

Translation-capable Panorama on Android Device Using Light Field Imaging

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Motivation

Current 360 degree camera create panorama enabling users to rotate views around. However, it has to stay in a fixed position, which is the center of the scene. We propose to solve this problem by using light field (LF) imaging technology to add translation capability to conventional panorama, since the LF's ability of refocusing, linear translation and depth sensing has been proved in 2D planar case. Our goal is to create a translation-capable panorama on Android device.

Our approach

Our approach towards a translation-capable panorama includes following steps:

Step 1: Capture the entire scene by placing a Lytro camera in the center and rotate around

Step 2: Keep the focus of light field images at 2m, using standard stitching algorithm and depth estimate to create a RGB-D panorama with camera positioned in the center of the scene

Step 3: Keep the focus and virtually move the camera position, calculate the corresponding set of images and stitch them to get another panorama.

Step 4: Step 3 gives us multiple panoramas at discrete positions which we will store on an Android device. To get continuous translation in a panorama, we will interpolate the images between different camera positions based on the depth information. (Doing interpolation instead of directly calculation in order to save computational power to make it a real running App on Android device).

Step 5: Transform this translation-capable panorama into a virtual reality setting. (optional)

We think the most challenging parts are the panorama reconstruction algorithms at virtual camera position and the depth-based interpolation between neighboring panoramas.

We are using an Android Device; and thanks to Dr. Dansereau's advice, we may also need a depth camera for more accurate depth sensing.

Reference

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