

Compute the Remoteness Connecting Two Points by Means of Euclidean Distance Task in an Picture Dealing Out Applications

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Abstract - In this paper, we can take advantage of using different distance functions in image processing Applications. The proposed Methods are based on well-known algorithms that use Distance measurement. Our final purpose is to find the distance between two points in a single image using Euclidean Distance function that provide the best results for a given problem, so we present some tools that help with finding them.

Keywords - Euclidean Distance Function, Image Processing, Image Transformation.

1. INTRODUCTION

Image processing algorithms implemented in hardware has emerged as the most viable solution for improving the performance of image processing systems. Distances play a central role in comparison of binary images, especially for images resulting from local features such as edge or corner detection and used to obtain the medial axes of digital shapes. So many researches focus on finding distance through different algorithms. In computer vision and in many morphological image application distances plays a very important role. Euclidean distance is most common among all types of distance. Since Euclidean distance transform has many applications so many algorithms are proposed to find that distance [6]. Euclidean distance calculation is although a simple but time-consuming operation. It takes an excessive amount of time. The drawbacks of those techniques for calculating distance are very expensive in terms of computing time and resources. This paper focuses on finding exact Euclidean distance by using Sequential algorithm in order to reduce computational cost. Sequential Algorithm is modified for Euclidean distance calculation. There are many related works has been done which is as follows. Moore [5] discusses about distance, its different types and algorithms with their advantages and disadvantages for calculation of different distance transform function. For example the brute force technique, although calculate the exact Euclidean distance but its needs more resources and computation time is high. Another approach is incremental which uses the concept of neighborhood. Pequet states region expansion technique using real numbers [7]. Cuisenaire

[1] states difference between chamfering and vector distance transforms methods. The drawback of chamfer method or Sequential Weighted Distance Transform (SWDT) is that it gives no orientation information and is rotation sensitive. To overcome these limitations Danielsson[6] present vector method. The disadvantages of Danielsson[6] algorithms are that the distance is calculated only from the distances associated to the pixels in neighbors. So this is not sufficient to produce exact results in all cases and the processing and storage cost to be paid. Noticing the errors in Danielsson method, a region growing algorithm is presented by Cuisenaire [1] which uses the concept of bucket sorting by using ordered contoured propagation by Voronoi diagrams. This technique leads to linear time complexity of Euclidean distance. Porikli and Kocakin [8] present the two fast algorithms to calculate the approximate distance transformation of 2 Dimensional binary images. The Chen and Chuang [3] algorithm is same as of using dimension reduction or independent scanning. Hirata [2] states unified algorithm which calculates the Euclidean distance with time complexity $O(n^2)$. Vincent [4] proposed a new algorithm named chain propagations for calculating Euclidean distance. This algorithm is well suited for computing Euclidean distance in conventional computers as compare to all early proposed algorithms. It requires a random access to the pixels so not only suited to general purpose computers but also for some architecture it is extremely fast on parallel computers. Euclidean distance is most common in most of applications. There are various ways of applying the distance transform depending on which distance metric is being used and how the local distance information is propagated. Our final purpose is to find the distance between two points in a single image.

2. PRELIMINARIES

Euclidean distance is most common in most of applications. There are various ways of applying the distance transform depending on which distance metric is being used and how the local distance information is propagated. e.g. hamming distance, Manhattan distance Chessboard, and Euclidean distance etc. But Euclidean is being the most common. Euclidean distance has been computed through different algorithms like parallel,

linear time algorithms etc. On the basis of efficiency, accuracy and numerical computations, existing and proposed techniques has been compared so this study proposed a new technique of finding Euclidian distance using sequential algorithm. This technique has reduced the drawbacks of existing techniques. And the use of sequential algorithm has reduced the computational cost. The Other algorithms,(1). In parallel- these algorithms are difficult to parallelize during the computation. The drawback of this is for calculating distance are very expensive in terms of computing time and resources. (2)In Linear- it is required only for some applications because it depends on the Shape of Structuring Element & type of the distance Metric.

In other Algorithms at a time only one image will be examined, But in sequential algorithm scan two images so the computational cost has been reduced. Euclidean distance is a viable, quick and efficient alternative solution. Hence it is used as solution for a given problem. In mathematics, Euclidean distance can be defined as the straight line connecting two points distance and can be measured with a ruler. The Euclidean distance [6] between points is given as follows.

The Euclidean distance between points
 $P = (p_1, p_2, \dots, p_n)$ $Q = (q_1, q_2, \dots, q_n)$
 In Square of Euclidean n -space, is defined as

$$\sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \dots + (p_n - q_n)^2} = \sqrt{\sum_{i=1}^n (p_i - q_i)^2}$$

3. FRAMEWORK

The proposed system calculates the Euclidean Distance by using sequential algorithm. Once the image is acquired then after the preprocessing step, the Euclidean distance is calculated from the image. The steps involve in the implementation phase are as shown in Fig 1. The logical design of the system is shown in Fig 2.

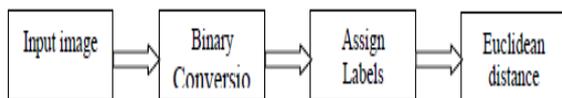


Fig.1. Process of Euclidean Distance Calculation.

