IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

Author: Mr. Wenyuan Wang
University of Electronic Science and Technology of China(UESTC), China, 974357137@qq.com

Dr. Chengjun Guo
University of Electronic Science and Technology of China(UESTC), China, johnsonguo@uestc.edu.cn
Prof. Dong Zhou
University of Electronic Science and Technology of China(UESTC), China, 1449608913@qq.com

DEPTH IMAGE OPTIMIZATION OF FIELD ENVIRONMENT BASED ON FUSION FILTERING

Abstract

The depth camera can obtain the depth information and optical image information of the scene at the same time. In the detection of the field environment, the detection equipment can use the depth sensor to detect and perceive the surrounding surface environment, analyze the acquired depth images, so as to navigate . However, the depth images obtained by depth sensors have problems such as low resolution and serious noise pollution. A color camera can provide a high-resolution color image of a scene, so the color image can be used as a guide image to obtain a low-noise and high-resolution depth image. Based on this research idea, this paper proposes a depth image optimization algorithm that combines guided image filtering and joint bilateral filtering. The algorithm takes the high-resolution color image of the scene as the guide image, and then uses the corresponding low-resolution depth image as the input image. The fusion filter that combines the joint bilateral filtering and the guided image filtering based on the perception of structural similarity obtains low noise and high Resolution depth image. Structural similarity is an index parameter proposed in this article, which can more accurately measure the structural difference between the guide image and the target image. This parameter not only has strong robustness to noise, but also more Accurately describe the structural relationship between the guide image and the input image, especially the description of the edge structure of the image. This paper selects some field scenes and shoots the depth images of the scenes as experimental data, and then combines different depth image data sets for experiments. The experimental results show that the processing method in this paper can provide higher-quality depth images numerically and visually, and the resolution and noise removal effect of the image are also better than traditional depth image processing algorithms. Therefore, the algorithm in this paper can effectively improve the quality of the depth image when detecting the field environment, and facilitate the equipment to better perform environment perception and navigation.