Currently, I am doing the research work related to following topics:

* 1. Temporal Video Segmentation Algorithm Based on Ensemble Learning

At present, both theprecision and accuracyof the Gradually Changing Temporal video's focus segmentation are low. In this project, we propose a Temporal Video Segmentation technology based on Ensemble Learning—ELA-TVS algorithm. ELA-TVS applies the principles of ensemble learning to temporal video segmentation technology. First, ELA-TVS would extract various features of video frames. Second, a number of training subsets would be established with a Biased Cross Group Re-sampling method, and the basic classifiers would learn from these training subsets. Third, the prediction of each classifier would be integrated into an ensemble result, employing simple voting or weighted ensemble methods. Finally, the resulting classification of frames would be transformed into shot boundaries, with some reverting rules. Through a series of experiments, the parameters of the ELA-TVS algorithm would be adjusted, ensemble strategies will be compared, and many machine learning methods will be compared with ELA-TVS algorithm.

* 2. Base Station Controlled Intelligent Clustering Routing in Wireless Sensor Networks

The main constrains for Wireless Sensor Network (WSN) are its limited energy and bandwidth. In industry, WSN is deployed with massive node density and diverse placement. This turns out to produce a lot of sensory traffic with redundancy. Accordingly, it decreases the lifetime of sensor network. In our proposed Base Station Controlled Intelligent Clustering Routing (BSCICR) approach, we are trying to investigate the problem on energy-efficient data transmission for WSN in a radio harsh environment where lots of sensor nodes may die by running out of their power or new sensor nodes may join in this WSN. The network lifetime that we defined is as the duration time until the first sensor node failure due to battery depletion. We propose a novel approach to create optimal routing paths for data transmissions. This process is classified by two phases. Firstly, the Genetic Algorithm (GA) is performed in the Base Station (also called as sink) to generate the optimal clusters and cluster heads for a given WSN. Secondly, Dijkstra’s algorithm is used to generate the energy-efficient routing paths based on the optimal cluster heads produced by the GA. In addition, we use the concept of data aggregation to eliminate the redundant data. To demonstrate the feasibility of our approach, formal analysis and experimental results will be done.

* 3. Web Image Retrieval Based on a User Interest Model

The rapid development of computer and network technology has resulted in volumes of Internet information. Finding relevant images quickly and accurately from many image resources on the web has become a great challenge. Currently prevalent approaches to web image retrieval fall into two main categories: text-based image retrieval (TBIR) and content-based image retrieval (CBIR). With CBIR, images are indexed by their visual contents, such as color, texture, shapes. Humans tend to use high-level features (concepts), such as keywords, text descriptors, to interpret images and measure their similarity, while the features automatically extracted using CBIR techniques are mostly low-level features (color, texture, shape, spatial layout, etc).There is semantic gap between the visual features and the richness of human semantics. Because of this the retrieval effect of CBIR systems is not ideal. In addition, CBIR system supports semantics retrieval. After extracting low-level visual feature of sample image, the semantics information is given by the image classification. Then the user can use the semantics information to retrieval image. The retrieval result is accurate and the effect is ideal. However, its shortcoming is that with the number of image species increasing, the accuracy of semantics annotation will be fallen down. This problem can be solved by using a user interest model. A new color feature extraction method is proposed in our project. We synchronize color feature and texture feature into eigenvector, and label image semantics information by using a user interest model. To address the above issues, our research will investigates the key techniques on web image retrieval from several perspectives, including web image annotation based on synchronizing of textual and content information, web image retrieval based on user interest model, relevance feedback technique, etc.