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Equisolid Fisheye Stereovision Calibration and Point Cloud Computation

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Abstract. This paper deals with dense 3D point cloud computation of urban environments around a vehicle. The idea is to use two fisheye views to get 3D coordinates of the surrounding scene's points. The first contribution of this paper is the adaptation of an omnidirectional stereovision self-calibration algorithm to an equisolid fisheye projection model. The second contribution is the description of a new epipolar matching based on a scan-circle principle and a dynamic programming technique adapted for fisheye images. The method is validated using both synthetic images for which ground truth is available and real images of an urban scene.

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