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Texture recognition using a multi-scale local mapped pattern

Boaventura I A G[1], **Boaventura M**[1], **Colnago R C**[2] and **Viana M**[3]
[1]Unesp, [2]USP, [3]UFSCar, Brazil

Texture is the basic feature in visual searching and computational vision, being capable to separate regions and contributing to the process of recognizing, analysis, description and classification of digital images. We investigated an approach based on new version of a multi-scale local pattern. The proposed method is based on uniform pattern analysis and it is used to describe the complexity of images and to generate digital signatures to represent and classify the samples of textures. The problem of detecting texture pattern has a widely used extractor, the Local Binary Pattern (LBP). Multi-scale versions of this method were presented as MSLBP (Multi-Scale Local Binary Pattern). Then, the LMP (Mean Local Mapped Pattern) technique, equally based on LBP, was also introduced. These new techniques offered quite promising results.

The LBP micropattern and its extended forms, such as LMP and MSLBP, were developed with the purpose of analyzing textures. Such methods compared histograms generated by micropatterns extracted from textures. A micro-pattern may be understood as a structure formed by pixels and its respective gray levels capable of describing or representing a spatial context of some feature found in the image, such as borders, corners, texture and even more complex and abstract patterns, such as those found in a fingerprint. In the MSLBP, a histogram is built in each scale with the values generated by image patterns smoothed by the Gaussian filtering. The LMP technique consists of smoothing the image gray levels from the mapping made through a pre-defined function. For each image pixel, the mapping of the region is made on the basis of a specific region of its neighbors.

In the texture description problem, the LMP technique presented excellent results in considering the average of the locally mapped patterns, whereas the MSLBP, working in several scales, also reached higher performance compared with the original LBP. Thus, in this work we propose a new technique joining both previous methods, that is, the LMP and the MSLMP, herein referred to as MSLMP (Multi-Scale Mean Local Mapped Pattern). The proposal of this new approach is to attenuate noisy actions often occurring in digital images with the use of applications in charge of smoothing high frequencies found in the neighborhood of a pixel. The proposed method requires the definition of several parameters, which were adjusted by using Transgenic Genetic Algorithms. In this talk we will present some examples of the method applied on real and synthetic images composed by textures of Brodatz Database and for the problem of detecting spoofing fingerprint. The experiments carried out so far suggest that the technique presented provides detections with higher performance than the results presented in the state-of-the-art research in the specialized scientific literature.

Biography

Boaventura I A G is graduate at Mathematics from UNESP, Brazil, Master's degree at Computer Science and Computational Mathematics from USP, Brazil and Ph.D at Electrical Engineering from USP. She has experience in Computer Science, focusing on Graphical Processing, and acting on the following subjects: Biometrics, Image Processing, and Computer Vision. She is a full-time Professor and Head of the Department at Department of Computer Science and Statistics at UNESP, campus of Sao Jose do Rio Preto, Sao Paulo, Brazil. In 2011-2012, she was a visiting researcher at PRIP Laboratory –CSE –Michigan State University.

ines@ibilce.unesp.br

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