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ANALYSIS OF IMAGE COMPRESSION USING HAAR AND DB-2 WAVELET WITH MEDIAN FILTER

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ABSTRACT

The technological advancements in digital communication and computer technology have paved the way for all pervading World Wide Web based internet. The development and deployment of 4G technology based mobile communication has provided a powerful multimedia communication device for users. The multimedia signals are alphanumerical text signals, audio signals including speech and music, and video signals including still and moving images. Transducer based sensor data may fall under any one or more of the above categories of signals i.e. text, audio and video. Sensor networks have emerged as an integral part of information technology. In this paper analysis of image compression using Haar and Db-2 Wavelet Transform with median filter and flat fading is used as wireless channel for transmission of image on wireless medium with QPSK modulation. Performance of these systems is measured by BER verses SNR**.**

Keyword: BER, Fading channel, Haar-wavelet, Image compression, QPSK, SNR, Median filter,

INTRODUCTION

Image processing for wireless transmission is a challenging task, because of the amount of image data that need to be processed in real time, the restriction of transmission bandwidth, and other limited resources of the wireless network. One of the most important and challenging goal of current and future communication is transmission of high quality images from source to destination quickly with least error where limitation of bandwidth is a prime problem. By the advent of multimedia communications, the multimedia transmission of multimedia over wireless links is considered as one of the major applications of future communication systems, and such systems require the use of high storage capacity and less error transmission. Image processing includes any form of information processing in which the input is an image. Many image processing techniques derive from the application of signal processing techniques to the domain of images two-dimensional signals such as photographs or video. Extend naturally to images as well. However, image processing brings some new concepts such as connectivity and rotational invariance - that are meaningful or useful only for two-dimensional signals. Also, certain one-dimensional concepts - such as differential operators, edge detection, and domain modulation - become substantially more complicated when extended to two dimensions.

A. Digital Image Processing

Digital images are composition of pixels (short for picture elements).Image is sampled and mapped as picture elements or a grid of dots (pixels). Each pixel represents the colour (or gray level for black and white photos) at a single point in the image, so a pixel is like a tiny dot of a particular colour. An image have large number of points, it helps to create a digital approximation of the test image by which a copy of the original image can be reproduced. The binary digits also called bits for each pixel are stored in a sequence manner by a computer and of also reduced to a mathematical representation (compressed form). These bits are then interpreted and read by the computer to reproduce an analog version for display. Pixels are like grain particles in a conventional photographic image, but it arranged in a regular pattern of rows and columns and store information some differently manner. A digital information contained image is a rectangular array of pixels also called a bitmap [1].

B. Requirement of Image Compression

In recent years, digital images are becoming more and more important. Digital cameras are now rather cheap and technically mature. As a consequence, digital images are replacing conventional analog images in almost every field. Examples range from holiday pictures to medical images, like x-ray tomography. So, there is a natural need

to store images on a computer and also to transmit them over the internet, to share them with other persons [3]. The big problem is that digital images are quite memory-consuming, and so a need to compress images is also quite natural if one wants to store lots of images with a rather high resolution or wants to transmit these images via a channel with limited bandwidth. Although memory is getting cheaper and cheaper these days it is still not unlimited and also the number and even more severe the resolution of images one may want to store has increased in the last years. Furthermore, we should not forget that transferring images is still an issue, as the bandwidth of networks, may they be wireless or wired, is still quite limited, actually too limited to transfer images in a raw format [4]. So, Image compression is very important for efficient transmission and storage of images. Images contain large amounts of information that requires much storage space, large transmission bandwidths and long transmission times. Therefore it is advantageous to compress the image by storing only the essential information needed to reconstruct the image. An image can be thought of as a matrix of pixel values. Image compression standards bring about many benefits, such as: (1) easier exchange of image files between different devices and applications; (2) reuse of existing hardware and software for a wider array of products; (3) existence of benchmarks and reference data sets for new and alternative developments [5].
Image compression helps the problem of reduce the data needed to represent a digital image. The removal of redundant data is basis principle of the reduction process. According to mathematical point of view, this amounts to transforming a twodimensional pixel array into a statistically uncorrelated data set. The example below clearly shows the importance of compression. An image, 1024 pixel×1024 pixel×24 bit, without compression, would require 3 MB of storage. If these image is compressed at a 10:1compression ratio, need of storage requirement is reduced to300 KB [6].

