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OBJECT DETECTION AND RECOGNITION IN IMAGE PROCESSING

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ABSRACT -This paper describes a machine learning approach for visual object detection which is capable of processing images extremely rapidly and achieving high detection rates.Object Recognition is a technique used in the field of computer. It is assumed to be one of the most difficult and challenging tasks in computer. Many methods have been proposed in the past, and a model with new techniques which is not only fast but also reliable. Easynet model has been compared with many other models as well.At the time of prediction, our model bring forth scores for the presence of the object in a particular category. It makes predictions with a Single network evaluation. Object detection is a regression problem to spatially separated bounding boxes & associated class probabilities.

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INTRODUCTION

Category Detection which is a part of the object recognition deals with differentiating the object from the background. And Category Recognition deals with classifying the object into one of the categories those are already defined. It is the process which is used to identifying specific object in a digital image or video. Generally, Object recognition algorithms dependupon matching, learning, or pattern recognition algorithms using appearance-based or feature-

based techniques [5]. It means, it is used to find instances of real life objects such as bicycles, fruits, animals and buildings in images or videos.

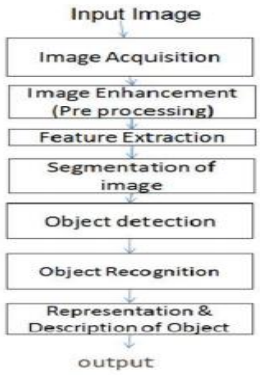

Fig 1 procedure of object detection

As shown in figure above the Object detection algorithms use features which can be extracted to identify a particular object. This is a simple way to implement. Object detection is a single regression problem which find directly from bounding box coordinates and class probability.

RELATED WORK

Object detection is the technique used to detect all instances of objects such as people, cars or faces in an image. In past few years, the Objects detection in real time and Image processing has become an active area of research and many new approaches have been proposed. Al lots of researchers have conducted many studies about Object detection

1.S.V.Viraktamath, MukundKatti, AdityaKhatawkar&PavanKulkarni has held a study of openCV and also have published an IEEE paper for Face Detection and Tracking using OpenCV. Their work is allied with converting web cam captured 2-Dimensional Images and convert them

into 3-Dimensional Images related to human faces by constructing 3D Geometry data outputs [1].

2.ArjunArora,Ashish Pant, , Sunnet Kumar and Prof. R.P. Arora form DIT Dehradun have worked about Image Processing and also encrypting an Image in order to transfer safely over the networks.

3.Theyproposed their work as Sophisticated Image Encryption Using OpenCV [2].

PRESENT WORK AND TECHNIQUES

OBJECT DETECTION

In present work I have worked upon the technique called PhaseCongruency. It assumes that the compressed image format should be high in *information*/ *entropy*, and low in redundancy. Thus, despite searching for points where there are sharp changes in intensity, this model searches for patterns of **order** in the phase component of the Fourier transform. The phase congruency technique is a *frequency-based* model of visual processing. It is assumed that, instead of processing visual data, the visual system is capable of performing calculations byusing the phase and amplitude of the individual frequency components in a signal. Let us assume that we can represent our image signal in the Fourier domain. A signal, say $f(x)$, is recreated from its Fourier transform by

$$f(x) = \int_{-\infty}^{\infty} a_\omega \cos(T\omega x + \phi_\omega) d\omega,$$

where, for frequency w, a_w is the amplitude of the cosine wave and $T\omega x + \phi_\omega$ is the phase offset of that wave. The term T is the size of the image window and assumed as 1.

Suppose, if the image signal were a simple step edge, then

$$f(x) = \frac{-4}{\pi} \int_{-\infty}^{\infty} \frac{1}{2\omega + 1} \cos(\omega x + \pi/2) d\omega,$$

and, at the point of the edge ($x = 0$), all the phase terms are aligned at $\pi/2$. It is the only place in the signal where there is *congruency* in the phase values; at all other points, the phase values of individual frequency components ranging from 0 and 2π .

An example taken is an image feature consisting of a single line, such as the letter "l".Various edge-detection algorithms will choose two adjacent edges: the transitions from white to black,

and black to white. But, the phase congruency map has a single line. A Fourier analogy of this scenario is a triangle wave. In each of its crests there is a congruency of crests from various sinusoidal functions.

