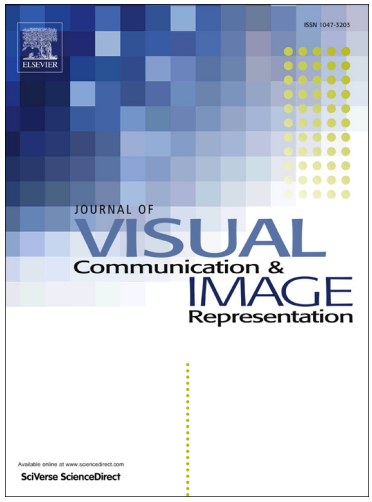

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Gaussian-Hermite Moment-Based Depth Estimation from Single Still Image for Stereo Vision

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Abstract

Depth information of objects plays a significant role in image-based rendering. Traditional depth estimation techniques use different visual cues including the disparity, motion, geometry, and defocus of objects. This paper presents a novel approach of focus cue-based depth estimation for still images using the Gaussian-Hermite moments (GHMs) of local neighboring pixels. The GHMs are chosen due to their superior reconstruction ability and invariance properties to intensity and geometric distortions of objects as compared to other moments. Since depths of local neighboring pixels are significantly correlated, the Laplacian matting is employed to obtain final depth map from the moment-based focus map. Experiments are conducted on images of indoor and outdoor scenes having objects with varying natures of resolution, edge, occlusion, and blur contents. Experimental results reveal that the depth estimated from GHMs can provide anaglyph images with stereo quality better than that provided by existing methods using traditional visual cues.

Keywords: Anaglyph image, depth estimation, focus cue, Gaussian-Hermite moments, Laplacian matting.

1. Introduction

In the recent years, the use of stereo vision has become ubiquitous in entertainment industry, e.g., films and games, robotics, and media. In addition to the intensity information, the depth map is an essential component to generate the stereo vision of a scene. Sensors based on scanning lasers along with two-dimensional (2D) imaging source can provide a depth map of a scene, but the resolution of depth in such a case is much lower than that of the pixel intensities [1]. The popular approach of depth map generation of a scene is to estimate the disparity map by capturing several 2D images of the scene at a same time from cameras positioned at different locations. In practice, the depth estimation from such multiview settings are complex and costly, since the estimation of disparity requires a precise calibration of the cameras as well as known parameters of the imaging condition such as the focal lengths of

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[1]A significant part of this work has been done when the author is in BUET.