S.No	Paper Title	Authors	Method	Merits	Demerits	Paper Link
1	Video Based Drowning Detection System	Pavithra P et al.	Used Faster R-CNN algorithm. Followed by feature extraction, passing into RPN followed by convolution. Anchor boxes (output of RPN) will undergo ROI pooling which will finally be operated on by Regressor and Classifier.	Yields better results than existing deep learning algorithms Accuracy of 99% Less computational time Usage of cost effective resources	Lower accuracy compared to other papers Lack of LED light on the vest	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9545174
2	Drowning Detection System using LRCN Approach	Shardul Sanjay Chavan et al	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.	Live video can be fed for drowning detection. If drowning is detected it will be highlighted on the system screen as well as alarms will be raised to alert people.	Availability of better dataset Modern methodologies Technologies with high computational power accompanied by high-quality surveillance cameras	https://www.ijraset.com/best-journal/drowning-detection-system-using-lrcn-approach
3	Drowning behavior detection in swimming pool based on deep learning	Fei Lei et al	A behavior recognition framework of swimmers on the basis of YOLOv4 algorithm (BR-YOLOv4) is proposed. The spatial relationship between the location information of the target and swimming/drowning area of swimming pool is analyzed to further determine the swimmer's drowning or swimming behavior.	BR-YOLOv4 algorithm is superior to other models in accuracy, false rate and missing rate Swimmer behavior recognition based on deep learning can significantly reduce the impact of water ripple, surface reflection and shadows	The detection of overlapping, occluded and blurred objects detection not addressed Complex target detection models and the impact of different types of swimming pools on the detection accuracy not addressed	https://link.springer.com/article/10.1007/s11760-021-02124-9

4	Computer Vision Enabled Drowning Detection System	Upulie Handalage et al	Drowning detection happens in 3 stages using CNN model.	Accessibility to primary user No security or privacy issue as all processing is done on the client side	Hardware limitations Inability of drones to fly in extreme weather conditions Deployment in the iOS platform	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9671126
5	The Swimmers Motion Detection Using Improved VIBE Algorithm	Muhammad Aftab Hayat et al	Use a boosted swimmers motion detection algorithm based on the traditional ViBe algorithm	When the moving target exists in the first frame, the improved VIBE base target detection algorithm eliminates the ghosting noise in the later detection process.	It still needed to improve some deficiencies Ghosting will occur or made difficult to detect the original target	https://ieeexplore.ieee.org/document/8967390
6	Deep Learning Used to Recognition Swimmers Drowning	Jia-Xian Jian et al	Introduce artificial intelligence motion technology, mounting the camera on the bottom of the swimming pool, and use OpenPose to mark the image joint point features, and input the captured joint point features into the recursive neural network to determine whether the swimmer is drowning.	Used live data collected from actual swimmers Thoroughly analyzed swimmers' poses and motions.	This paper simulates the possible actions of swimmers when a drowning event occurs Accuracy is pretty low Too many air bubbles generated by the drowning swimmer in the water will not be detected.	https://ieeexplore.ieee.org/document/9704884

7	Implementation Of Deep Learning Based Edge Computing For Preventing Drowning	Yi-Tung Chan et al	This paper proposes an active protection edge computing device that can ensure safety through the use of a simple visual camera, which provides early warnings when a potential drowning victim is noticed and alarms the security guards. The implementation of deep-learning-based edge computing to prevent drowning with the use of NVIDIA Jetson Nano is proposed.	It was shown that edge computing with AI technology can be realistically applied in our lives It also can be deployed in an autonomous lifebuoy, which has propeller blades, as an active-preventing drowning system	Different cameras Different illumination conditions Lack of spatiotemporal clues	https://pdfs.semanticscholar.org/7dab/a830e63653262a9d0bc55a14fbbe95e510fa.pdf
8	Intelligent Video Analytics (IVA) and Surveillance System using Machine Learning and Neural Networks	Karthik Shankar et al.	The system will count the people in the frame and a threshold value for the count will be provided. If this threshold value exceeds, then an alert will be made. Zones where the threshold value is yet to reach, will be indicated with a green LED light, whereas zones with exceedance will be indicated with a red one.	Automates surveillance in crowded places Keeps an account of suspicious activities Helps in crowd management in public places	Various levels of data Data retrieval Volume of the data	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9112527