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Comparison of Filtering and Denoising Methods for RGB-D Image.

ABSTRACT - Masterthesis

RGB-D cameras such as the Microsoft Kinect are widely used in the fields of computer graphics, computer vision, and virtual reality as they are low-priced and readily available. These cameras capture color images (RGB) as well as depth information at high frame rates. However, the depth images often suffer from significant artifacts due to their inherently inaccurate measurement techniques. The artifacts, e.g., invalid pixels and temporal noise, greatly reduce the visual quality of the depth images. Suitable filtering and denoising algorithms are required to smooth and enhance the depth images while preserving as much detail as possible.

This thesis provides a comparison for various spatial and temporal denoising algorithms that improve depth image quality. Various hole filling approaches that fill in invalid pixels are compared using depth images of many datasets. Also, methods to handle temporal noise in the depth domain are compared. For this, existing optical flow methods are used in combination with various weighted averaging variants. Results show that this approach improves the image quality of the depth images for both static and moving parts of a scene by successfully filling the holes and reducing noise. Before using the Kinect output data, the proposed method can be applied as a pre-processing stage.