VirtualEye - LifeGuard for Swimming Pools to Detect Active Drowning

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LITERATURE SURVEY :

1) **Title: kAn Automatic Video-Based Drowning Detection System for Swimming Pools using Active Contours**

Author: Nasrin Salehi and Maryam Keyvanara

Year:2014

Abstract:

Safety in swimming pools is a crucial issue. In this paper, a real time drowning detection method based on HSV color space analysis is presented which uses prior knowledge of the video sequences to set the best values for the color channels. Our method uses a HSV thresholding mechanism along with Contour detection to detect the region of interest in each frame of video sequences. The presented software can detect drowning person in indoor swimming pools and sends an alarm to the lifeguard rescues if the previously detected person is missing for a specific amount of time. The presented algorithm for this system is tested on several video sequences recorded in swimming pools in real conditions and the results are of high accuracy with a high capability of tracking individuals in real time.

Advantages:

It is used to convert the paperwork and tedious task into paperless digital-format. Data analytics at the hospital will provide insights and benefits in

terms of money saving and doctor's time as well. It can resist up to high level of data storage.

Disadvantages:

f 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.

2) Title: An Early Drowning Detection System for Internet of Things (IoT) Applications

Author: Muhammad Ramdhan MS , Muhammad Ali, Paulson Eberechukwu N.Nurzal Effiyana G ,

Year: 2018

Abstract:

Drowning is the leading cause of injury or death for children and teenagers. Designing a drowning detection device by implementing an Internet of Thing (IoT) is needed. An Early Drowning Detection System (EDDS) is a system that gives an early alarm to the guardians (parents and lifeguard) if the detector triggered an abnormal heartbeat and the victims are submerged under the water for a long time. A microcontroller was used to control the signal received from a pulse sensor and time for the signal lost under the water before it is transmitted to the access point. The access point acts as a data forwarding to the database via an internet connection. Universal Asynchronous Receiver/Transmitter (UART) 433MHz radio frequency transceiver has been used to create the wireless communication between drowning detection device

and monitoring hub. A triggered warning signal will be transmitted to the guardians via Android apps and web page

Advantages:

The Early Drowning Detection System device has been successfully built and tested. The area under the curve for ROC is 0.94. The system used PPG types of pulse sensor to measure the abnormalities in heartbeat of the swimmer.

3)Title:Comprehensive Survey of Drowning Detection and Rescue Techniques

Author: Bhavesh Dhande, Yash Kothawade, Abhishek Kulkarni, Anjali Askhedkar

Year:2018

Abstract:

There are various methodologies put up in the domain of swimming pool safety using different intelligent control systems. Various methods have been adopted for drowning detection using the concepts of image processing, pressure and motion sensing, LASER-LDR mechanism and heartbeat sensing. The paper includes a scrutiny of these techniques and a blend which will be accurate and can be implemented easily as well. By studying and surveying this domain we also have mentioned the future scope of the topic which can be implemented in domestic swimming pools. A novel technique

that can be implemented for domestic swimming pools is also proposed.

Advantages:

The comparative and comprehensive study of various drowning detection and rescue systems showed a wide range of available ideas differing in their accuracy, complexity and reliability. Detection using image processing gives better accuracy but requires large cost price whereas LASER-LDR gives cost efficiency but lacks in accuracy.

4)Title:Drowning Detection Based on Video Anomaly Detection

Author: Xinyu He, Fei Yuan & Yi Zhu

Year: 2021

Abstract:

People are always trouble with drowning problems and want a drowning detection method. Almost existing methods extract simulated drowning features for supervised classification, but drowning events are rare abnormal events that are difficult to really simulate. In this paper, an unsupervised video anomaly detection method is proposed to detect pool drowning events. At first, we make a new dataset of pool scenes. Drowning

events are only in the test set and the train set only includes pool normal events. Pool dataset is preprocessed and a neural network modified from ResNet is proposed to reconstruct input video frames. The differences between reconstructed frames and ground truth frames are compared to detect anomalous events not in the training set. Experiments show that proposed method is more applicable to video anomaly detection in pool scenes than existing methods and it is feasible that methods based on video anomaly detection for drowning detection.

5)Title:Deep CNN-Based Computer-Aided Diagnosis for DrowningDetection using Post-mortem Lungs CT Images

Author: Amber Habib Qureshi; Xiaoyong Zhang; Kei Ichiji; Yusuke Kawasumi; Akihito Usui; Masato Funayama; Noriyasu Homma

Year: 2021

Abstract:

Drowning death rate is high in Japan and its diagnosis is still one of the most challenging tasks in the field of forensics due to the complex interpretation of its pathology. Postmortem lungs computed tomography (CT) images can be used for interpretation of forensic pathology due to its benefits but shortage of specialists is a critical problem. Also, manually interpreting CT images is a tiring and time-taking process. In this paper, we proposed a computer-aided diagnosis system based on a deep convolutional neural network (DCNN) for classifying the post-mortem lungs

CT images into drowning and non-drowning. A pre-trained DCNN was implemented in this study for classification of post-mortem lungs CT images. The DCNN was trained and tested using a post-mortem lungs CT image database obtained from Tohoku University Autopsy Imaging Center. The training process involves fine-tuning. The experimental results demonstrated a receiver operating characteristic (ROC) curve and an area under the curve (AUC) of 95 percent was achieved in drowning detection using the post-mortem lungs CT images.