VIRTUAL EYE – LIFE GUARD FOR SWIMMING POOLS TO DETECT ACTIVE DROWNING

INTRODUCTION :-

Video surveillance can be used as a tool for monitoring and security. Observing public and private sites has increasingly become a very sensitive issue. The visual monitoring capabilities can be employed in many different locations to help people live more safely. Videobased surveillance systems are designed and installed in places such as railway stations, airports, and even dangerous environments. Image processing, pattern recognition and machine-vision based methods are efficient ways for real-time intelligent monitoring of the objects or events of interest. One important environment that the need for monitoring systems is crucially sensed is the swimming pool. Each year many people including children are drowned or very close to drowning in the deeps of the swimming pools, and the life guards are not trained well enough to handle these problems. This raises the need for having a system that will automatically detect the drowning person and alarm the lifeguards of such danger. Real-time detection of a drowning person in swimming pools is a challenging task that requires an accurate system. The challenge is due to the presence of water ripples, shadows and splashes and therefore detection needs to have high accuracy.

LITERATURE REVIEW

[1] One important environment that the need for monitoring systems is crucially sensed is the swimming pool. Each year many people including children are drowned or very close to drowning in the deeps of the swimming pools, and the life guards are not trained well enough to handle these problems . This raises the need for having a system that will automatically detect the drowning person and alarm the lifeguards of such danger. Real-time detection of a drowning person in swimming pools is a challenging task that requires an accurate system. The challenge is due to the presence of water ripples, shadows and splashes and therefore detection needs to have high accuracy.

SOFTWARE USED : OPEN CV

[2] Lei Fei, Wang Xueli, Chen Dongsheng, proposed a background subtraction method for drowning detection and swimmer identification using visual surveillance in their research paper. This method fails to reflect real background accurately thus restricting model accurate shape detection of moving objects. It also fails to reflect sudden background changes.

Ajil Roy, Dr. K. Srinivasan, proposed drowning detection using RFID-based swimming goggles, however, this model also fails to overcome the limitation of accuracy since the water sensor is not placed very close to the mouth and nose. But this model successfully overcomes limitations of video surveillance-based drowning detection systems like the need for high power computing devices.

Thus, we suggest two approaches for implementing the drowning detection-

1. Using ConvLSTM2D layers in the model
2. Using LRCN approach

[3] ViBe algorithm establishes a model by selecting the gray values of N pixel which are randomly selected from eight neighbors of the pixel. It will decide by comparing the pixel values from the video belongs to the foreground or background of the scene. The first frame is used to adjust the background model in ViBe from live webcam or video. While presented improved algorithm to establish the background model uses odd frame gray values of each pixel of the original scene. By comparison with traditional ViBe notice that with improved background model the influence of ghosting on the sample model is significantly reduced. No memory updated in traditional ViBe algorithm which indicates that random selection of pixels of to form background model with and swap particular gray value with a present pixel value. Because of little difference between background model gray value and background point gray value, the traditional ViBe cannot give an accurate result, to improve the result improved algorithm is presented here.

Algorithm used : VIBE Algorithm

CONCLUSION

We provided a method to robust human tracking and semantic event detection within the context of video surveillance system capable of automatically detecting drowning incidents in a swimming pool. In the current work, an effective background detection that incorporates prior knowledge using HSV color space and contour detection enables swimmers to be reliably detected and tracked despite the significant presence of water ripples. The system has been tested on several instances of simulated water conditions such as water reflection, lightening condition and false alarms. Our algorithm was able to detect all the drowning conditions along with the exact position of the drowning person in the swimming pool and had an average detection delay of 1.53 seconds, which is relatively low compared to the needed rescue time for a lifeguard operation. Our results show that the proposed method can be used as a reliable multimedia video-based surveillance system.

Reference Link : -

https://www.researchgate.net/publication/357549495_Drowning_behavior_detection_in_swimming_pool_based_on_deep_learning

https://onlinelibrary.wiley.com/doi/full/10.1002/acp.3756

https://www.ijraset.com/research-paper/drowning-detection-system-using-lrcn-approach