It is proposed that multi-scale performance be done by seeing phase congruency of different high-passed versions of an image. The high-pass images are constructed from the sum of band-passed images, andwith the sum ranging from the highest frequency band down to some cut-off frequency. With this method, no matter what scale we consider, all features are localized accurately and in a stable manner.

Fig.2 Image detection using Phase Congruency

We can see that on the face image, the nose and the cheek features have been detected. The use of low frequency components in the calculation of phase congruency contribute highly to the detection of such features.

OBJECT RECOGNITION

Image recognition takes an image/patch of image as input and outputs. How does an image recognition algorithm find the contents of an image? Suppose if we want to find cats in images, we need to train an image recognition algorithm with thousands of images of cats and thousands of images of backgrounds that do not contain cats. Humans can identify any object in the real world easily without any extraefforts; on the other hands machines by itself cannot recognize objects. Recognition algorithms are implemented on machines; which is an intricate task. Thus object recognition techniques are required to develop which are less complex and efficient.

In this paper I have used color based recognition technique. Color provides powerful information for object recognition. A simple and effective recognition scheme is to represent and match images on the basis of RGB histograms as proposed by Swain and Ballard [6]. This color-based recognition method has been extended by Funt and Finlayson [2] to become illumination independent by indexing on an illumination-invariant set of color descriptors.

Our aim is to analyze and evaluate various color models to be used for the purpose of object recognition by color-metric histogram matching according to the following criteria: 1. Robustness to a change in viewpoint; 2. Robustness to a change in object orientation; 3. Robustness to a change in the intensity and the direction of the illumination; 4. Robustness to a change in the color of the illumination; 5. High discriminative power; 6. Robustness to noise; 7. Robustness to object occlusion and cluttering.

In the experiments, mainly we focus on object recognition using histogram matching for comparison reasons in the literature. Obviously, transforming RGB to one of the T. Gevers, A.W.M. Smeulders/ Pattern Recognition 32 (1999) 453–464 459 Fig. 3. The discriminative power of the histogram matching process differentiated for the various color features plotted against the ranking j. The cumulative percentile X for Hl ÇlÈl Ê , HH, HcÇcÈc Ê , Hrgb, HmÇmÈmÊ , HS , and HRGB is given by Xl ÇlÈl Ê , XH, XcÇcÈc Ê , Xrgb, XmÇmÈmÊ , XS and XRGB, respectively. invariant color models can be performed as a preprocessing step by other matching techniques

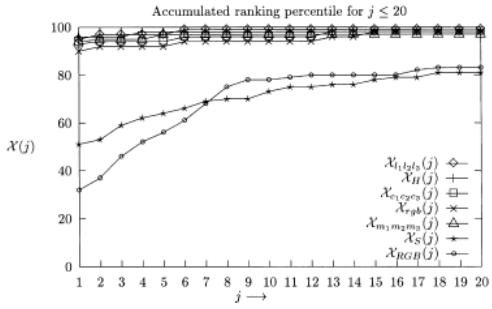

Fig 3 The discriminative power of the histogram matching.

CONCLUSIONS

The proposed algorithm is compared with the existing feature detection algorithm in systematical way, and is tested by images in BSDS and remotely sensed images. The comparison and test results show that the proposed algorithm proves considerable performance. It provides a new idea to detect image features based on the theory of phase congruency. There is still some lack of noise on the detection of image features, even though the algorithm of phase congruency has been modified to reduce noise. Therefore, further work is required to improve the algorithm and to control noise more efficiently.

In conclusion, RGB is most appropriate for multicolored object recognition when all imaging conditions are controlled. Without the presence of highlights and under the constraint of white illumination, c 1 c 2 c 3 and normalized color RGB are most appropriate. When images are also contaminated by highlights, l 1 l 2 l 3 or H should be taken for the job at hand. When no constraints are imposed on the SPD of the illumination, m1 m2 m3 is most appropriate. We concluded by presenting a schema on which color models to use under which imaging conditions to acquire on both invariant and discriminatory recognition of multicolored objects.

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