Novateur Publication's
International Journal of Innovation in Engineering, Research and Technology [IJIERT]
ICITDCEME'15 Conference Proceedings
ISSN No - 2394-3696

DIGITAL IMAGE PROCESSING BY USING PASS BAND MODULATION TECHNIQUES

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ABSTRACT
Now a days there is use of telecommunication is day today life. Use of Carrier Wave modulation techniques for the image processing is the challenge in the field of communication. This paper introduces the Digital image processing using shift keing techniques. The selection of modulation scheme depends on Bit Error Rate (BER), Peak Signal to Noise Ratio (PSNR), Available Bandwidth. The basic criteria for best modulation technique are Power efficiency, better Quality of Service, cost effectiveness, bandwidth efficiency and system complexity.

INTRODUCTION

As there are many techniques like ASK,BPSK,QPSK,MSK,M-ary PSK,M-ary FSK,QASK,QAM we can send the image through the above techniques. But there is big challenge to get better results of parameters like Bit Error Rate (BER), Signal to Noise Ratio (SNR), Available Bandwidth. The basic criteria for best modulation technique are Power efficiency, better Quality of Service, cost effectiveness, bandwidth efficiency and system complexity. Although lot of work has been carried out by carrier modulation techniques for different digital signals. As we can easily convert image into the digital data we can send the image by using the above techniques.

IMAGE

An image is an array, or a matrix, of square pixels (picture elements) arranged in columns and rows. In a (8-bit) grey scale image each picture element has an assigned intensity that ranges from 0 to 255. A grey scale image is called as black and white image.

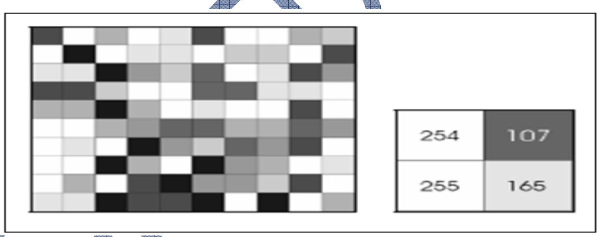

Fig.1. Gray Scale Image.

Each pixel has a value from 0 (black) to 255 (white). The possible range of the pixel values depend on the color depth of the image, here 8 bit = 256 tones or grey scales. A normal grey scale image has 8 bit color depth = 256 grey scales. A "true color" image has 24 bit color depth = 8 x 8 x 8 bits = 256 x 256 x 256 colors = ~16 million colors

BASIC MODULATION TECHNIQUES

1.1.1 QPSK : The main aim of digital communication system is to provide a reliable performance, reduce the probability of error and efficient utilization of channel bandwidth. A continuous wave (CW) modulation technique, QPSK is the one which satisfies all these requirements of the communication system. QPSK stands for Quadrature Phase Shift Keying. QPSK is a multi level, rather a 4-level modulation technique, which can represent only 2 levels of data i.e. 0 &1.

$$V_{QPSK}= \sqrt{Ps}\, b_0(t) \sin \omega_c t + \sqrt{Ps}\, b_e(t) \cos \omega_c t \quad \text{OR}$$
$$V_{QPSK} = \sqrt{2Ps} \cos [\omega_c t+ (2m+1) \prod/4], \quad m=0,1,2,3$$

1.1.2 FSK: The main aim of digital communication system is to provide reliable performance reduce the probability of error and efficient utilization of channel bandwidth FSK is the acronym for Frequency Shift Keying . here the frequency of the sinusoidal carrier is shifted between two discrete value . One of these frequencies (f_H) represent a binary'0' of original data . There is no change in amplitude and phase of the carrier. That is we have two different frequency s/g's according to binary s/g's . Let there be a phase shift by Ω .

i.e. $f_H = fc+\Omega/2\pi$ for symbol '1' $f_L = fc\Omega/2\pi$ for symbol '0'

1.1.3 BPSK: The binary sequence d(t) is converted into NRZ s/g, b(t) by using the NRZ

ISSN No - 2394-3696

encoder. The NRZ s/g b(t) is then used to modulate the PN sequence c(t) generated by the PN code generator. The transmitter uses two stage of modulation. The first stage uses a product multiplier with b(t) and c(t) as it's i/p's and the second stage consists of a BPSK modulator. The modulated s/g at the o/p of the product modulator i.e. m(t) is used to modulate the carrier for BPSK modulation. The transmitted s/g, x(t) is thus a direct sequence spread BPSK i.e. DS-BPSK s/g. The BPSK carrier is given by,

$$V_{carrier}(t) = \sqrt{(2Ps)}\ \sin(2\prod fct)$$

The o/p of the BPSK modulator i.e. x(t) is terminated. x(t) is given mathematically as

$$x(t) = m(t) \times V_{carrier}(t) = m(t) \times \sqrt{2Ps}\ \sin(2\prod fct)$$

$$\text{but} \quad m(t) = \underline{+1}$$

$$\text{hence} \quad x(t) = \sqrt{2Ps}\ \sin(2\prod fct)$$

thus the phase shift of x(t) is 0 degree corresponding to a positive m(t) and it is 180 degree corresponding to a negative m(t).

IMAGE PROCESSING AND MODULATION TECHNIQUES

Firstly we can use digital image processing by using basic modulation techniques. For that we need to compare different pass band modulation schemes for the different parameters.

Table 2.1 Comparison of Binary Modulation Schemes

No.	Technique			requirement
	Binary Modulation Scheme			
01	Binary Amplitude Shift Keying	BASK	Non coherent	$2R_B$
02	Binary Frequency Shift Keying	BFSK	Non coherent	$2R_B$
03	Binary Phase Shift Keying	BPSK	Coherent	$2R_B$
04	Differential Phase Shift Keying	DPSK	Non coherent	$2R_B$
	Quadrature Modulation Scheme			
01	Quadrature Phase Shift Keying	QPSK	Coherent	$2R_B$
02	Minimum Phase Shift Keying	MSK	Coherent	Less than QPSK

Table 2.2 Comparison of M-ary Modulation Schemes

	M-ray Modulation Scheme			Where $M = 2^N, N$
01	M-ary Phase Shift Keying	M-ary PSK	Coherent	$2R_b/N$
02	M-ary Quadrature Amplitude Shift Modulation	M-ary QAM	Coherent	$2R_b/N$
03	M-ary Frequency Shift Keying	M-ary FSK	Coherent	$M2R_b/N$

PROPOSED SYSTEM BLOCK DIAGRAM:

Fig 2.1 Digital Image processing by using Pass band Modulation technique

CONCLUSIONS

Hence the comparative analysis of various pass band modulation techniques is done in this paper. And we can implement the image processing by using these all pass band modulation techniques. The application can be reviewed by using the important parameters such as BER & PSNR. In case of image processing also the BER should be low & SNR should be high. If that is achieved image processing can done through the Pass band modulation techniques.

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