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CHAOS-BASED ROBUST METHOD OF ZERO-WATERMARKING FOR MEDICAL SIGNALS

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ABSTRACT

The growing use of wireless health data transmission via Internet of Things is significantly beneficial to the healthcare industry for optimal usage of health-related facilities. However, at the same time, the use raises concern of privacy protection. Health-related data are private and should be suitably protected. Several pathologies, such as vocal fold disorders, indicate high risks of prevalence in individuals with voice-related occupations, such as teachers, singers, and lawyers. Approximately, one-third of the world population suffers from the voice-related problems during the life span and unauthorized access to their data can create unavoidable circumstances in their personal and professional lives. In this study, a zero-watermarking method is proposed and implemented to protect the identity of patients who suffer from vocal fold disorders. In the proposed method, an image for a patient's identity is generated and inserted into secret keys instead of a host medical signal. Consequently, imperceptibility is naturally achieved. The locations for the insertion of the watermark are determined by a computation of local binary patterns from the time–frequency spectrum. The spectrum is calculated for low frequencies such that it may not be affected by noise attacks. The experimental results suggest that the proposed method has good performance and robustness against noise, and it is reliable in the recovery of an individual's identity.

Key Words: Chaotic system, logistic map, healthcare, privacy protection, vocal fold disorders.

1. INTRODUCTION

Recent developments in the area of the Internet of things (IoT) and signal processing technologies have significantly assisted the healthcare industry in remote data collection and processing. In fact, rapid progress in IoT has made the building of smart homes and cities a reality [1]. With the smart facilities provided in smart homes and cities, healthcare has become an important service not only for providing health-related facilities without visiting hospitals but also for the optimal use of health resources. In the coming decades, the continuous occupation of beds