A Novel Image Encryption Scheme based on Multiple Parameter Discrete Fractional Fourier Transform

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Authors:
Deepak Sharma
Rajiv Saxena

Abstract

Security is one of the most challenging aspects in internet and Multimedia applications. Encryption is a process which is used to secure data. The Encryption algorithms and suitable transforms play a crucial role to form efficient security systems. In this regard the original information in the existing security system based on the fractional Fourier transform (FRFT) is protected by only a certain order of FRFT. In this paper, we propose a novel method to encrypt an image by using multiple parameters discrete fractional Fourier transform (DFRFT) with random phase matrices. The multiple-parameter discrete fractional Fourier transform (MPDFRFT) possesses all the desired properties of discrete fractional Fourier transform. The MPDFRFT converts to the DFRFT when all of its order parameters are the same. We exploit the properties of multiple-parameter DFRFT and propose a novel encryption scheme using the double random phase in the MPDFRFT domain for encrypting digital data. The proposed encoding scheme with MPDFRFT significantly enhances the data security compared to DFRFT and FRFT and it shows consistent performance with different images. The scheme offers a high degree of resistance towards bruteforce attack.
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L. F. Chen and D. M. Zhao, "Optical color image encryption by wavelength

Index Terms

Computer Science

Security

Keywords

Discrete Fractional Fourier Transform (DFRFT)  Decryption  Encryption  Fourier Transform (FT)

Fractional Fourier Transform (FRFT)

Multiple Parameter Discrete Fractional Fourier Transform (MPDFRFT).