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Hybrid Method based on Neural Network and Histogram of Local Binary Pattern for Object Detection

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***Abstract*—With the development of digital resources, hardware to store those material also get increase. While dealing with such digital contents, searching also plays very important role. This article is all about the object detection method. This article detects various object by using Neural Network along with Histogram of Local Binary Pattern. Firstly this method find LBP and then apply Neural Network. This article achieves accuracy to detect the objects. This work is implemented in MATLAB.**

***Index Terms*—Neural Network, Object Detection, MATLAB. Histogram of Local Binary Pattern.**

I. Introduction

Object detection is a big part of people's lives. We, as human beings, constantly "detect" various objects such as people, buildings, and automobiles. Yet it remains a mystery how we detect objects accurately and with little apparent effort. Comprehensive explanations have defied psychologists and physiologists for more than a century.

From a long ago, objects were sought to be delineated before their identification. This gave rise to segmentation, which aims for a unique partitioning of the image through a generic algorithm, where there is one part for all object silhouettes in the image. Research on this topic has yielded tremendous progress over the past years [1, 2, 3, 4]. But images are intrinsically hierarchical: In Figure 1a the salad and spoons are inside the salad bowl, which in turn stands on the table. Furthermore, depending on the context the term table in this picture can refer to only the wood or include everything on the table. Therefore both the nature of images and the different uses of an object category are hierarchical. This prohibits the unique partitioning of objects for all but the most specific purposes. Hence for most tasks multiple scales in a segmentation are a necessity. This is most naturally addressed by using a hierarchical partitioning, as done for example by Arbelaez et al. [1].

Types of Image Processing:

The two types of image processing techniques are used. As,

Analog Image Processing

Digital Image Processing

Analog or visual techniques in the image processing are important in hard copies such as printouts and photographs. Image analysts implements several fundamentals rule of the interpretation at the time working with visual techniques.

Digital Processing techniques assist in the manipulation of its digital images through working with computers. As new data from the imaging sensors produce satellite platform having deficiencies. To get rid of those flaws and to achieve actual of the information, they have proceed several phases of the processing.

In the image processing, object detection and tracking plays an important role. In any computer vision applications, it helps in the detection of an object. The computer vision applications includes: recognition, automotive safety, and surveillance. Object detection is the process of finding instances of real world objects. Object detection algorithms are used to extracted features and learning algorithms, which helps to recognize instances of an object category. It is used in applications such as image retrieval, security, surveillance, and automated vehicle parking systems. In the object detection many methods are used. as:

- Detect a Face To Track

Firstly detect the face, then track face by the use of vision. The cascade object detector is used to find out its location of their face in any video frame. Where cascade object detector implements Viola Jones detection algorithm and some trained classification model for their detection. The detector is used to configured the detect faces, whereas they have configured for some different object sorts. When the face of a person tilts tracking may be loss. This is happened because of the sort of trained classification model implemented for detection.

- Identify Facial Features To Track

The next step in the object detection is to identify the features that will help in tracking the face. Selects a attribute which is different to the object and keep it unchanged even the time object is moving.

- Track the Face

The face can be track by the use of feature. The tracking of the face depends upon which kind of features, a user select. If a user selects the skin tone for the vision, then Histogram Based Tracker is used for the purpose of tracking. The histogram depended on tracker implements the CAM Shift algorithm, which offers the ability for tracking the object by histogram of their pixel values Object classification is a standard pattern recognition task. To track objects and analyze the behavior, it is essential to correctly classify moving objects. There are two different categories of approaches for classifying moving objects like, shape based and motion based classification.

II. IMAGE SEGMENTATION & OBJECT RECOGNITION

In Image Segmentation the generative models are used to decide which part of the image a model should occupy. Active Appearance Model (AAMs) is used as generative models and addresses the problem of jointly detecting and segmenting objects in images [5][6]. Regarding recognition, each object hypothesis is validated based on the image area assigned to the object, as well as the estimated model parameters, which indicate the familiarity of the object appearance. On one hand, knowing the area occupied by an object is needed for the estimation of the model parameters and, on the other hand, the model synthesis is used to assign observations to the model. Since neither is known in advance, we cannot address each problem separately. We view this problem as an instance of the broader problem of parameter estimation with missing data: In our case, the missing data are the assignments of observations to models. A well-known tool for addressing such problems is the EM algorithm.

An expectation-maximization (EM) algorithm is used for finding maximum likelihood estimates of parameters in probabilistic models, where the model depends on unobserved latent variables. In order to find maximum likelihood estimate we have to find probability density function and log likelihood.

