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A Dual Secured Medical Image Steganography Model to Enhance Network Security based on Deep Learning Techniques

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B. Ramapriya ; Dr Y. Kalpana **All Authors** •••

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Abstract:
A growing number of researchers have taken an interest in steganography due to the value it offers to information security over the past decade. A process named medical image steganography conceals confidential medical data within an image. It is common practice to securely embed secrets in image steganography methods so that the payload capacity is almost forgotten and the human visual system quality is not good enough. By converting the cover into frequency domain with DWT, the high frequency components are optimally selected with pixels. For transmitting secure data, Lempel-Ziv Welch (LZW) and Huffman techniques are used first. In the next step, the data is encrypted with RC4 encryption. The encrypted data into the cover image is accomplished through the hidden network (H-net). In real life applications, deep learning-based image steganography is relatively rare. This research proposes a novel Convolution Neural Network based on H-net and R-net model that can successfully recover secret data, while solving the challenge of secret images embedded in a carrier image. The network is trained throughout its entirety, from start to end. Then, the secret picture is embedded into the carrier by the encoding network, and the distinct secret images are reconstructed by the decoding network. Quality of stego image is further improved by using HFNN.

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I. Introduction

Steganography has emerged as a more effective means of obtaining secure data due to advances in the field of security [1]. Steganography appears to be a good choice when considering three parameters: capacity, security, and image quality. The networks make it convenient to transmit medical images for research, education, and consultation. When medical images are transmitted over the internet, information security and privacy protection are extremely important because they contain personal information about the patients [2]. and confidential, steganography is implemented to make the patient's information undetectable. An embedded message and an extracted message are two main steps in the steganography system. Depending on the procedure, a secret key may be required or not. A stego image refers to images that contain secret information. The medium that presents digital steganography has multiple advantages in sectors like military, diplomatic, personal, and intellectual property. In steganography, secret data can be encrypting any form, such as a message, an audio message, an image, or a video. An image, audio, or video can be hidden within another image, audio, or video using steganography [3]. "Plain text" refers to the data that needs to be hidden, and "encryption" refers to the method used to disguise it. An "encryption algorithm" is a collection of rules that is used to encrypt an original text; the original encrypted text is referred to as a "cipher text.". As the message's and the algorithm's input, the encryption usually depends on an "encryption key.". Recipients must possess a "decryption algorithm" that decrypts encrypted text using a valid "decryption key" in order to retrieve the original text and decipher the message.

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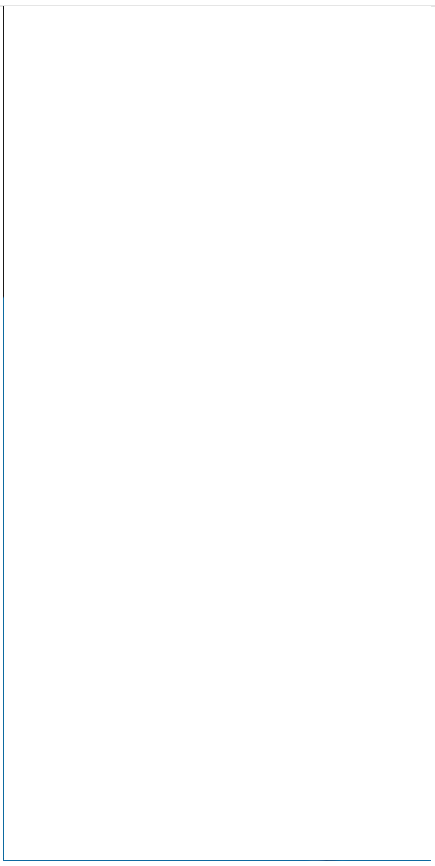

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