

## Chapter 5

### Conclusions

Motion estimation and classification for image sequences are important tasks in the fields of 3-D image processing and computer vision. In this thesis, we use the gradient structure tensor based method (GSTM) to estimate motion vectors in an image sequence. GSTM can perform motion estimation much better than the conventional spatio-temporal gradient method (GM) because GSTM is far more robust to noise and is capable of estimating larger motion than GM. Moving objects are successfully classified by using the self-organizing feature map (SOM). An advantage of using SOM is that we do not need to give any a priori information about an image sequence because SOM learns by itself from the input data in an unsupervised manner. Simulation results show that an image is successfully segmented according to the direction and magnitude of the motion of each image segment.

Combination of GSTM and SOM can be applied onto any motion image sequences. However, for the surveillance image sequences, we add one more step called background subtraction by temporal median filtering. Since the backgrounds for these sequences are stationary, only the motions within moving objects are interested. Background subtraction can remove the unwanted background part so that classification becomes faster.

In conclusion, combining the existing methods, gradient structure tensor method, background subtraction and self organizing feature map can lead to the successful motion estimation and classification algorithm that can apply to both stationary and non-stationary background image sequences in real time applications.