Hologram of Computer Vision Feature Abstraction

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The Project aims to implement a computer vision algorithm on the FPGA to extract features from an image. A new image would then be generated with these features and sent out via VGA. Current feature detection first acquires an image that has been preprocessed to extract key information, then creates features, and finally tests candidate objects against a model or classifier, typically to make a pass fail judgement. The process is often application specific and prohibitively expensive at high detection speeds.

In this project we would start by generating object candidates through an algorithm that clusters adjacent, similarly colored pixels to create object candidate windows, then generate a feature space using HOG (histogram of oriented gradients) that can be compared against a precomputed linear classifier boundary. This allows the user to use the same hardware for different detections by just swapping out the classifier and letting the hardware handle feature generation. The overall effect should be real time candidate and feature generation, as well as, candidate classification where the generation of the classifier boundary is abstracted away.

The illusion of a hologram would be created with the technique called pepper's ghost. The monitor will be placed parallel to the ground. Then a clear plate of plastic will be mounted at a 45 degree angle from the monitor. The monitor's reflection in the clear plate will create the illusion of a hologram. This display is mostly to make the output of our feature extraction more interesting.