SIMULATION MODEL

The simulation model shows the procedure of whole process. This model can be divided into three sections: (1) Compression of image by Haar and Db2 Wavelet transform separated, De noising, that Compressed image by Wiener and Median filter separately. (2) Transmission of data on wireless AWGN and Flat fading channel separately on QPSK modulation separately.

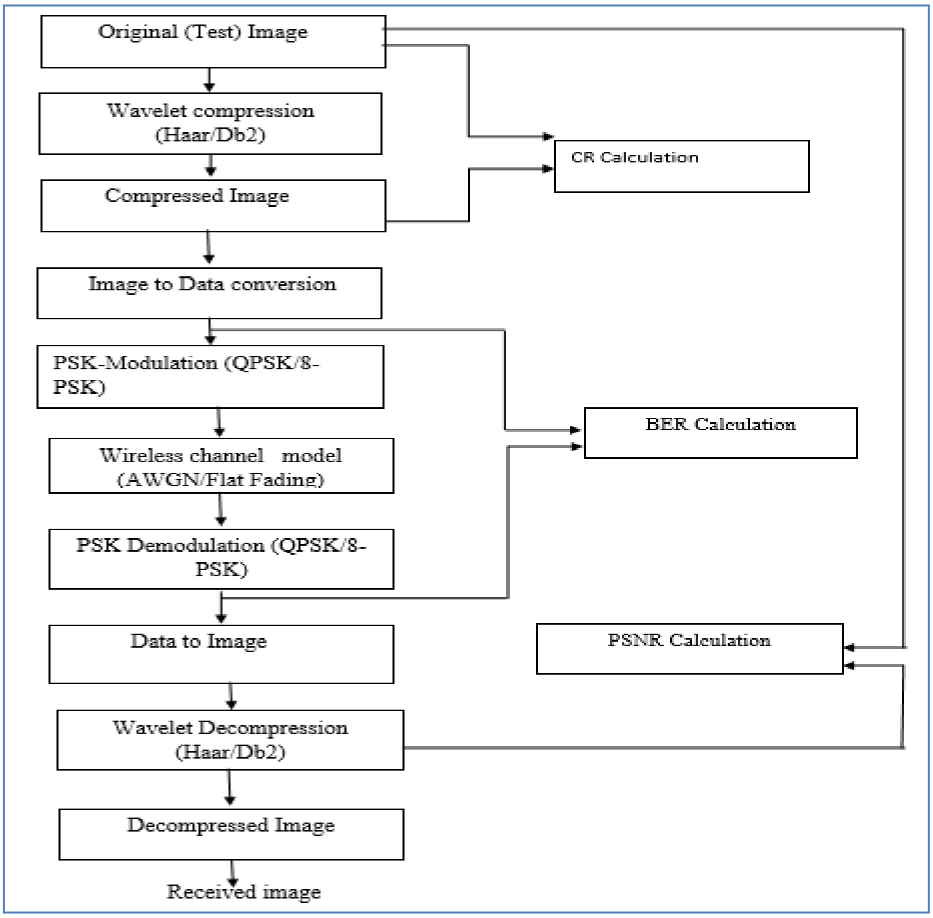

Fig. 1: Simulation Model

RESULT ANALYSIS OF FLAT FADING WITH QPSK MODULATION

A. Performance of Haar Transform with median filter

In the figure 3 and 4 show the BER and SNR (dB) comparison of the results with the proposed technique of discrete wavelet techniques, Haar wavelet and Db2 wavelet with De-noising filter, with Median filter to the existing network respectively. In the figure 2 shows the A. Original image, B. Compressed image and C. De-compressed image

