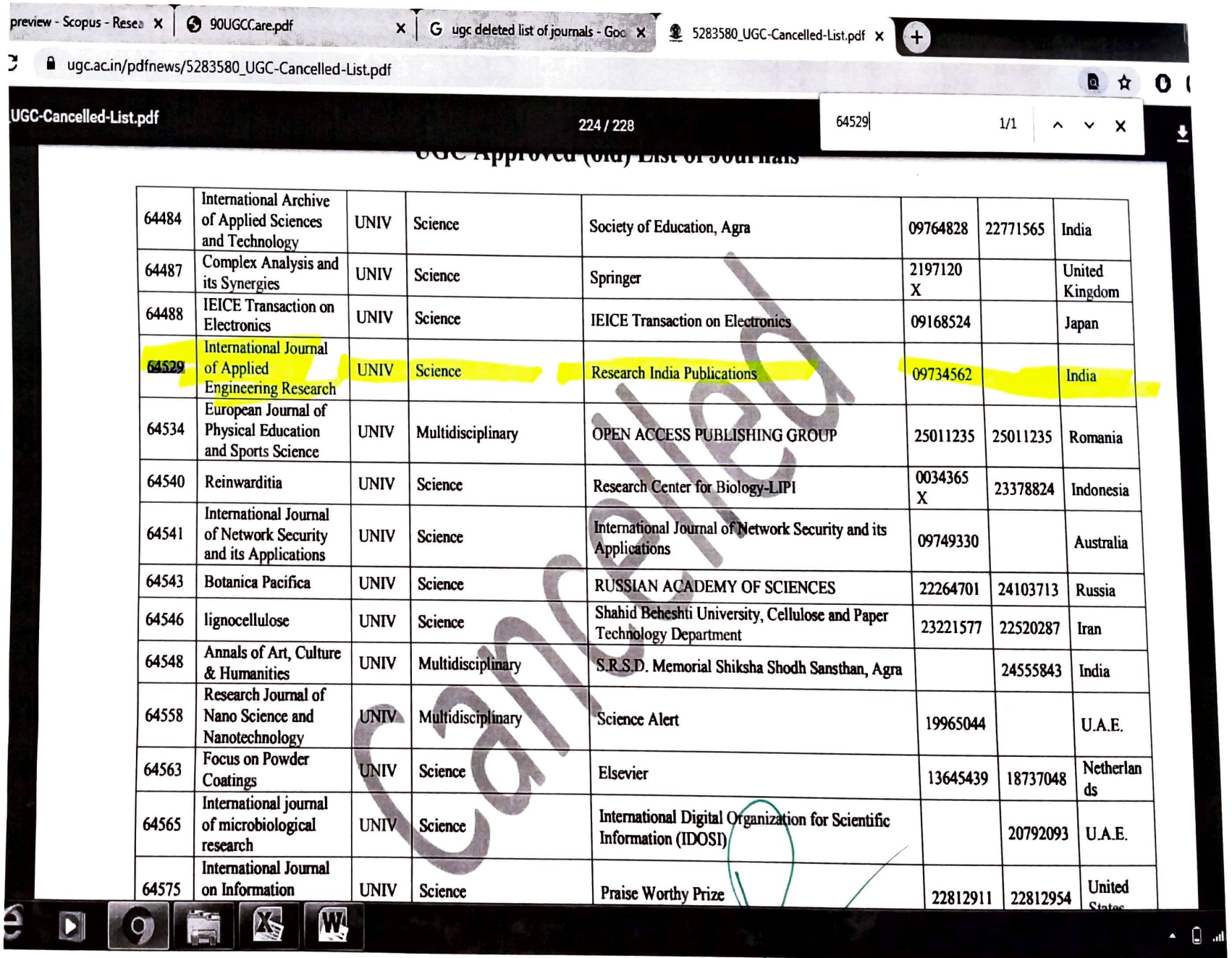

64484	International Archive of Applied Sciences and Technology	UNIV	Science	Society of Education, Agra	09764828	22771565	India
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64488	IEICE Transaction on Electronics	UNIV	Science	IEICE Transaction on Electronics	09168524		Japan
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64558	Research Journal of Nano Science and Nanotechnology	UNIV	Multidisciplinary	Science Alert	19965044		U.A.E.
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64565	International journal of microbiological research	UNIV	Science	International Digital Organization for Scientific Information (IDOSI)		20792093	U.A.E.
64575	International Journal on Information	UNIV	Science	Praise Worthy Prize	22812911	22812954	United States

