LITERATURE SURVEY

TITLE: VirtualEye - Life Guard For Swimming Pools To Detect Active Drowning

DOMAIN NAME: Artificial Intelligence

TEAM ID: PNT2022TMID20970

LEADER NAME: Nandhakumar.S

TEAM MEMBER NAME :

Dhanushraj.NS

jayeshwar Karthick.V

Musti venkata Sai Sravan N

Rajesh.S

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. According to the evaluation results, the number of false alarms generated by the system is minimal and the maximum alarm delay reported by the system is 2.6 sec which can relatively be reliable compared to the acceptable time for rescue and resuscitation.

INTRODUCTION

Drowning is by far the most devastating form of death till date, as it puts the victim in a confused state of trying to gasp for breath and at same time trying not to allow the passage of water in the nostrils or mouth. According to the International Lifesaving Federation [ILS], 2007, Drowning is defined as the "act of experiencing difficulty in breathing as a result of excess entry of liquid into mouth or nostrils leading to a lightening of the blood in the lungs. The blood then rapidly loses its ability to carry oxygen effectively. This can lead to death.Drowning is one of the most painful and unforeseen cause of death today in the world not only among children but also adults. As swimming pools, bathtubs, seas, lakes, and oceans constitutes the agents of drowning, mortality rates are said to have increased drastically over the years due to this agents. Agents are widely used for leisure, sports and temperature relief especially during hot climates which possess drowning risks on the groups of individuals who are attracted by it. Drowning also occurs when the victim had no intention of going into the water. For instance, accidents which results in collapsing into the water body or boats colliding with objects thus bringing about sinking which in turn affects passengers. About 1.2 Million individuals die by drowning every year, indicating that more lives are lost from drowning than from natural disasters annually

LITERATURE SURVEY

Recently, there has been growing interest around the topic of drowning detection systems (DDS) in the sport and leisure industry both across the UK and globally. Advancements in technology, coupled with the importance of pool safety, has led to its growing prominence, with mention of DDS now in documents such as HSG179 - the latest UK standards document for health and safety in swimming pools (Health and Safety Executive, 2018). However, the topic is a debated area for various reasons explored in this review. Whilst there are plenty of academic articles dedicated to the technology and design behind these products in the fields of biometrics, computer science and electronic engineering, there is limited academic research investigating their application to real-world scenarios. Furthermore, there is uncertainty around their use alongside traditional lifeguarding; whether international testing standards (ISO standards) are robust enough; and general risks affecting the effectiveness of these products. This includes factors such as water clarity, high pool occupancy, lighting, glare and attractions such as water slides and wave machines. These concerns alongside the lack of research and high installation costs have resulted in a reluctance by some operators to incorporate DDS into their pools. This signifies the

importance of independent research into DDS. Along with the specific aims outlined in chapter 2, this literature review intends to support the move towards the shared goal of improved pool safety. This piece will begin with an overview of the different definitions of DDS, followed by an explanation of the aims and methodology of this review. It will then discuss what the current DDS standards are alongside legislation and guidance available around DDS, and provide a summary of the shared responsibilities towards the effective operation of DDS. Following this, the literature review will examine the co-existence between DDS and traditional lifeguarding, provide an analysis of its impact so far, and conclude with recommendations on the direction of future DDS research. The results of the current study have found the predicted advantage for lifeguards in spotting and responding to drowning targets in a swimming pool situation Lifeguards also appear to have a higher threshold for responding to a drowning target. This may reflect their greater sensitivity to visual cues that discriminate between drowning and normal swimming. Additionally, lifeguards may be more aware of the dangers of committing to a potentially drowning target. Once a response is initiated in a pool situation (e.g. entering the water to rescue the drowning swimmer) the lifeguard is limited in their ability to spot secondary drowning targets. Thus lifeguards may need greater evidence before responding, though this did not negatively impact on their time to respond when they chose to do so A second interesting finding lies in the different responses evoked by the active and passive drowning targets. Despite a tendency for a small cluster of predominantly passive-target trials to prompt premature responses, active targets were still more likely to be responded to than passive targets. However, at several levels of the set size factor, these active targets were also responded to more slowly than passive targets, which differed from the predicted results that active targets would elicit faster and more accurate responses.

REFERENCES

1. Ericsson, K. A., Krampe, R. Th., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100, 363–406.

2. Wolfe, J. M., & Friedman-Hill, S. R. (1992). Visual search for oriented lines: the role of angular relations between targets and distractors. Spatial Vision, 6(3), 199-207.

3. International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 3, Special Issue 2, March 2015.

4. M. Peden, K. McGee, and E. Krug, "Injury: a leading cause of the global burden of disease, 2000," 2002. [2]

5. E. Krug and W. H. Organization, "Injury: a leading cause of the global burden of disease," 1999