CHAPTER SIX

CONCLUSION

In brief, this thesis presents a novel operational computer vision framework for extracting visual attributes from human motion. The proposed system captures a video data and classifies those moving objects in the current scene which are characteristically human. Then perform analyzing and mining operations based on full frame based analysis and inter frame based analysis to interpret the current activity. Moreover, based on selective criteria from full frame board and inter frame board the system evaluate the current activity through crisp set algorithm to assist the security officers to catch the events of interest moreover, creating multi storing scheme for reducing the storage capacity in 24 hours surveillances system.

6.1 Revisiting the Presented Thesis

The presented thesis manipulates the incoming video data from the capturing device to achieve the objectives mentioned in Chapter one based on there main levels of processing. The first level concern with setting the rules for extracting the motion attributes of the existent objects in the camera view based on full framing concept. The second level concern with setting the rules for extracting the motion attributes of the existent objects in the camera view based on inter framing concept. Finally, throughout this thesis region based analysis concept is implemented in order to evaluate significant attributes with respect to a pre defined image zones. The next paragraph illustrates these three concepts in more details.

6.1.1 Full Frame Based Analysis

Chapter three of this study defines the concept of full frame motion's attributes as extracting a set of motion attributes from a sequence of successive frames, where the

board of full frame attributes consists of motion trajectory, pixel frequency distribution and the time characteristics for the objects of interest. Chapter three also introduces the interpretation of these attributes from a security point of view [Altahir A. Altahir et al, 2007, Altahir A. Altahir et al, 2008a, Altahir A. Altahir et al, 2008d, Altahir A. Altahir et al, 2008e].

6.1.2 Inter Frame Based Analysis

Chapter four of this study defines the concept of Inter Frame motion's attributes as extracting a set of motion attributes from a sequence of frames based on a pre defined time threshold, where the board of inter frame attributes consists of the crossed distance, objects velocity and motion direction. Chapter four also introduces the interpretation of inter frame based attributes from a security point of view [Altahir A. Altahir et al, 2007, Altahir A. Altahir et al, 2008a, Altahir A. Altahir et al, 2008d, Altahir A. Altahir et al, 2008e].

6.1.3 Region Based Analysis

The concept of region based analysis is realized in this thesis by segmenting each new frame into four equal zones. Generally speaking, determining the number of zones and zones boundaries is a supervised operation based on the topology of the observed view and the security requirements and so, minimizing the area of each zone provides more deterministic results about the time spent by the object of interest in this particular segment. This concept achieved via segmenting each zone mentioned in the previous section into new four sub zones and then examining the existence of the object of interest in these sub zones.

The idea behind segmenting the image plane into zones is that, the entire image plane is not at the same level of the importance from a security point of view (e.g. there are walls, high places or any other areas out of the range of security consideration). As a result of the segmentation process the efforts of observing the moving objects will be concentrated in a highly sensitive area in the camera view. This research work implement a based pixel segmenting algorithm to perform the task of segmenting the image plane into adjacent

segments [Altahir A. Altahir et al, 2007, Altahir A. Altahir et al, 2008a, Altahir A. Altahir et al, 2008d, Altahir A. Altahir et al, 2008e].

6.2   Contributions

The target application of our research is smart surveillance systems. This section presents the contributions of this study which is discussed in the earlier chapters of this thesis:

6.2.1   Activity Classification

As discussed in section 5.3 the activity of the objects in the camera view is evaluated based on a fuzzy image. The concept is relayed on classifying objects activities with respect to the pre defined regions in image plane. The classification method relayed on extracting two powerful attributes from objects motion, namely velocity and pixel frequency distribution. The output of the classification algorithm appeared in the form of visual alarms in order to assist the security officers to catch the events of interest [Altahir A. Altahir et al, 2008c].

6.2.2   Reducing the Storage Capacity

Section 5.4 in this study presented a novel approach for reducing the storage capacity in surveillance systems according to the activity in the observed scene. Reducing the storage capacity is achieved via implementing fuzzy logic rules in order to generate multi storage rates according to the current activity exhibited by the objects of interest. The strength of the proposed method comes from its ability to evaluate the current events and generate a suitable storage rate according to these events without any need to implement any compression algorithms.

6.3   Future Works

This section discusses in details the future direction of this study and considering the improvement for the current system moreover it illustrates implementing the current

system for traffic monitoring. The upcoming paragraph discusses these two issues in more details.

This section presents the necessary improvements suggested to overcome certain problems appeared through the experimental work. These improvements are listed as follows:

(i)   Implementing a self adapting background subtraction method able to detect the objects of interest day or night, while has a capability of removing the effects of shadows and dealing with objects in dynamic environment with illumination changes.

(ii)   Implementing a tracking method capable of tracing multi objects in highly active scenes and labeling these objects.

(iii)   Maximizing the ability of detecting the objects by implementing multi sensors network. This suggestion also will solve the occlusion problem which it happened when one objects hide another object from the camera.

In conclusion, this thesis show that, the suggested improvements can be contribute to improving a real world commercial version of surveillance system able to detect abnormal events, assist the security officers and store the video data based on the current activities. In addition, utilizing the current system for traffic monitoring and accidents discovery is one of the future directions of this study. Besides, maximizing the ability of detecting the objects by implementing multi sensors network as an extension for this study.