Fast cellular automata implementation on graphic processor unit (GPU) for salt and pepper noise removal

ABSTRACT

Noise removal operation is commonly applied as pre-processing step before subsequent image processing tasks due to the occurrence of noise during acquisition or transmission process. A common problem in imaging systems by using CMOS or CCD sensors is appearance of the salt and pepper noise. This paper presents Cellular Automata (CA) framework for noise removal of distorted image by the salt and pepper noise. In order to enhance the performance of the designed CA for noise removal, a parallel programming approach has been adopted and implemented on GPU. The results obtained show that the proposed CA models implemented on general purpose processor and GPU are able to suppress noise in high noise intensity up to 90 percents. The proposed CA implemented on GPU has successfully outperformed the method implemented on CPU by factor of 2 for gray scale image and factor of 10 for color images.

Keyword: Cellular automata; Graphic processing units; Salt and pepper noise