Improving the Perceived Quality of Images for 3D-TV

An algorithm for disocclusion removal in depth-image rendering

Dr. Ghassan AlRegib from Georgia Tech has developed an algorithm for disocclusion removal in depth-image rendering for 3D-TV that allows for high quality rendering and low computational complexity without the need to alter the depth map image. Hierarchical Hole-Filling (HHF), a new DIBR-based technique, eliminates the need for pre-processing of the depth map in previous approaches. HHF uses a pyramid like approach to estimate the hole pixels from a sequence of lower resolution estimates of the 3D wrapped image. The lower resolution estimates involves a pseudo zero canceling plus Gaussian filtering of the wrapped image. Starting backwards, the lowest resolution hole-free image is expanded, via interpolation, and pixel values are used to fill in the holes in the higher resolution image. The procedure is repeated until the image with highest resolution is hole-free.

***This HHF algorithm is in the operational prototype stage with successful tests completed.

Summary Bullets

- Virtual images free of any geometric distortions
- Not sensitive to depth maps with high percentage of bad matching pixels or poor depth map estimation
- Minimal computational cost with no additional computational complexity

Solution Advantages

- Virtual images free of any geometric distortions
- Not sensitive to depth maps with high percentage of bad matching pixels or poor depth map estimation
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Potential Commercial Applications

- 3D TV
- 3D movie recordings/cinema
- Gaming
- Animation
- Medical imaging
- Printers

- Display-HMD
- Smartphones
- Signage

Background and More Information

3D-TV (3-dimensional TV) is quickly becoming the next generation of television broadcasting to create a more life-like and visually immersive entertainment experience. To achieve 3D views, depth perception is required and can be generated by projecting two views of the same scene captured from slightly different angles into a stereoscopic display. Depth image-based rendering (DIBR) came about as a more efficient way to obtain the two-views (right and left) required in depth perception—for 3D display—from a single 2D image and a corresponding depth map. However, resolving disocclusion and holes remains a major challenge with current DIBR techniques. Several solutions have been proposed to reduce the impact of such holes rely on various smoothing and layered depth images (LDI), both of which are computationally more complex, inefficient and inadequate.

Inventors

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IP Status

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Publications

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Images

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