Determination of Object Similarity Closure Using Shared Neighborhood Connectivity

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Abstract Sequential object analysis are playing vital role in real time application in computer vision and object detections.Measuring the similarity in two images are very important issue any authentication activities with how best to compare two independent images. Identification of similarities of two or more sequential images is also the important in respect to moving of neighborhoods pixels. In our study we introduce the morphological and shared near neighborhoods concept which produces a sufficient results of comparing the two images with objects. Considering the each pixel compare with 8-connectivity pixels of second image. For consider the pixels we expect the noise removed images are to be considered, so we apply the morphological transformations such as opening, closing with erosion and dilations. RGB of pixel values are compared for the two sequential images if it is similar we include the pixels in the resultant image otherwise ignore the pixels. All un-similar pixels are identified and ignored which produces the similarity of two independent images. The results are produced from the images with objects and gray levels. It produces the expected results from our process.

• Key Words : Similarity Measures, Morphology, Neighborhoods, Pattern recognition

1. Introduction

Commonly used measures such as the cross-correlation coefficient are very lengthy and insufficient indicators of image similarity. The fundamental operation for any visual information is mainly a comparison of two images for similarities. For instance the finger print of any person has to be verified in the database to identify the individuals in any institute or country. Meaningful image similarity is measured through the shared near neighborhoods with sufficient RGB values. The morphological process is an important activity for preprocess which yields the accurate images for comparisons. Morphological transformations such as erosion, dilation with opening or closing are considered to remove the noise and make image accurate. Mathematical morphology is a non-linear image processing approach which is based on the application of lattice theory to spatial structures

Radhakrishnan et al [1] proposes morphological decimation of power network images for the purpose of analysis. The method creates a graphical image of a power network with a thickness of lines proportional to their respective rated megavolt-ampere capacity. Through morphological tools, the network image is decimated. This decimation process eliminates weak lines. Thus, strongly connected subnetworks emerge. Ying Shan et al [2] proposed a novel similarity measure of two image sequences based on shapeme histograms. The idea of shapeme histogram has been used for single image/texture recognition, but is used here to solve the sequence-to-sequencematching

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problem. The proposed method yields image sequences of tracked objects demonstrate the efficacy. C.C. Chen et al [3] produced the experimental results of applying two similarity measurements, Euclidean distance and chord distance, to test a set of six Brodatz's textures. A similarity measurement between images should be simultaneously considered.SimoneSantini [4] developed a similarity measure, based on fuzzy logic that exhibits several features that match experimental findings in humans. The model is dubbed fuzzy feature contrast and is an extension to a more general domain of a the feature contrast model due to Tversky. And they showed how the FFC model can be used to model similarity assessment from fuzzy judgment of properties. R.A.Jarvis et al [5], a nonparametric clustering technique incorporating the concept of similarity based on the sharing of near neighbors is presented. In addition to being an essentially parallel approach, the computational elegance of the method is such that the scheme is applicable to a wide class a practical problems involving large sample size and high dimensionality. Guadalupe et al [6] introduces a measure of similarity between two clustering of the same dataset produced by two different algorithms, or even the same algorithm (K-means). And they apply the measure to calculate the similarity between pairs of clustering, with special interest directed at comparing the similarity between various machine clustering and human clustering of datasets.Francisco Ortiz [7] deals with the use of morphological filters by reconstruction of the mathematical morphology for Gaussian noise removal in color images. These new vector connected have the property of suppressing details preserving the contours of the objects.For the extension of the mathematical morphology to color images we chose a new polar color space, the l1-norme. This color model guarantees the formation of the complete lattice necessary in mathematical morphology avoiding the drawbacks of others polar spaces.

2. Methodology

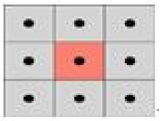
The process of similarity comparison starts with preprocesses using morphological transformations. The given input images (IPimage1), (IPimage2) areappliedonmorphologicalclosingthenfollowedbyopeningwithanappropriatestructuringelementortemplates,whichagainusedwithclosingoperationsperformedontheresultantimagetogetnoiseremovedimages.Opening(o) is erosion followed by dilation and Closing (·) is dilation followed by erosion. The templates or structure elements have to be selected based on the objects size and structure in the images which we input, so processing will be smoother and produce the accurate results. For color images we can apply the vectorial opening reconstruction (VOR) and vectorial closing reconstruction (VCR) sequentially.

The size and structure of the template finalize the preprocessed image of de-noising in both binary and gray scale images. This will be extended on color morphology transformation for using RGB pixels contained images.

For Gray images
Preprocessed image(1)
$= [[\ IP_{image1} \cdot \text{Template}\ ]\ o\text{Template}\ ] \cdot \text{Template}]$

For RGB images
Preprocessed image(1)
$= [[\ IP_{image1} VCR\ \text{Template}\ ]\ VOR\text{Template}\ ] VCR\text{Template}]$

The de-noising images are used to identify the similarity between them by using shared near neighborhood techniques with 8-connectivity(fig 1)



[Fig. 1] 8-connectivity

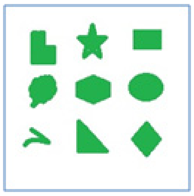
The current pixel RGB value of image1 will be verified with respective pixel of image 2; if it is matching then it will be considered as similar. Otherwise we use 8-connectivity of shared near neighborhood to identify the next pixel, by considering the next pixel of image 2 with current pixel of image1 if it similar we check the next pixel of current pixel of image 1. This yields the similarity of respective pixels or neighborhoods

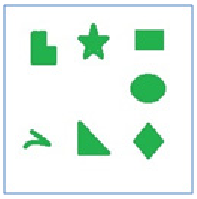
```
If [Block (image1) = Block (image2)]
        than
                " Similar Object"
        Else
                IF[Block(image1)   =   Neighborhood
  Block(image2)]
                than
                " Moved Object in image2"
                Else
                " Object not available in Image 2 ".
End if
```

The above process is continued for all pixels of image 1 using Raster scan approach to get the comparison for all the similarities of image 1 and image 2.

3. Results and Discussion

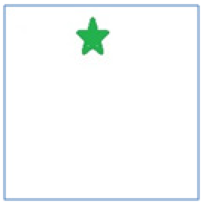
Our approach is applied in three different inputs to identify the similarities of two images. The first examples with 9 objects with various structures as image 1(Fig 2a), the image 2 (Fig 2b) is only with 7 objects. The resultant image (Fig 2c) yields only similar pixels of two input images.





[Fig. 2] (a)Image 1 (b) Image 2

(c) Resultant image



[Fig. 3] (a) Image 1 (a) Image 1

(c) Resultant image

[Fig. 4] (a) Image 1 (b) Image 2

(c) Resultant image

In the same manner, we used two input images (Fig 3a, 3b) which are same but in different locations of same objects, so resultant image (Fig 3c) shows empty because the objects are not in the same pixels. Likewise we also used some gray level images (Fig 4a, 4b) which are having objects located at various pixels. So result (Fig 4c) also empty because no pixels are similar at respective locations. This produces the expected results of our approach

4. Conclusion

Our approach is simple and useful for clustering the images in various pixel oriented techniques. The sequence of two images can be identified by using the 8-connectivity neighborhoods which can use for moving object. The image with similar appearances but located in different pixels are also identified, which basically on intensity of pixel with respective pixels in the second image. It will be also interesting to sequence the images based on the connectivity of pixels.

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