Comparison of metrics and filters to reduce impulsive noise in medical images on GPU.

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Abstract

The problem of impulsive noise reduction in images is a widely studied process in the field of image processing. The Impulsive noise is commonly found caused by the malfunction of sensors and other hardware in the process of formation, storage or transmission of images. This type of noise affects some individual pixels, changing its original value.

In medicine field, particularly in mammography, the mammography device malfunctions, may generate noise in the images acquired.

In the literature there are many methods proposed to reduce noise of color image. In this work we adapt a method to grayscale image, including images taken in a mammography. The computational cost in many of these techniques is high. In order to reduce the computational cost, we present a parallel method for reducing impulse noise in such images. The method consists of two phases. The first phase identifies and classifies the noisy pixels as corrupt or not corrupt. In the second phase, the pixels detected as corrupted are filtered by replacing the noisy pixel with the result obtained by applying the approximation process.

We present a study of the behavior of different metrics (Fuzzy and Euclidean) of the distance used in the concept of peer group to detect noisy pixels. We used the Vector Median Filter (VMF) in the filtering processes for the calculation of corrupted pixels and afterwards we show the results of the resulting image quality.

The parallel implementation uses the Graphics Processing Unit (GPU) and the platform CUDA (*Compute Unified Device Architecture*) for programming the Graphics Card.