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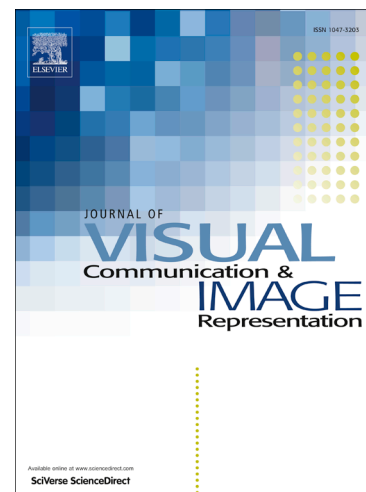
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## An efficient lossless secret sharing scheme for medical images

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**Abstract**

Medical doctors use diagnostic imaging techniques such as X-rays, CT scans and MRI, for detecting diseases or narrowing down possible causes of pain. This often require sharing and transmitting medical images over public channels. In this work we adapt Shamir's secret sharing paradigm to propose a novel lossless scheme for secure sharing of medical images. The proposed scheme takes advantage of the redundancy in typical medical images to reduce share sizes, and hence facilitate storing and sharing. To this end, we employ a customized run-length encoding method to compress the medical image. We conduct an extensive performance analysis on the proposed scheme, including a comparison with some existing Shamir-type secret image sharing schemes.

*Keywords:* Secret sharing; Secret image sharing;  $(t, n)$ -threshold scheme; Chaos.

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**1. Introduction**

Diagnostic imaging techniques such as X-rays, CT scans and MRI are widely used to detect diseases and identify possible causes of pain. Nowadays most medical applications require storing, sharing and transmitting patients private information and medical images over public channels, thus the distribution of such sensitive data makes it vulnerable to security threats. A number of techniques are developed to remedy this problem such as image encryption and steganography. In image encryption schemes, the secret image is usually mapped into a noise like image using some mathematical transformation to protect its contents from an unauthorized user. While in steganography schemes, the secret image is hidden in a host/cover medium which can be a digital image, video, text, etc. in such a way that an unauthorized user cannot detect the presence of such image in the host medium. Unfortunately, both techniques host the secret in a single cover medium which makes it subject to security threats. Furthermore, anyone holding the secret key

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