Gesture Recognition
Using a Laser Pointer

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Gesture recognition

Tracking the movement of the pointer allows the interpretation of the interpolated directions as a chain code. This can then be used to train a Hidden Markov Model classifier, by example.

A colour CCD camera, with a resolution of 1280x1024 pixels, is used to record the location of the laser spot [1], whilst a LCD projector is used to display the actions and location information onto a screen. The laser spot is detected using a combination of brightness thresholding and colour analysis in HSV space. Using this method we can control a standard Windows PC using the laser pointer as a mouse [2].

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Projection takes the necessary perspective transforms into account to improve the positional correlation of the laser spot and the mouse pointer.

In use, the HMM compares the input chain code with previous examples, using a Viterbi segmentation algorithm to compute a score. New gestures can be added to the system by supplying several examples.

Recognised gestures can be used to trigger application events, such as page transitions in presentation slides.

The recognition of a set of simple symbolic gestures showed almost perfect identification. Extending the method to other symbols, such as numbers, displayed a 97% success rate even at a significant distance between the user and the projection plane.

Future Work

Future work will look at improving the responsiveness of the laser spot detection in varying environmental and illumination conditions.