59

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A Robust Image Watermarking Technique using DTCWT and PCA

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Abstract

The dual-tree complex wavelet transform (DTCWT) is a relatively recent enhancement to the discrete wavelet transform (DWT) with beneficial properties such as shift invariant, good directionality, perfect reconstruction. These properties are well utilized to obtain improved robustness and perceptibility Principle component analysis is used as a predictive model and is an excellent technique for inserting the watermark in the host image. The watermark energy is distributed in the principle component of DTCWT sub bands in order to improve robustness and perceptibility of watermarking algorithm. Performance parameters are evaluated. PSNR is 59 db and correlation coefficient is 1. The algorithm is resistant to geometrical attacks.

Keywords: DTCWT, PCA, 2D signal spectrum, 2D DWT, Digital Watermarking.

INTRODUCTION

Creating a digital copy, transmitting and distributing have become a daily routine of multimedia technology in internet era. Digital image watermarking provides copyright protection, by hiding appropriate ownership information in digital images. This ownership information may be in the form of logo or called as 'watermark'. The image formed after hiding 'watermark' in original image is called 'watermarked image'. There are four essential parameters [3], which are commonly used to determine quality of watermarking scheme. They are robustness, perceptibility, payload, and security.

Robustness is a measure of immunity of watermark, against intentional attacks like image processing attack or geometrical attack like compression, filtering, rotation, scaling, [3] resizing, cropping etc. Imperceptibility means quality of host image should not be destroyed by presence of watermark. Payload is the number of bits to be embedded in cover image. It is called 'watermark capacity'. Security is ability to secure and resolving the rightful ownership. The effective attack handling is essentially required during testing of image watermarking techniques.

RELATED WORK

There has been a drastic increase in the research of watermarking. To develop an efficient watermark algorithm literature survey involves extensive study of journals, research articles and through light on this research.

Marzieh Amini et.al [1] proposes watermark algorithm using DWT and principle component analysis. The robustness of the algorithm is improved compared to the previous work. Baolong et.al [4] developed a robust watermark algorithm using DTCWT and mean quantization technique to enhance embedding capacity to 1024 bits and robustness against all attacks and also achieves PSNR 40 to 42db. Koritala Nagavardhani [5] proposes DWT and block based PCA watermarking algorithm which improves the bit error rate and also robust against all geometric attacks. He Anthony T.S. [6] et.al proposes a system for an authentication application using histogram and fast Haadamard transform to achieve correlation factor of 0.96.

The paper is organized as follows: Section 1 introduction, section 2 explains the DT-CWT PCA and watermarking technique. Section 3 experimental results. Section 4 conclusion and 5 is the references.

Dual Tree Complex Wavelet Transform (DTCWT)

The standard DWT is a very powerful tool for many signal processing applications. But it suffers from three major limitations like shift sensitivity, means shift in the input leads to large [2], changes in the coefficients of the filter. Poor directivity example inability to distinguish between +45° and −45° spectral features. Absence of phase information. These problems can be solved by DTCWT [2] .The DTCWT for 2-D image is obtained by separate filtering along rows and then columns. However, if row and column filters both suppress negative frequencies, then only the first quadrant of 2-D signal spectrum is obtained. The most computationally efficient way to achieve a pair of conjugate filters is to maintain separate imaginary operator j1 and j2 for row and column processing as in Fig. 1 The input image X is

59