

Refinement of Depth Estimation Method via Energy Minimization

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Abstract

It has been proposed in this paper an idea of refining depth map obtained according to local stereo matching. Energy was calculated based on the entire image, meanwhile, energy minimization concept was adopted, and the area obtained according to color segmentation algorithm was adopted too. The lower the energy of an image, the better depth quality will be generated. The color feature and depth value among different regions and their neighboring regions are used to define the relation between the smooth and occluded regions in the energy function. Then the region energy was calculated repeatedly until the change was insignificant or the number of iterations was reached. The corrected left and right view was used first to perform local stereo matching to get initial depth estimation. The color information of the left view was used to perform color segmentation, and then the segmented region and initial depth estimation were used to calculate the parameter of disparity plane for each region. This process was performed iteratively on the disparity plane, where a more reasonable depth map can be obtained while the energy cost is minimized. From the experimental result, it is proved that the depth map after refinement showed better object shape and smooth region density as compared to that of the initial depth map.

Keyword : Stereo Matching, Color Segmentation, Plane Fitting, Energy Minimization