The proposed research based on the calculation of exact Euclidean Distance by using Modified Sequential Algorithm. Sequential or recursive algorithms are proposed for the purpose of reducing the number of scanning required for the computation of an image transform.

4. LOGICAL DESIGN OF THE SYSTEM

Model of Proposed Technique- For implementing the proposed technique, the following steps and functions are involved.

Step 1: Read an image-The input image will be read out.

Step 2: Binary Conversion The image will be converted into binary form by using "Dither" function.

Step 3: Assigning Labels

The next step is to assign labels to binary image.

Step 4: Euclidean Distance Calculation: So after assigning labels the proposed system calculates the Euclidean distance by entering the labels under the range of input image. First it checks the coordinates of both labels and then Euclidean distance is calculated by putting the coordinates of input labels in the formula.

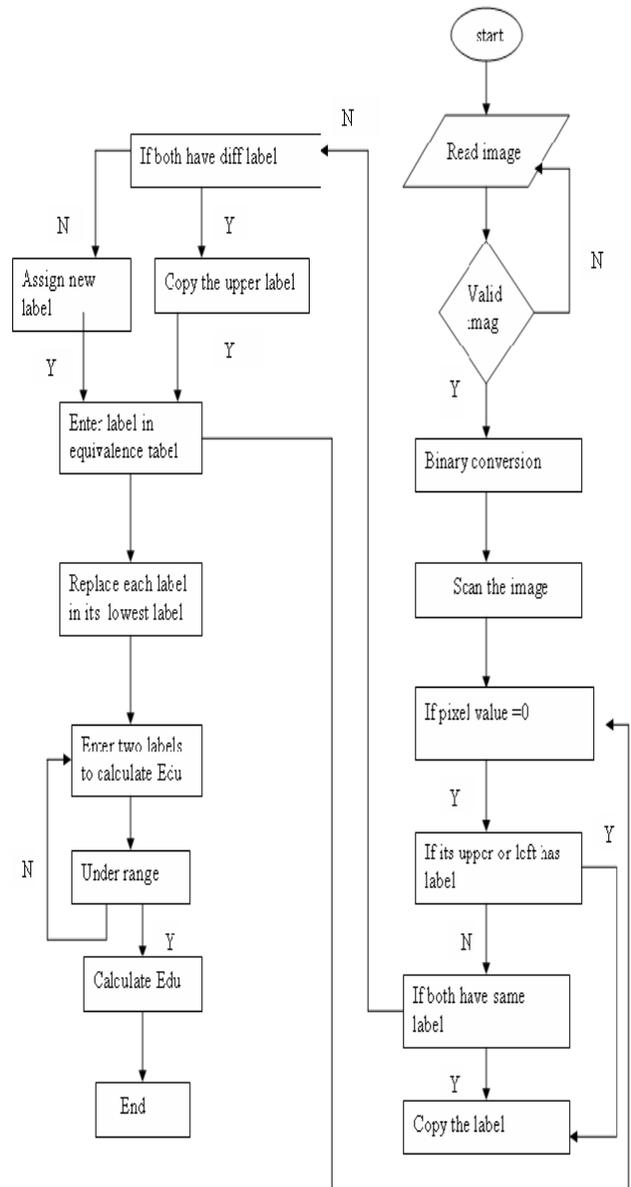


Fig.2. Flow Chart of the Proposed System

5. BACKGROUND ON MATLAB AND THE IMAGE PROCESSING TOOLBOX

The software code and supporting tools are based on the leading software in the field: *MATLAB*® and the *Image Processing Toolbox*™ from the MathWorks, MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and

solutions are expressed in familiar mathematical notation. Typical uses include the following:

- Math and computation
- Algorithm development
- Data acquisition
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including building graphical user interfaces

MATLAB is an interactive system whose basic data element is a matrix. This allows formulating solutions to many technical computing problems, especially those involving matrix representations, in a fraction of the time it would take to write a program in a scalar non-interactive language such as C.

The name MATLAB stands for *Matrix Laboratory*. MATLAB was written originally to provide easy access to matrix and linear algebra software that previously required writing FORTRAN programs to use. Today, MATLAB incorporates state of the art numerical computation software that is highly optimized for modern processors and memory architectures.

In university environments, MATLAB is the standard computational tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the computational tool of choice for research, development, and analysis. MATLAB is complemented by a family of application-specific solutions called *toolboxes*. The Image Processing Toolbox is a collection of MATLAB functions (called *M-functions* or *M-files*) that extend the capability of the MATLAB environment for the solution of digital image processing problems. Other toolboxes that sometimes are used to complement the Image Processing Toolbox are the Signal Processing, Neural Networks, Fuzzy Logic, and Wavelet Toolboxes.

The *MATLAB & Simulink Student Version* is a product that includes a full-featured version of MATLAB, the Image Processing Toolbox, and several other useful toolboxes. The Student Version can be purchased at significant discounts at university bookstores and at the Math Works website (www.mathworks.com).

6. CONCLUSIONS AND FUTURE WORK

The proposed technique is based on the calculation of Euclidean distance using Sequential algorithm and our final purpose is to find the distance between two points in a single image. To reduce the deficiencies of previous algorithms, this study focuses on finding Euclidean distance using sequential algorithm. This system will deal with only binary images. At a time only one image will be examined, as sequential algorithm scan only two images so the computational cost has been reduced.

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