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BINARY IMAGE IN LINEAR ALGEBRA

*[1]Venkata Pavani. P, [2] Pravalika. T, [3] C. V. Rajagopal Reddy

[1]Lecturer, Dept. of Mathematics, C.S.S.R & S.R.R.M. Degree & P.G. College, Kamalapuram, YSR Dist, A.P

[2]Lecturer, Dept. of Mathematics, C.S.S.R & S.R.R.M. Degree & P.G. College, Kamalapuram.

[3]Principal, C.S.S.R & S.R.R.M. Degree & P.G. College, Kamalapuram

ABSTRACT

Linear algebra is a branch of mathematics. Linear algebra is widely use in both abstract algebra & functional analysis. Linear_algebra is a sub-field of mathematics concerned with vectors, matrices, and linear transforms. Like vectors can be implemented by lists and matrices can be implemented with the help of nested lists. In this article we are discussing applications of Linear Algebra like matrix, and explore matrix operations on an image and Processing of images using mathematical operations.

Keywords: Digital Image, Vectors, Matrices, Linear Transforms, Mathematical Operations

I. INTRODUCTION

With the introduction of computers, the processing is performed by means of computer graphic algorithms to digital images, which are obtained by a process of directly using any digital device. Almost of the pc graphics operations which will be simply done by using the algebra in Turning, sloping, scaling, Bezier curves, reproductions, dot and cross products, projections, and vector fields. Other more complex processes like filters, require the grouping of algebra with other mathematical apparatuses. Digital Image processing isn't just imperfect to retouch or resize images seized by the camera; it's generally used now a days.

II. EXPLANATION

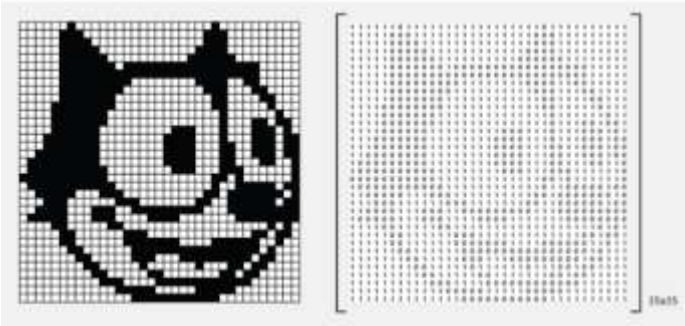
Development of medical images processing Techniques and their Applications using Graphical system Design. Digital image processing has a broad field of applications, such as Acoustic image processing, Robotics, Movie industry, microscope imaging and image sharpening and restoration .and automated inspection of industrial parts. Digital image is composed of a finite number of elements, of which has an exact location and value.

Picture.1: Digital image processing and operations with matrices:

There is a relation among matrices and digital images. A digital image in a computer is presented by pixels matrix. The motive of this work is to perceive matrix elements nature and arrangement to recognize matrix parts – positive from negative, real from complex, bigger from smaller the pictures

you see on internet pages the photographs you take with your mobile phone are examples of digital images. It is probable to denote this kind of image using matrices. For example, the small image of Felix the Cat can be represented by a 35 X 35 matrix whose elements are the numbers 0 and 1. These numbers specify the color of each pixel the number 0 indicates black, and the number 1 indicates white Digital images.

Picture.2: image of Felix the Cat



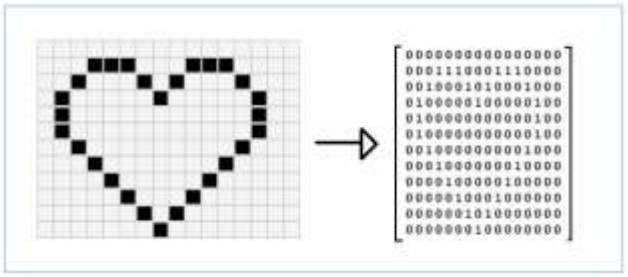
Grayscale images can also be signified by pixels matrices. Each pixel of such image is presented by one matrix portion digit from the set. For convenience, most of the current digital files use integer numbers between zero (black pixels) to 255 (white pixels). Usually, the result of such operation is matrix of original image dimension (m x n).Once a digital image can be represented by matrices, we may ask how operations on their elements affect the corresponding image.

For example: If we consider the binary image A below as a matrix, say A = $(a_{i,j})$then the image B corresponds to the *transposed matrix* of A, that B= $(b_{i,j})$

is, B= $(b_{i,j})$ = $(a_{i,j})$ = A^T. The image corresponds to the matrix $(a_{j,35-i+1})$. Try to discover the matricial relationships between the image A and the other images.

Another example: if we take the standard arithmetic mean of the component matrices R, G and B from a color image A, we will get a grayscale version of the image (non-integr values are rounded to the nearest integer)

Picture.3: Grayscale version of the image



III. CONCLUSION:

Linear algebra underlies much of computerized image processing, as all digital images are matrices. with matrices used in two-dimensional discrete linear transforms, in image processing.Images acquired by satellites are useful for tracking natural resources, geographical mapping, analysis of urban growth, and many other environmental applications. for each element of the matrix that represents the image, we observe its neighbouring elements and, then, we arrange them in an ordered list. The subject is vast, rich and modern. This concept reflects the fact that images frequently Pixel is the term most widely used to denote the elements of a digital image collections of objects each of which can be the basis for a region.

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