Panorama Based on Light Field Images
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Motivation

Recently, light field imaging has been a very heated topic because of its post-focus ability and richer information (for example, depth information) than conventional 2D picture. Inspired by this novel technology, we want to generate panorama from light field (plenoptics) images. For instance, panorama of a scene at a specific focus. Figure 2 on the left shows the first-generation Lytro camera and the rotation stage we use. On the right [3] is the illustration of lenslet-based plenoptic camera. Light coming from right is focused by the main lenslet (blue) onto the lenslet array and then split by sub-lenslets.

Methodology

Camera Calibration and Finding Rotation Axis: Camera calibration is achieved by light field toolbox V0.4 on MATLAB. And we find the rotation axis via motion parallax.

Depth map: From focal stack and perspective views extracted by Lytro desktop, we generate the depth map via 3 methods: locally standard deviation, Laplacian filter, and gradient-based method.

Anaglyphs: The anaglyphs are produced from the left-most one and right-most one in the sub-image array.

Panorama: We design an algorithm to automatically stitch the target image with the most matched focused image.

Reference


Here we present the near-focused (left top), far-focused (left bottom) and anaglyphs panorama (right top) generated from light field images.