

Puthipong Sthitpattanapongsa 2012: Multilevel and Multi-dimensional Thresholding. Master of Engineering (Computer Engineering), Major Field: Computer Engineering, Department of Computer Engineering. Thesis Advisor: Assistant Professor Thitiwan Srinark, Ph.D. 79 pages.

Thresholding is a low-level image segmentation method. Otsu's method is one of the most popular thresholding method. In order to increase its efficiency, Otsu's method is thus extended to use a multi-dimensional histogram to handle images that contain noise, and it is extended to support multiple levels to analyze complex images. These two extended methods have different properties. However, real world images mostly contain noise and are complicated. In this thesis, we combine these two methods into a single one so that the new proposed method can take advantages from both methods, for thresholding real world images.

However, there are some drawbacks in multi-dimensional methods as follows. The region division of the multi-dimensional histogram is not reasonable; and ignoring edge and noise regions in calculation can cause unsuccessful segmentation results. So we propose methods to improve the multi-dimensional method to overcome these drawbacks before combining. From the experimental results, they show that our methods including 2D and 3D ones perform faster, more resist to noise, and give better or comparable results than the others. Moreover, our 3D method gives better results and less computational time than our 2D one.

Finally, we combine our proposed 3D method with Eichmann's multilevel thresholding method for the threshold selection. From the experimental results, they show that our proposed multilevel method is more resist to noise and also give better or comparable results than the other methods but it requires longer execution time.

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