III. OBJECT DETECTION TECHNIQUES

They initial step in this process is to tract the object for identifying object interest in video sequence and in some cluster pixels of such objects. As moving object is typically the primary source of the information, most techniques concentrate on its detection like objects. Brief description for several techniques is as below.

A. Frame differencing

The existence of movable objects is find out through computing the difference in between any two of their consecutive images. Its computation is easy and simple to use. For several dynamic environments, it possess tough adaptability, but usually hard to get whole outline of that moving object, which leads to effect the accuracy level of the object [7].

B. Optical Flow

Optical flow technique [8] computes the image optical flow field, and also do the clustering processing regarding the optical flow distribution attributes of the image. This technique achieve whole information and finds out the moveable object from its background, Moreover , a huge quantity of calculation, sensitivity to noise, poor anti-noise performance, which leads to not suit the real-time demanding occasions.

C. Background subtraction

The initial step for the background subtraction is refer as background modeling. It refer as the core of the background subtraction algorithm. Background Modeling should have sensitive enough to understand the moving objects [9]. Background Modeling draws yield reference model. Reference model is implements in background subtraction where every video sequence has been compared against their reference model to get the possible Variation. The variations in between present video frames and reference frame in terms of the pixels signify presence of the moving objects [9]. At present, mean filter and median filter [10] are mostly used for realizing background modeling. The background subtraction technique is taken for implementing difference techniques of the present image and background image to search moving objects, with easy algorithm, but it is very sensitive to vary in their external environment and possess poor anti- interference capability. Somehow, it can offer the most allover object information in their case background is familiar. As explained in [11], background subtraction has two approaches:

1. Recursive algorithm

Recursive techniques [11] [12] don't maintain any buffer for the background estimation. Unlike, they just update single background model depended on each input frame. Due to this, input frames from their distant past become effective on the present background model. Comparing it with non-recursive techniques, recursive techniques needs less storage, but some faults in their background model remains there for long period of time. This technique involves several techniques like as approximate median, adaptive background, Gaussian of mixture

2. Non-Recursive Algorithm

A non-recursive method [12] [11] implements a sliding-window work process for background the estimation. It saves a buffer of last L video frames, and synthesizes the background image depended on its temporal variation of every pixel having a buffer. Non-recursive methods are much adaptive as they don't base on its history beyond their frames present in their buffer. Whereas, the storage needs are important when huge buffer is required to cope up with slow-moving traffic.

IV. RELATED WORK

Many approaches for object detection operating on raw 3D data attempt to find the best alignment by determining correspondences between regions of the current scan and regions of the model. Typically, these regions are represented by features that compactly describe areas in the data so that comparisons can be carried out efficiently.

This concept is extensively applied in computer vision, where object recognition based on feature extraction is a popular research topic. E.g., Lowe [13] used SIFT features to compare an image with a database of reference images. Clusters of matching features that agree on a possible object pose are extracted. The probability to be a true match is computed based on how well the matched features fit and on the number of probable false matches.

Our approach operates on 3D laser data. Compared to cameras these sensors provide accurate range information and are less sensible to the lightening conditions, but they are affected by a slow acquisition time. The increased accuracy of

3D lasers allows us to determine more accurate positions of the objects in the scene.

Gelfand et al. [14] present an approach to the global registration depended on “integral volume descriptors”, which refer as one dimensional descriptors where values based on its volume enclosed through local surface with respect to a point. Compared to our approach described in this paper, this technique is mainly targeted towards finding the best alignment of two shapes and not to test if an identical shape exists.

Johnson et al. [15] proposed the spin-images for object detection in 3D data. A spin image is a 2D representation of the surface surrounding a 3D point. This technique has been often reported to provide good matching results. In their approach they calculate a spin-image for each point in model and each point in its scene. Correa et al. [16] introduced a variant of the spin-images (spherical spin images) which solves the comparison to nearest neighbor search by using the linear correlation coefficient as the equivalence classes of spin-images. To efficiently perform the comparison of features they compress the descriptor.

Triebel et al. [17] implements spin-images like a attribute for a associative Markov network (AMN). The dimensions of such AMN are studied from a manually labeled training data set. The main difference between this work and our approach is that we identify complete instances of objects from their partial views observable in a scene, rather than labeling the single points according to classes they resemble. Mian et al. [18] use the so-called tensor descriptors which depended on an accurate synthesis of their surface normal or on its mesh structure of its data in general.

