Detection of Hand Position and Orientation in Video

Team:
Jacob Waggoner – jacobw1@stanford.edu, (541) 815-6686

Phases:

The intent of this project is to perform some of the pre-processing steps for an independent gesture recognition program. Specifically, the project seeks to 1) detect the position and orientation of hands in a video, 2) extract and segment these hands, and 3) port this detection mechanism to the android platform. To begin, I assume that neither the hands themselves, nor any of the fingers, are occluded. I further assume that the lighting of the scene and the skin color are (generally) constant, and that the video includes, at all times, the upper half of the body (head, torso, arms, and hands). In order to detect the hands, then, I intend to use a color-based detection algorithm that additionally utilizes contextual information from the body as in [2] and [3]. If I am successful to this point, I then intend to integrate features into the project that attempt to account for these assumptions, beginning with the assumption of color and light constancy, moving to that of the presence of the upper body, and finally to that of non-occlusion. This will require implementation of methods used in [3] such as color adjustment relative to the detected face and “super pixel.” Time permitting, I also will attempt the difficult problem of detecting points of interest on these hands – finger tips, the primary joints, and the center of the palm.

Subsequent to the successful completion of this first phase, I plan to extract the hands into separate windows and segment them from the background. If the first phase was, in fact, successful, this should not be too difficult for most backgrounds.

Finally, I tentatively plan to develop this program on the android platform so that hand data can be extracted from imported videos or from a live video feed. Should I get this far, I may begin to additionally incorporate elements of the independent project (which I would rather not provide particular details of at the moment) that I’m working on, but which may or may not demand the use of servers supporting the program.
