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Unionized Optimization of Object Detection Strategies in Image Processing Domain

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Abstract: Object identification in Image processing domain provides a strategic way of implementation towards real-time image data with different level of retrievals. Our conventional setup focuses on images with its position, shape, color and clarity and space area. This paper perform a detailed study of object identification towards variant images in the field of image processing which can be carried out with optimal output strategies. We implemented our proposed methodology as a fusion of image object retrieval techniques with real time implementation of several component structures. In near future this research will be extended to perform neuro fuzzy algorithmic procedural strategies for the successful implementation of our proposed research technique in several sampling domains with a maximum level of improvements including textures.
Key words: Classification, Slicing, Pattern, Object, Resizing.

I. INTRODUCTION

In imaging science, image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image [1]. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it [2].

Image processing usually refers to digital image processing, but optical and analog image processing also are possible [3] this article is about general techniques that apply to all of them. The acquisition of images (producing the input image in the first place) is referred to as imaging [4].

Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans)[5].

Images play avital role in grasping information's quickly and lead us to various interpretations and analysis. The process of capturing objects from our human eye carries various algorithms based on our inheritance, knowledge and experience[6].The process of creating an automated system for object identification depends on the implementation of image processing techniques utilized by our generic human behaviors and understanding[7].

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing[8]. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems[9].

Object detection is the process of finding instances of real-world objects such as faces, bicycles, and buildings in images or videos. Object detection algorithms typically use extracted features and learning algorithms to recognize instances of an object category. It is commonly used in applications such as image retrieval, security, surveillance, and advanced driver assistance systems (ADAS)[10].

II. PROPOSED METHODOLOGY

For structuring the proposed methodology of unionized optimization of Object Detection in image databases, Let us consider the following images with the analytics,

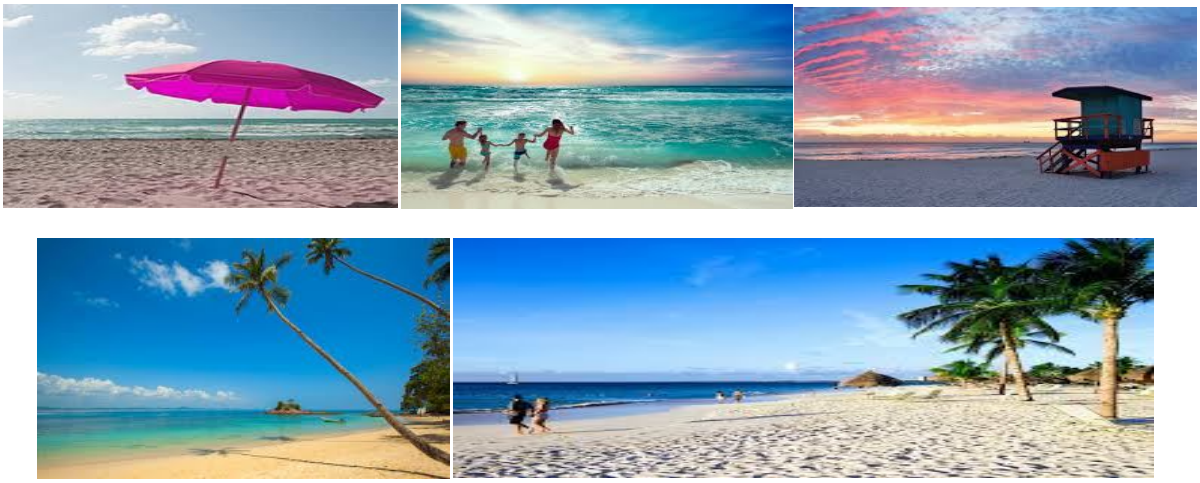

Fig.1:Set of 5 image samples with different objects in same environment

Now focusing on the images one by one and applying our manual object detection technique, the following list of items are come into preference based with smaller variations.

Table-I
Image set of Fig.1-Analysis Table

Sl.No	Objects List
Image-1	1.Family-Because Husaband, Wife, Female Child and Male child. 2.Sand-Because they are not entered into water. 3.Water and Waves-Safety analysis. 4.Sky with two colors blue and white. 5.Family members dress colors. 6.Four shadows-dark color on ground side object
Image-2	1.House/Room with stairs 2.Sky-with two colors
Image-3	1.Umbrella 2.Umbrella color. 3.Water 4.Sky with 2 colors 5.Umbrella shadow
Image-4	1.Two cocout trees 2.Normal trees 3.Sky with 2 colors. 4.Tree shadows. 5.water
Image-5	1.Trees 2.Two couples. 3.Water 4.Sand 5.Sky with 2 colors. 6.Huts.

