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CS283: Computer Vision
Final Project Proposal

I propose the creation of a modern system for exploring the stereo-perceptual phenomena discussed in class. It is of interest to computer vision researchers to understand how the human vision perception system works[1], as computer vision systems may need to replicate quirks of the human vision system and may also benefit from understanding the mechanisms of human vision. However, current methods to generate and study stereograms are outdated[2], involving a complicated setup of computers and mirrors. The goal of my project is to use modern technology, specifically the Oculus Rift, to create a system of generating these stereograms in order to see if it is possible to use the headset in this manner, and if so, better facilitate study of stereograms.

To do this, I will develop for the Oculus Rift a variety of sets of images in order to simulate these perceptual phenomena. The Oculus Rift works by having two displays, one for each eye. By showing close but different images to each eyes, we can induce stereoscopic depth. There will be some sort of control mechanism, such as keyboard, video game controller, or Leap Motion controller, that will allow the subject to tune the parameters of the illusion, such as the size or distances of the constituent components. This setup will allow users to play with the parameters of the stereogram in order to see the limits of the illusion and human perception. This setup does not take advantage of the Oculus Rift's head-tracking or capability for 360 views, and I am planning on talking with Professor Nakayama of the Harvard psychology department on possibly leveraging these capabilities.

The evaluation metric for this proposed project, then, is whether or not it can induce the intended stereo-perceptual illusions.

I realize that this is a major change from my initial project proposal. However, I have made sure to get feedback on this project idea as well. This project idea was actually suggested to me by Professor Zickler, so he seems to agree it is within scope for the class, but any further advice or requests for clarification would be greatly appreciated.

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[1] http://visionlab.harvard.edu/members/ken/Papers/183ScheirerAnthony2014.pdf
[2] Gillam, B, & Nakayama, K 2002, 'Subjective contours at line terminations depend on scene layout analysis, not image processing', *Journal Of Experimental Psychology: Human Perception And Performance*, 28, 1, pp. 43-53, PsycARTICLES, EBSCO*host*, viewed 16 November 2015.