Rendering of Stereoscopic 360º Views From Spherical Image Pairs
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**Goal and Motivation**

The goal of this project is to capture vertically displaced spherical image pairs with the Ricoh Theta camera, and generate stereoscopic 360º views for the Samsung Gear VR.

**Methodology**


**Experimental Results**

- **Initial Top and Bottom Images**
  - Captured 360 by 180 degree panoramas using a Ricoh Theta camera at two known tripod heights

- **Disparity Map Generation**
  - Used a windowed similarity accumulator to calculate raw disparities
  - Median and closing filters for small holes
  - Filled in large, undefined regions.

- **Color Segmentation**
  - RGB image was segmented using chromaticity, to identify objects in the scene.

- **Depth Map Generation**
  - Converted disparity values to their trigonometrically corresponding depth values.

- **Stereoscopic Image Rendering**
  - Calculated new position for each pixel from shifted viewpoints.
  - Filled image holes with depth-sensitive replication.

The system implemented in this project facilitates easy capture and review of 360º 3D video, since the entire scene is captured at once and there is minimal scene occlusion by the setup.

**References**


**Figures**

- **Ricoh Theta**
  - Capture vertical stereo scene information.

- **Processing**
  - Extract scene information and render new views.

- **Samsung Gear VR**
  - Display stereoscopic 360º information.