Here they have introduced a rotation invariant parts depended model to find out objects with the complex shape in the high resolution remote sensing images. Significantly, the geospatial an object having complex shape initially separates into various main parts and the structure information within parts is explained and regulated in the polar coordinates to get the rotation invariance on its configuration. Due to that, the pose variance of every part associate with object is sate as our model. In encoding the attributes of rotated parts and objects, a latest rotation invariant attribute is introduced through forwarding histogram oriented gradients. At the time of the last detection step, a clustering technique is proposed to locate the parts in the objects, and that method implements to fuse the detection results. Moreover, an efficient detection model is generated and the experimental results analyzed their robustness and precision of introduced detection model.

Due to the lack of standard data sets of HR remote sensing images for object detection, we evaluate the RIPBM on Quick Bird for aircraft detection with the resolution of 60 cm/pixel. The size of the training set is 100 patches with aircraft and 150 patches with background. In the training phase, the parts of the aircraft are manually labeled, i.e., one head, two wings, and one empennage. In the testing phase, we take 40 images independent from the training set, and there are several aircrafts with different types and directions in each image. One labeled example and some samples from the training set, and the positives are aligned.

Human faces assist in presenting huge variability because of the reasons like as pose and facial expression variations, changes in illumination and occlusion, within others, hence generating face verification refer as a challenging issue. Here they observe the problem of the face verification having important interest to decrease the degradation generally related with face images obtained under uncontrolled environments condition. In this work they have initiate with a preprocessing step to handle in-plane face orientation and to reward for illumination variations. SURF function is taken into action afterwards, which adds up to this technique a specific degree of invariance to a pose, facial expression and other sources of the variation. Regarding SURF features such as input, an actual pairwise face matching function is offered. The results of matching saved in a same matrix, for analyzing afterwards. An experimental observation declared that introduced work process creates best ROC curve as compare to published work with respect to unsupervised setup of its Labeled Faces in that Wild (LFW) [19] face database.

This paper presents a novel approach to the face verification problem with state-of-the art performance. The proposed method is characterized by an initial preprocessing stage, the use of SURF features extracted from key-points on the face image and a new features comparison strategy, which is based on an existing similarity function Similarity is calculated between gray levels histograms of the key-points and weighted by the histograms intersections Tested with the LFW images database under the unsupervised protocol, our method performed better than other state of the art methods reported at the LFW website.

V. PROPOSED WORK

The proposed algorithm is given below

1. Read image
2. Take r be the radius
3. P be the number of neighbor in radius r integer value >=1
4. For each neighbor point calculate LBP
5. Eliminate redundant value of LBP
6. Now rotats image by angle θ
7. Calculate LBP(θ)
8. Now DetectFeature=∑LBP(φ) - Deformationparm
9. For DetectFeature >Ø;
   //neuralNetwork
10. Train BNN with DetectFeature
11. testFeatuer =Calculate DetectFeature for query image
12. Test testFeatuer to BNN
13. Compute accuracy of test result

Fig 1: Algorithm of proposed work

. Proposed work (Hybrid Method based on Neural Network and Histogram of Local Binary Pattern for Object Detection) is meant for identifying various objects in a particular image. This work is responsible to detection of objects. Algorithm for the proposed work is shown in fig 1.

VI. SIMULATION AND RESULTS

All the experiments were conducted on following configured PC. System is Dual-Core with 2.20 GHz speed along with 3 GB RAM. System is using windows 7 with 32 bit operating system.

Dataset is taken of FGVC-Aircraft Benchmark [20]. It is of 2.5 GB dataset of various plans on which experiments are performed.

We are comparing the results of the proposed work, Histogram of Local Binary Pattern Based Method for Object Detection, on the following 3 parameters:

- True Positive
- False Positive
- Accuracy

True Positive (TP): It is a number which is equivalent to the correct hits.

False Positive: It is a number which is equivalent to the Wrong Acceptance.

Accuracy: It is a measurement system is how close it gets to a quantity's actual (true) value.

Table I shows True Positive (TP) in base and proposed work.

TABLE I: True Positive

	Existing	Proposed
True Positive	260	828

Table II shows False Positive (FP) in base and proposed work.

