

Title: Light-Field Depth Estimation and Computational Orthographic Imaging

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Abstract: Depth estimation is an interesting problem to solve with plenty of challenges. The field has been studied extensively in stereo vision and many solutions and approaches have aggregated over the years. Light field is essentially a multi-view stereo data in which the problem of depth estimation becomes slightly easier because of the availability of more correspondences. We will approach the problem of depth estimation by taking inspiration from stereo based methods and coming up with an entirely new approach for the light field depth estimation paradigm. Orthographic imaging is another problem which we have investigated and it is related to the problem of depth estimation when images are being captured from a perspective camera. In fact, we can construct an orthographic image provided we have an unoccluded depth map. These images have historically been used for measurement applications and in GIS. We will develop a theory for capturing orthographic images using a 2D Cartesian manipulator, and address two particular industrial applications which can be solved using this technique.

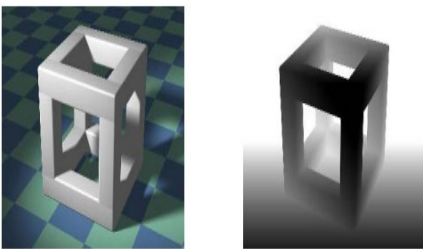


FIGURE 1.3: Depth map, nearer is darker

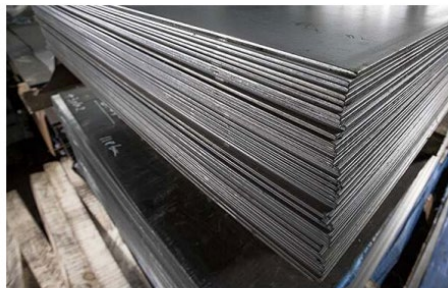


FIGURE 1.6: Stack

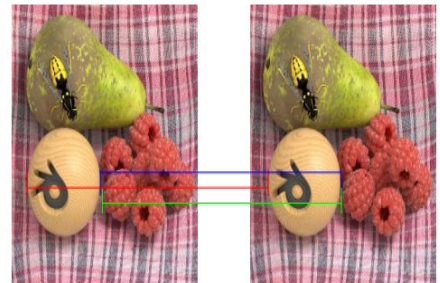


FIGURE 2.1: Stereo Pair

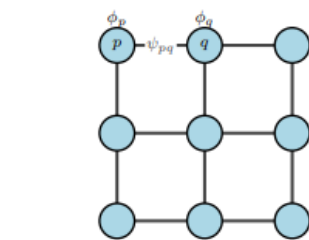
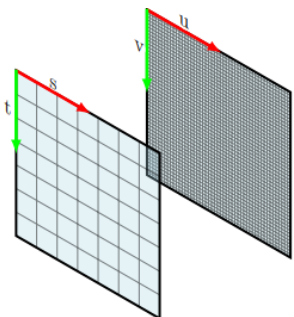


FIGURE 3.3: A Graph structure for images

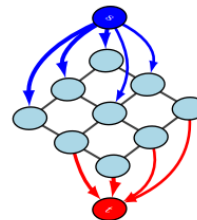


FIGURE 3.4: A graph with two terminals

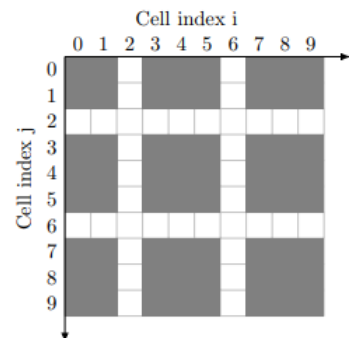


FIGURE 4.6: Mapping from Image domain disparity to Real world depth

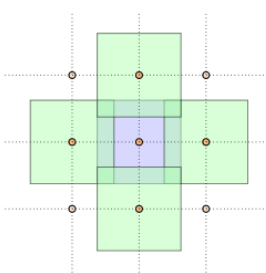


FIGURE 4.4: Depth and Disparity relationship

