Project Summary

Abstract

This project was designed to apply the MeanShift algorithm on video object tracking using the webcam. Through the project, the student studied the kernel filtering mechanism based on the concept of derivative, learned the computer hardware integration and software control knowledge, and programmed the algorithm to process digital video/image data and perform the tracking procedure.

The video object tracking procedure contains three major steps: video capture via webcam control, image analysis on color distribution, and the location prediction for the moving object. The program displays in real time the video sequence captured from the webcam, and the predicted object location represented by a colored rectangle. In the experiment, the performance of the program is evaluated using two criteria, including the execution time, and the tracking error. The student investigated the key factor that influences the performance, i.e. the histogram bin width for the color distribution analysis in the MeanShift algorithm. The experimental results verified the hypothesis that larger bin width leads to lower processing time and larger tracking error, and vice versa. An optimal bin width was selected based on the quantitative analysis on the relation between the key factor and the system performance.