The preference based object identification from images leads to the following factor oriented impishness created by the object present in the image which lead to Unionized Optimization for Object detection in Image sets.

A. Position.
B. Shape
C. Color.
D. Clarity.
E. Space-Occupying area.
F. Negligence components.
G. Verification Slicing

The Proposed Architecture is as follows,

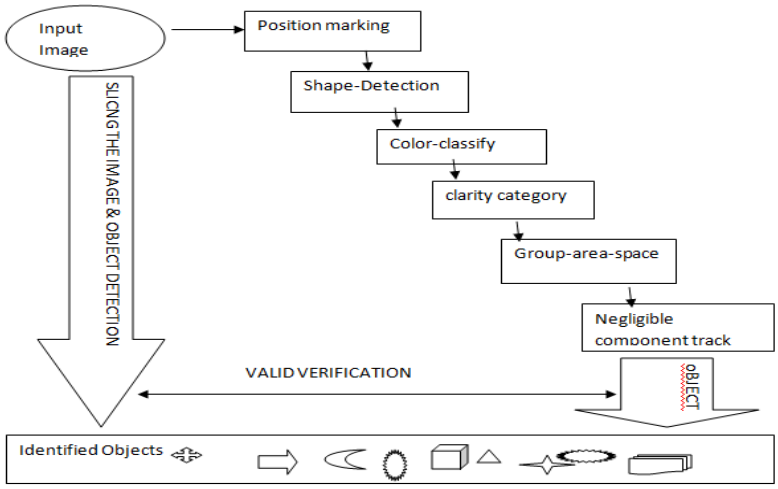

Fig.2:Proposed Unionized Optimization for Object Detection in Images

III. IMPLEMENTATION

Now implementing the strategies for the object identification is as follows

A. Position

Center area focuses more compared with the edges. For right handed people right side area covers more than the left one and vice versa.

The position of each object is covered by measuring the distance between any two relative points such as,

The distance AB between two points in a plane containing A and B with Cartesian coordinates A(x1,y1) and B(x2,y2) is given by the following formula:

$AB=\sqrt{(x2-x1)2+(y2-y1)2}$---------(1)

B. Shape

The shapes of the object consist of the following primitives.

1) Basic Object shapes-Circle/Rectangle/Lines etc.
2) Primitive Object shapes-Box/Wheel/Cylinder etc.
3) Real Time Objects-Car/Bus/Tiger/Lion/Human/Pencil etc.
4) Virtual objects-cartoon/Alien etc.

Moment invariantsare useful features of a two-dimensional image as they are invariant to shifts, to changes of scale and to rotations, or to shifts and to general linear transformations of the image [2]. The results show that recognition schemes based on shape moment invariants could be truly position, size and orientation independent, and also flexible enough to learn almost any set of patterns.

If we represent object R as an image, the central moments of the order p + q for the shape of R are defined as:

$S_{p,q}=\sum(x-x_c)^p*(y-y_c)^q$----------(2)

Where x_c,y_c represents the center of the object.

C. Color

The color of the object focuses on the following preferences,

1) Red, Green, Blue patches.
2) Black/White
3) Pink/Yellow/Brown(Derivative of RGB).
4) Other Dark colors.
5) Remaining mild colors

Color histogram is easy to compute and effectively represents the distribution of pixel colors in image. A solution to this problem can be dividing the image into sub areas and finding the histogram for each of them. This increases the information about location but also increases the memory requirement and computational cost. For digital images, a color histogram represents the number of pixels that have colors in each of a fixed list of color ranges, that span the image's color space, the set of all possible colors.

For example, a Red–Blue chromaticity histogram can be formed by first normalizing color pixel values by dividing RGB values by R+G+B, then quantizing the normalized R and B coordinates into N bins each. A two-dimensional histogram of Red-Blue chromaticity divided into four bins (*N*=4) might yield a histogram that looks like this table:

Table-II
Color code analysis for Blue-red Band

		red			
		0-63	64-127	128-191	192-255
blue	0-63	43	78	18	0
	64-127	45	67	33	2
	128-191	127	58	25	8
	192-255	140	47	47	13

D. larity

The clarity of the image focuses on the following factors based on resolution preference with 1080p,720p,540p,480p,360p,240p,144p,

1) Brightness
2) Contrast
3) Blurred

Resolution refers to the number of pixels in an image. Resolution is sometimes identified by the width and height of the image as well as the total number of pixels in the image. For example, an image that is 2048 pixels wide and 1536 pixels high (2048X1536) contains (multiply) 3,145,728 pixels (or 3.1 Megapixels). You could call it a 2048X1536 or a 3.1 Megapixel image. As the megapixels in the pickup device in your camera increase so does the possible maximum size image you can produce. This means that a 5 megapixel camera is capable of capturing a larger image than a 3 megapixel camera.

