probabilities, etc.

In this segment, we empirically propose LRCN approach for the implementation of drowning detection as CNN extracts the features from the input provided to the model and then the LSTM layers predict the action of the human whether one is drowning, swimming or diving.

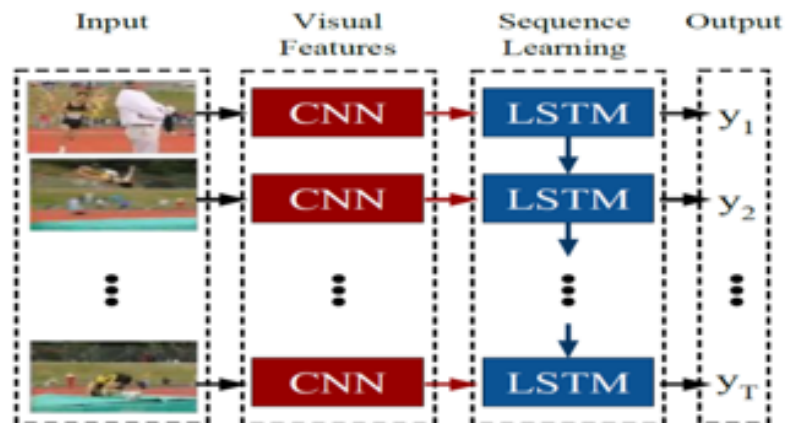


Fig 1: LRCN Architecture

# CONVOLUTIONAL NEURAL NETWORK (CNN's):

Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm that can take in an input image and assign learnable weights to various features in the image. As compared to other classification algorithms, Convnet requires less preprocessing. Filters are hand-engineered, with enough training in primitive methods and ConvNets can learn these filters/characteristics.

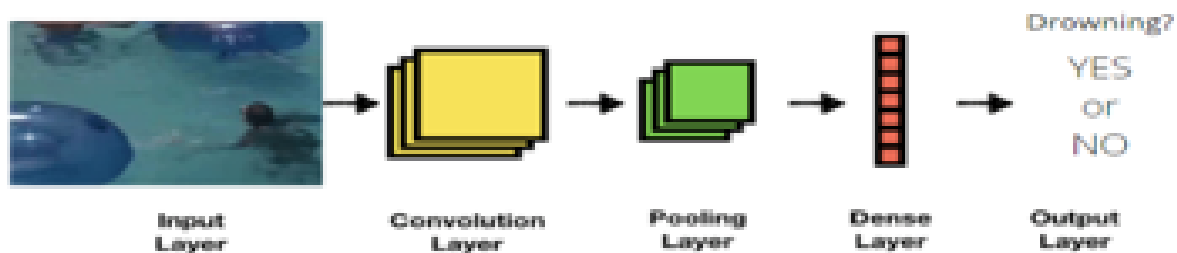


Fig 2: CNN Network