

Occluded Edge Detection in Light Field Images for Background Removal (Green Screen Effect)

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Standard edge detection or foreground/background separation techniques, such as Otzu's method, require color or intensity differences between the background and regions that need to be separated. For example, green screens are routinely set up as the background in a scene so that there is a clear difference in color between the background and foreground.

Light field images, captured in 4D and passively containing depth information for the scene can be used to approximate this effect. Depth estimation in the scene alone could provide a metric to separate the foreground and background, but more sophisticated methods are available. Considering the edge detection from a single image from a single viewpoint and analyzing the depths from the light field around the edges in that image, occluded edges and intensity or color edges can be distinguished. Along with the rest of the depth information this can allow the foreground and background, in terms of their relative depths, be identified and then a variety of processing could be done including removal of the background.

In this project I'd like to implement some form of the occluded edge detection and compare it to the depth map from the light field images alone. With the occluded edges detected and formed into regions with the depth map I could take a single image from a single view focused at the foreground and remove the background pixels, effectively clipping out the foreground even with a complicated background scene. For example, I'd like to get experiment photos from the lab ready for publication by removing the often cluttered and confusing background of the lab, complete with other students performing experiments, etc.

References:

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