Fractional Bio-Image Encryption using Karhunen-Loeve Transform

Abstract

Bio-images such as fingerprint, face and iris are sensitive and hence small change in such images could affect the result substantially. The processing overhead could be reduced by encrypting a preferred region instead of encrypting the entire image. In this paper a novel fractional bio-image encryption method is presented using Karhunen-Loeve (KL) transform, which is a reversible linear transform. The original image (x) is given as input to cropping function to identify and extract the region to be encrypted. Next, the extracted region, in the form of square, is given as input to the KL transform which in turn produces the cipher image (y) and the inverse transform key (T). The encrypted region is combined with the original image to get the partial cipher image. Since the inverse transform key (T) plays a major role for decryption, it could be given to the receiver by encrypting with symmetric key cryptosystem. On receiving the partial encrypted image (y) the receiver identify and extract the encrypted region and apply the inverse of KL transform using the inverse key (T). The result is merged with the received image to get the original image (x). The histograms of the encrypted portion of the images are nearly uniform and different from the histogram of original images. This method of fractional bio-image cryptosystem will reduce the overhead of encryption and decryption processes.
References


Index Terms

Computer Science

Security

Keywords