Table-III
Image-Resolution-clarity Analysis

Image Resolution	Maximum Print Size
less than 640X480	Wallet size only
640X480	absolute largest, 4X6
1024X768	4X6

1152X864	5X7
1600X1200	8X10

Nowconverting an image from one size to another can be done through Microsoft Office Picture Manger software tool itself as follows,

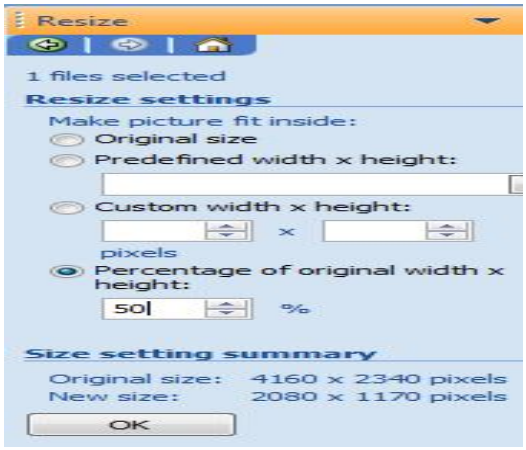

Fig.3: Image Resolution/clarity converter technique

E. Space

It represents the dimension and coverage in the image.It is differ from shape such that a bird shape can occupy more space in the image with a group of birds flying in the sky.It focuses on the following factors.

1) Group of homogeneous objects.
2) Group of Hetero generous objects.

F. Negligence Objects

Negligence area in image represents the remaining coverage are after applying the above 5 strategic variations. It focuses on the following factors.

1) Light color.
2) Tiny objects with irregular shapes.
3) Inadequate to view/extract.

G. Verification Slicing

Slice the image into 3x3 matrix by length/3 and Breadth/3 so that we obtain the following components.

Table-IV
Image-Slice in 3x3 Matrix Format

L1B1	L1B2	L1B3
L2B1	L2B2	L2B3
L3B1	L3B2	L3B3

Now identify the objects from each cell part and classify them based on its pattern and properties stored in databases.

IV. RESULTS AND DISCUSSION

The Unionized optimization of image object identification can be obtained through the sequential implementation of the object identification strategies, which can yield the results as follows

A. Stage-1:Focus on the Position by the following approach

Now consider the image and apply the positional function with the distance metrics

Focus-4		**Focus-2**
	Focus-1	
Focus-5		**Focus-3**

Fig.4: Image Positional function technique

Focusing on the center pattern we easily identify the main object in the image as a human being.

B. Stage-2:Try to extract shapes

The shapes are extracted from the image with the following variations,

Fig.5: Primitive Image Sets for Identification

C. Stage-3

The implementation of color impishness are different for various cells in the image as follows,

Fig.6: Image Color extracting and identification

D. Stage-4:Clarity

The clarity of the image can be used for object identification which yields the variation as follows,

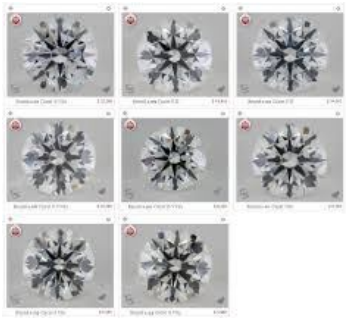

Fig.7: Image with different clarity cluster

E. *Stage-5.Space:*Identifying the group of objects present ina single image yields the following results,

Fig.8: Image with group of similar object identification

F. *Stage-6*:Neglect the white spaces and and blurred area in the given image.

Fig.9: Blurred Image for negligence

G. *Stage-7:*Slice and verify

Now for verifying the image of two toys in the reverse process by slicing it into a 3x3 matrix we obtain the following result.

Fig.10: Image Sliced in 3x3 matrix

Now each cell in the image identifies the components as folows
L1B1=Left eye of the doll
L1B2=Right eye of the doll
L1B3=Second toy Head
L2B1=Left Nose
L2B2=Right Nose
L2B3=Second Toy head
L3B1=First Toy Left tsomach
L3B2=First Toy right Stomach
L3B3=Right Toy Stomach
Finally this image contains two toys.

