

ABSTRACT

Digital image and video processing technologies have revolutionized the world and have attained worldwide acceptance among the public in several forms of applications such as abnormal event detection, abandoned object detection, intruder detection, fall detection, traffic monitoring, crowd control, theft and fraud prevention in banks, households, business organizations etc. Digital image and video processing mainly deal with processing the image and video information for quality enhancements, achieving compression, data acquisition, extraction of useful information in the form of segmentation and so on. In addition, digital video processing application includes surveillance monitoring, frame rate conversion targeting display devices, video content analytics based on target applications, object tracking and so on.

The increased usage of multimedia devices over the years have triggered several challenges in image and video processing while a few of them have been related to tradeoff among computational complexity and image quality, security and privacy concerns of the data, monitoring and maintenance of large volume of surveillance data. With several challenges ahead, the primary focus of this research is in dealing with an efficient Fast Forward Motion Estimation algorithm for video compression suitable for frame rate conversion, Video surveillance technique for the application of abandoned object detection and intruder detection. The work also involves analyzing a hybrid technique for fall detection algorithm by using a two stream classification approach.

In the first research work, a Fast Forward Motion Estimation (FFME) algorithm is proposed and it aims in reducing the computational complexity as well as the risk involved in real time implementation. The algorithm proposed exploits the spatial correlation that exists with the neighboring block while predicting the motion vectors. Hence, a preconditioning technique is used to ensure the spatial correlation before regular motion estimation algorithm which is used for estimating the motion vector. After evaluating the algorithm, the

simulated result shows that there is a reduction in computational complexity of about 78% without much degradation in Peak Signal to Noise Ratio (PSNR) and Structural Similarity (SSIM).

In the second research work, dynamic background modeling is proposed for video surveillance by making use of deep learning architecture. Here, the incoming frames from the surveillance video are trained with the deep autoencoder network to generate an output equivalent to the background model. Performance evaluation of the proposed method using change detection CDNET 2014 dataset demonstrates the efficiency of the technique in background modeling compared to other state of art methods. The proposed algorithm used is also evaluated on unattended object detection and unmanned remote surveillance based on available datasets and the simulated results obtained are found to be prominent and suitable for real time applications.

In the third research work, another contribution of the research deals with the analysis of automatic detection of a human fall event in a smart home environment by using a hybrid approach by combining the spatial and the temporal features. In this research, an analysis on fall detection technique is proposed by combining both spatial and temporal features in the model generated, with the training dataset. Then, key frames are extracted from the video sequence that is subject to a two stream classification. Simulated results show the hybrid approach by combining both spatial and temporal features which achieve reliable results compared to other methods, even while training with fewer training samples.