VIDEO BASED GESTURE RECOGNITION

PROPOSAL

A Proposal Prepared for the
Final Project of the Graduate Course
EE635: Digital Image Processing

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ABSTRACT

The goal of this project is to develop a program implementing gesture recognition. At any time, a user can exhibit his hand doing a specific gesture in front of a video camera linked to a computer. However, the user is not supposed to be exactly at the same place when showing his hand. The program has to collect pictures of this gesture thanks to the video camera, to analyze it and to identify the sign. At any time, a user can exhibit his hand doing a specific gesture - presenting zero up to five fingers of his hand in front of a video camera linked to a computer. The computer program has to handle the video stream of pictures captured by the camera, identify the user's hand, separate it from other elements in the input picture, count the fingers shown by the user and present the result to the user as fast as possible.

2.1 RESEARCH QUESTION OR PROBLEM

Computer recognition of hand gestures may provide a more natural computer interface, allowing people to point, or rotate a CAD model by rotating their hands. Hand gestures can be classified in two categories: static and dynamic. A static gesture is a particular hand configuration and pose, represented by a single image. A dynamic gesture is a moving gesture, represented by a sequence of images. We will focus on the recognition of static images.

The first problem to deal with is how, by means of image processing and given a set of representative pictures, to analyze the pictures and to find the user's hand in it. Assuming the user will not always put his hand in the same area of the picture, the solution could not be based on clipping the margins of the picture around a certain targeted area. Moreover, assuming the user will not always put his hand in the same distance from the video camera, the solution could not be based on size evaluation applied by pixel counting.

2.2 RESEARCH GOALS AND OBJECTIVES

The goal of this project is to develop a program implementing gesture recognition. At any time, a user can exhibit his hand doing a specific gesture in front of a video camera linked to a computer. However, the user is not supposed to be exactly at the
same place when showing his hand. The program has to collect pictures of this gesture thanks to the video camera, to analyze it and to identify the sign. It has to do it as fast as possible, given that real time processing is required. In order to lighten the project, it has been decided that the identification would consist in counting the number of fingers that are shown by the user in the input picture. At any time, a user can exhibit his hand doing a specific gesture - presenting zero up to five fingers of his hand in front of a video camera linked to a computer. The computer program has to handle the video stream of pictures captured by the camera, identify the user's hand, separate it from other elements in the input picture, count the fingers shown by the user and present the result to the user as fast as possible.

23 RESEARCH DESIGN AND METHODS

This project's goal is the implementation of gesture recognition in real time. In order to achieve this goal, the work was done in two main stages. The first stage was developing an image-processing algorithm. The development of the algorithm was done using the MATLAB environment, which enables a use of a large variety of included image-processing functions. In this stage, there were no real time constraints and therefore it was possible to work on typical and representative movies previously chosen and saved. The second stage was translating the MATLAB program into a C++ program in order to achieve requirements. Although translation of MATLAB code into C code can be done automatically with MATLAB, previous projects encountered problems using this method with image-processing MATLAB code, and because the resulted C code is impossible to debug, we prefer to translate the MATLAB code into C++ code ourselves. Moreover, in order to capture the image from the video camera, we used the VideoOCX ActiveX within a visual C++ application.

24 STAFFING PLAN

Qian Sang - C++ coding;
Yi Huang - MATLAB coding.

25 TIMELINE
March 15–31: Algorithm/Methods Analysis and Investigation;
March 29: Project Proposal Presentation;
March 25–April 10: Coding;
April 5–25: Report on Final Project;
April 26: Final Project Presentation.

REFERENCE