V. CONCLUSION

In this paper, we have discussed various object detection techniques. The Unionized Optimization of Object Identification strategies requires large database of image templates for correct object recognition. Hence it must be used only when limited objects are to be detected. This combinatorial method can give better result and are efficient as compared to local individual features. These techniques help in easy access of the images. They also find their application in fields such as biometric recognition, medical analysis, surveillance, etc

Object identification in images is a highly technical process to implement in an efficient way. The image component collection and the extraction is a scientific methodology to implement. Our proposed methodology makes it as an easy process by the further focusing of images into sub blocks of components as used in the slicing strategy. For a given image size, we are limited in the number of blocks we can break our image into. For multiple degraded images, we may be limited by how many image snapshots we can obtain. So we are limited in both cases by how many components we can average over, and this profoundly affects our estimations. This is one of the main drawbacks that we found in this Fusion of Object Detection technique. In near future this research will focus on an Neuro fuzzy based optimal algorithmic identification of Image object identification process.

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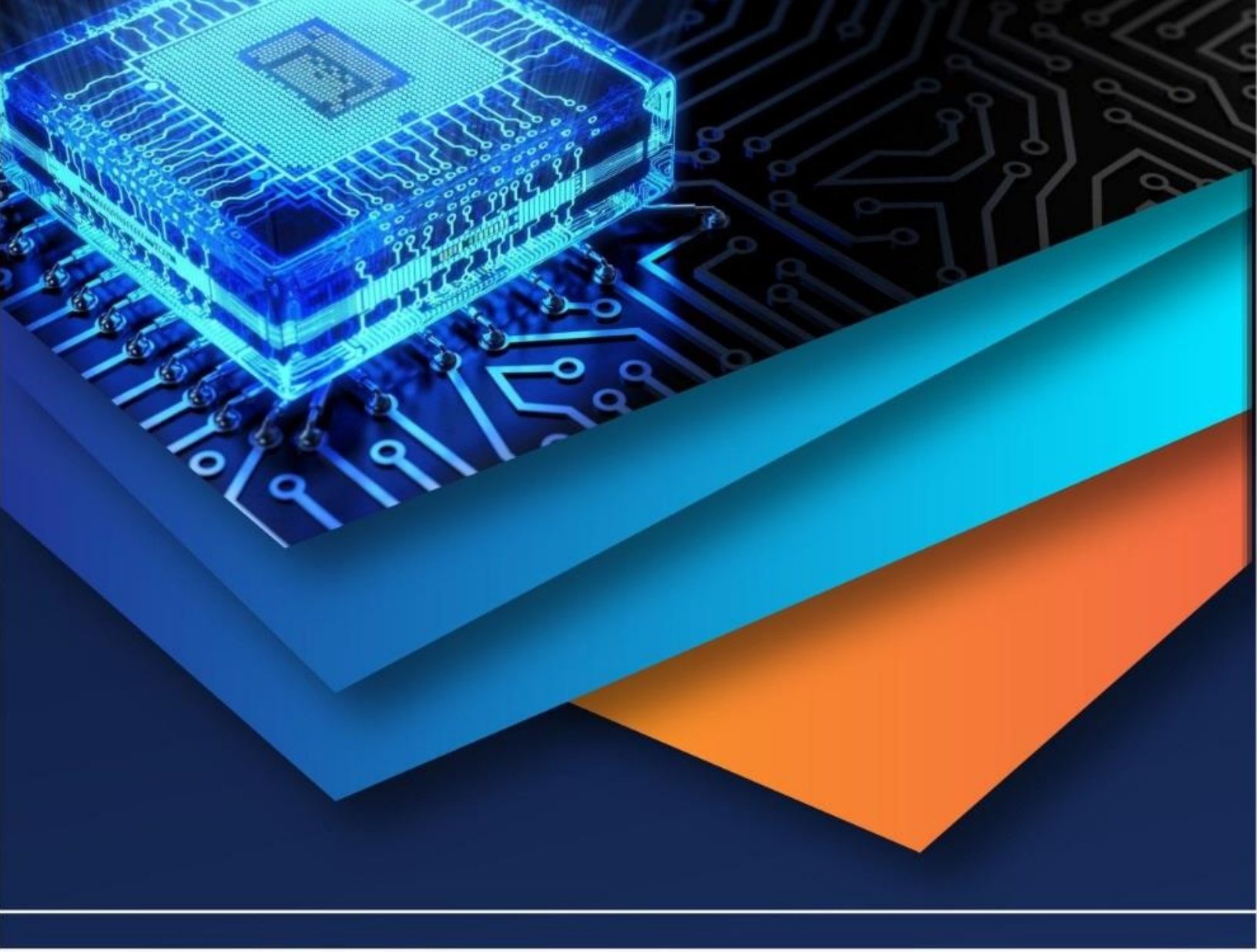

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