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Entropy estimation for robust image segmentation in presence of non Gaussian noise

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Abstract
In this work we introduce a new approach for robust image segmentation. The idea is to combine two strategies within a Bayesian framework. The first one is to use a Markov Random Field (MRF), which allows to introduce prior information with the purpose of preserve the edges in the image. The second strategy comes from the fact that the probability density function (pdf) of the likelihood function is non Gaussian or unknown, so it should be approximated by an estimated version, and for this, it is used the classical non-parametric or kernel density estimation. This two strategies together lead us to the definition of a new maximum a posteriori (MAP) approach based on the minimization of the entropy of the estimated pdf of the likelihood function and the MRF at the same time, named MAP entropy estimator (MAPEE). Some experiments were conducted for different kind of images degraded with impulsive noise and other non-Gaussian distributions, where the segmentation results are very satisfactory comparing them with respect to recent robust approaches based on the fuzzy c-means (FCM) segmentation.

Keywords Bayesian estimation · Markov random fields · Image segmentation · Non parametric estimators · Estimation

1 Introduction

Segmentation is one of the most important tasks in image processing, it is considered the first step in object recognition, scene and image understanding. Some of its applications comprise industrial quality control, medicine, robot navigation, geophysical exploration, military applications, agriculture, among others. Nevertheless, digital images are usually affected by some degrading factors such as blurring or noise coming from image acquisition systems, resulting in degraded or distorted images of the real world and producing, as

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