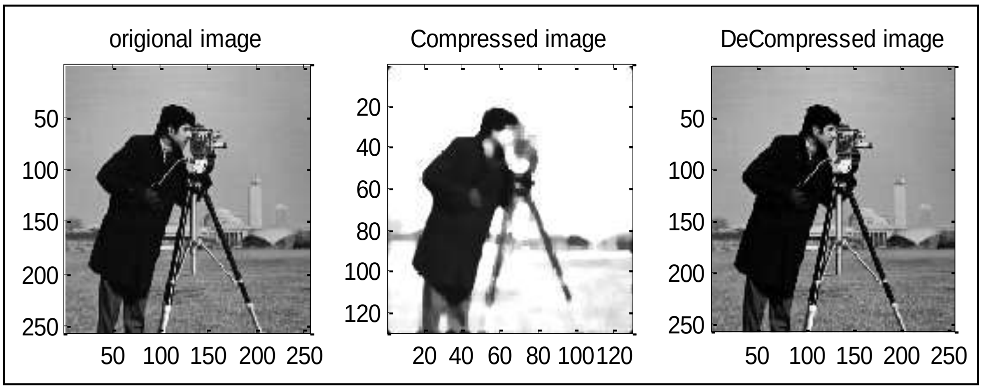

Fig. 2 shows the A. Original image, B. Compressed image and C. De-compressed image

A. Performance of Haar Transform with median filter

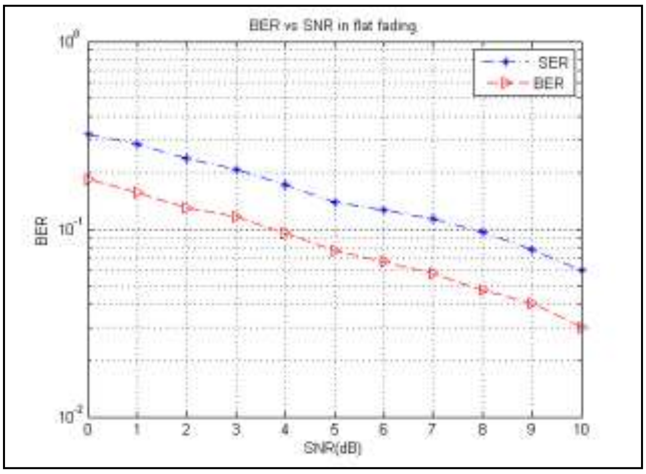

Fig. 3: FLAT of QPSK in Haar with median filter

B. Performance of Db2 Transform with median filter

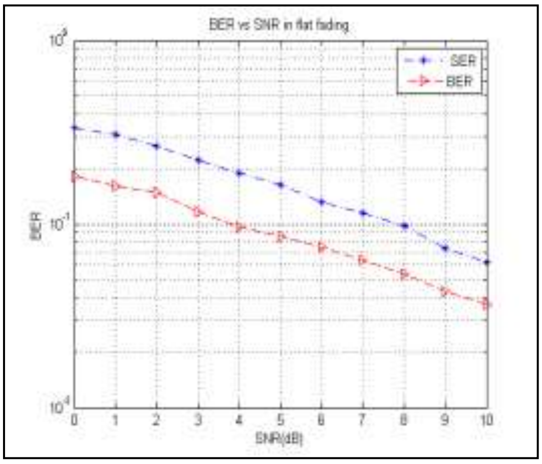

Fig. 4: FLAT of QPSK in Db 2 with median filter

CONCLUSION

We get results of different wavelet image compression techniques (Haar wavelet and Db2 wavelet) are presented and compared their effect. We also the used of de-noising Median filter. Our focus on increase CR and PSNR and decrease MSE also get simulated result of wireless channels model Flat fading channel with QPSK modulation techniques and compared their effect, focus on decrease BER. Simulation result shows in figure 3, BER v/s SNR for Flat fading of QPSK in Haar with median filter at SNR up-to 10 dB. So, Best BER & SER is 3.0117×10^{-2} & 6.0616×10^{-2} respectively at SNR of 10 dB. Simulation result shows in figure 4 BER v/s SNR for Flat fading of QPSK in Db2 with median filter at SNR up-to 10 dB. So, Best BER & SER is 3.6764×10^{-2} & 6.2410×10^{-2} respectively at SNR of 10 dB.

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