The Poor Man’s American Sign Language to English Translation

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Abstract:
The goal is to create a system whereby a user can translate sign language into English. There are many English to American Sign Language dictionaries; most of which are web-based allowing the user to click on an English word and watch a video of the sign. However, since there is no formal way of writing ASL, no ASL-to-English dictionaries exist. This project would attempt to remedy that issue. This would be invaluable for students beginning ASL or hearing parents of a deaf child.

The end goal of this project is to provide an easy and accessible solution to anyone who might need to translate American Sign Language into English. Another major goal of the system is to make it very scalable, allowing the lexicon to grow and even offering a user interface to allow user training of the classification model. While many other ASL recognition systems have been successful with expensive hardware, my approach will be to develop an inexpensive and simple system that anyone can use.

Stages of the Program:

Stage 1:
Obtains user input through Java Applet. Obtains video of sign being performed (either from webcam or video file) and also obtains discrete information about sign: handshape, hand color, etc.

Stage 2:
Tracks the hand movement through the frames. In any given frame, hands are found through segmentation and information about previous location. Segmentation is found using Color Filtering and Sobel Edge Detection. (See Figures 1 and 2)

Stage 3:
Perform training or classification operation. A modified K-Nearest Neighbor algorithm is used as the paradigm for classifying.

Conclusion:
In the beginning of this project, I was overly optimistic. I expected that with ample work, I’d finish the task of translating individual signs and eventually even have time to begin translating sentences and phrases. However, the issue of image segmentation isn’t a simple one. While I suspected that I’d be unable to recover the information about the handshape from each frame, I never could have imagined how difficult it was just to track one’s hands. My solution yielded results, but the end product requires more user input and time classifying than was desired.