Most Influential Paper over the Decade Award

This award is given to the authors of papers appearing in IAPR MVA'98 which have been recognized as having the most significant influence on machine vision technology over the subsequent decade.

Reconstruction Textured Urban 3D Model by Fusing Ground-Based Laser Range Image and CCD Image

Huijing Zhao and Ryosuke Shibasaki

In this paper, a method of fusing ground-based laser range image and CCD image for the reconstruction of textured 3D urban object is proposed. An acquisition system was developed to capture laser range image and CCD image simultaneously from the same platform. The registration of laser range image is achieved by finding corresponding planar faces which are extracted from laser range images. Texture data are projected onto TIN-based object surfaces derived from laser range data. Through an outdoor experiment for reconstructing a building at IIS, University of Tokyo, it is demonstrated that textured 3D model of a building can be generated in an automated manner.

Optimal Homography Computation with a Reliability Measure

Kenichi Kanatani

This paper describes an algorithm for optimally computing the homography between two given sets of points on a plane and evaluating the reliability of the resulting mapping. The basic principle is maximum likelihood estimation by a technique called renormalization.

Illumination Invariant Face Recognition Using Photometric Stereo

Seok Cheol Kee, Kyoung Mu Lee and Sang Uk Lee

In this paper, we propose an elegant approach for illumination invariant face recognition based on photometric stereo technique. The basic idea is to reconstruct the surface normal and the albedo of a face using photometric stereo images, and use them as the illumination independent model of the face. We also investigated the optimal light source directions for reconstructing accurate surface shape, and the robust estimation technique for the illumination direction of an input face image. The performance of the proposed algorithm is tested using 125 real face images of 25 persons which are taken under 5 quite different illumination conditions, and achieved the success rate of more than 80%

A Map-Based Approach to Extracting Object Information from Aerial Images

Yukio Ogawa, Kazuaki Iwamura, and Shigeru Kakumoto

We have developed a map-based approach which enables us to efficiently extract object features from aerial images. We match an image with its corresponding map in order to estimate the object states in the image. This approach is characterized by its active use of a figure contained in the map as the object model for comparison. We determine the principal steps for the map-based approach for recognizing objects, and the steps are applied for obtaining the locations of missing buildings and the heights of existing buildings. The results of experiments using aerial images of Kobe City show that the approach is effective for automatically extracting urban-object information from aerial images.

Feature-based Image Mosaicing

Naoki Chiba, Hiroshi Kano, Minoru Higashihara, Masashi Yasuda, and Masato Osumi

We propose an automatic image mosaicing method that can construct a panoramic image from digital still images. Our method is fast and robust enough to process non-planar scenes with free camera motion. The method includes the following two techniques. First, we use a multi-resolution patch-based optical flow estimation for making feature correspondences to automatically obtain a homography. Second, we developed a technique to obtain a homography from only three points instead of four, in order to divide a scene into triangles. Experiments using real images confirm the effectiveness of our method.

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