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STEREOSCOPIC CONVERSION OF MONOSCOPIC VIDEO USING EDGE DIRECTION HISTOGRAM

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Abstract. *In this paper, we propose an algorithm for converting a monoscopic 2D image into stereoscopic 3D image by generating depth information based on vanishing points. The distance between two parallel lines in a 3D space becomes narrower as they are further away from the perspective of the viewer, until they finally meet at one point called a vanishing point. The viewer is able to estimate this vanishing point with geometrical features in an image, and perceives depth with the relative position of the vanishing point. In the proposed algorithm, depth information in each image is generated by the relative position of a vanishing point estimated by an edge directional histogram and one of the predefined initial depth maps is selected with this depth information. A final depth map is then generated by properly combining the selected initial depth map and vertical linearity depth map obtained with an assumption that the lower parts of an image usually have more depth. The left and right images for the stereoscopic 3D image are then generated with the final depth map. Experimental results show that the proposed algorithm produces a good quality of stereoscopic images with less computational power.*
Keywords: 2D/3D conversion, Stereoscopic image conversion, Depth map, Edge direction histogram

1. **Introduction.** Since the two eyes of a person are 6.5cm apart, a slightly different image is captured in the left and right eyes. This phenomenon is called binocular disparity. Our brain analyzes two images with binocular disparity to perceive depth. Conventional stereoscopic images are obtained by stereo cameras or image editing tools. However, generating stereoscopic images with a stereo camera system is not cost-effective and using an editing tool manually is also time-consuming work. Therefore, we need more cost and time effective methods to provide more stereoscopic 3D content.

Since 1990, much research has been done to develop good converting algorithms [1-5]. A method by using modified time difference (MTD) by the Okino group is one of the most popular conventional methods. This method first detects an object's motion in an image and then, left and right images for stereoscopic 3D are just selected from neighboring frames of the current frame [1,2]. However, most conventional methods, including the MTD method, do not perform very well. Especially, the quality of converted images depends on the type of a given image. Also, most conventional algorithms need much computational power. Recently, taking part of a picture and converting that part into stereoscopic format has also been proposed, but it is a little different approach since it also creates the rest of the picture part graphically [6].