

Comparative analysis on raster, spiral, hilbert, and peano mapping pattern of fragile watermarking to address the authentication issue in healthcare system

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ABSTRACT

Healthcare service is one of the focus areas in supporting the existence of smart city. Nowadays, many procedures are done paperless and fully in digital. Medical scanning is also stored in digital modalities format and transmitted through a hospital management system. An authentication system is needed during the transmission, thus the need of watermarking. Some interesting research directions in watermarking include the embedding pattern of watermark data in the early process of watermarking. The objective of this research is to investigate the best pattern to determine the bit locations for watermark embedding for copyright protection. This paper applies four types of embedding patterns on medical images, which the quality of watermarked images would depend on how the mapping pattern is. It compares the difference of having a straight forward pattern mapping as a raster pattern and a unique pattern mapping like spiral, Hilbert, and Peano patterns. After mapping, all would have the same stages of a watermarking scheme which are embedding, detection and recovery stage. The comparison factors include the peak-signal-noise-ratio, mean-squared-error values of embedded images, and the computational time. From the result, the significant difference is the computational time; the taken time by the unique pattern is significantly longer than raster. When it comes to handling superabundant data, it is very crucial to produce a user-friendly system. However, as a whole, the results from Peano pattern embedding scheme shows it has a unique pattern which hard to be tracked, yet, its computational time to watermark is acceptable.

KEYWORDS

Data authentication; Data security; Medical image watermaking; Mapping pattern; Smart city; Smart healthcare system

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