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Homographic p-norms: Metrics of homographic image transformation

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Images often need to be aligned in a single coordinate system, and homography is one of the most efficient geometric models to align images. In this talk, we present homographic p-norms, scalar metrics of homographic image transformation, and to the best of our knowledge these are the most rigorous definition of scalar metrics quantifying homographic image transformations. We first define a metric between two homography matrices, and show it satisfies metric properties. Then we propose metrics of a single homography matrix for a general planar region, and ones for a usual rectangle image. For use of the proposed metrics, we provide useful homographic 2-norm expressions derived from the definition of the metrics, and compare the approximation errors of the metrics with respect to the exact metric. As a result, the discrete version of the metric obtained by pixel-wise computation is greatly close to the exact metric. The proposed metrics can be applied to evaluation of transformation magnitude, image closeness estimation, evaluation of camera pose difference, selection of image pair in stereo vision, panoramic image mosaic, and deblurring. Experimental results show the efficacy of the proposed metrics.

Biography

Changsoo Je received his BS degree in Physics, MS and PhD degrees in Media Technology from Sogang University, Seoul, Korea, in 2000, 2002, and 2008, respectively. He is currently a Research Professor of Electronic Engineering at Sogang University, Seoul, Korea. He was a Senior Analyst of Standard and Patent at Korea Institute of Patent Information (2010-2011), a Research Professor (2009-2010), and a Post-doctoral Research Fellow (2008-2009) of Computer Science and Engineering at Ewha Womans University. His research interests include computer vision, computer graphics, and image processing. He received an Outstanding Paper Award at the Korea Computer Graphics Society Conference in 2008 and a Samsung Humantech Thesis Prize Award from Samsung Electronics Co., Ltd. in 2004.

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