TABLE II: False Positive

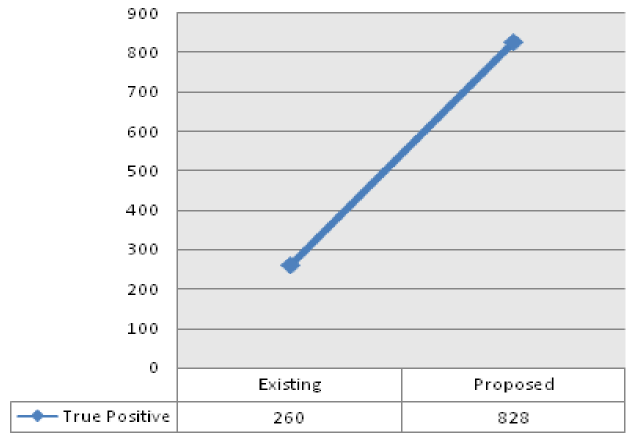
	Existing	Proposed
False Positive	7	2

Table III shows Accuracy

Table III: Accuracy

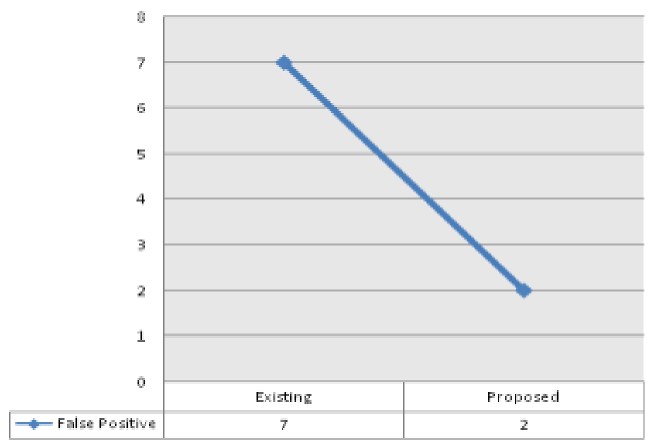
	Base Work	Proposed Work
Accuracy	0.97	0.997

Graph 1 shows the effectiveness of the proposed work on the parameter of True Positive (TP).



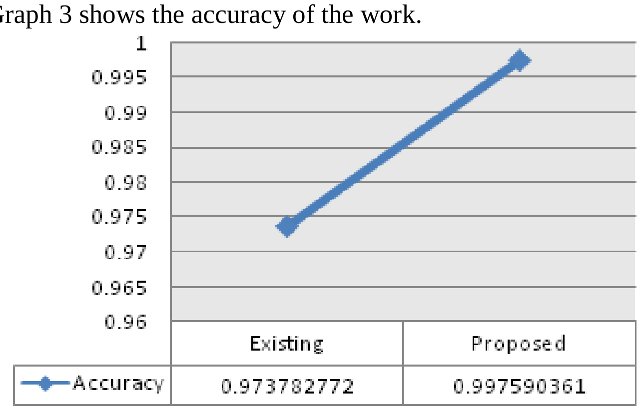
Graph 1: True Positive (TP)

Graph 2 shows the effectiveness of the proposed work on the parameter of False Positive(FP).



Graph 2: False Positive (FP)

Graph 3 shows the accuracy of the work.



Graph 3: Accuracy Compariso

VII. CONCLUSION

Proposed 'Hybrid Method based on Neural Network and Histogram of Local Binary Pattern for Object Detection' method is meant for the object detection. This work is based on calculation of Histogram of Local Binary Pattern for a range around a particular location. From the Table I, II and III AND Graph 1, 2 and 3, It is very much clear that the performance of the proposed work is better than the performance of the base work.

REFERENCES

[1] P. Arbelaez, M. Maire, C. Fowlkes, and J. Malik. Contour ´ detection and hierarchical image segmentation. TPAMI, 2011. 1, 2, 3, 4, 8, 10, 11

[2] D. Comaniciu and P. Meer. Mean shift: a robust approach toward feature space analysis. TPAMI, 24:603–619, 2002. 1, 3

[3] P. F. Felzenszwalb and D. P. Huttenlocher. Efficient GraphBased Image Segmentation. IJCV, 59:167–181, 2004. 1, 3, 4, 5, 7

[4] J. Shi and J. Malik. Normalized cuts and image segmentation. TPAMI, 22:888–905, 2000. 1

[5] Iasonas Kokkinos, and Petros Maragos (2009),"Synergy between Object Recognition and image segmentation using Expectation and Maximization Algorithm"., IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI), Vol. 31(8), pp. 1486-1501, 2009.

[6] Y.Ramadevi, B.Kalyani, T.Sridevi(2010), " Synergy between Object Recognition and Image Segmentation", International Journal on Computer Science and Engineering, Vol. 02, No. 08, 2010, 2767-2772.

[7] Rupali S.Rakibe, Bharati D.Patil, "Background Subtraction Algorithm Based Human Motion Detection",International Journal of Scientific and Research Publications, May 2013

[8] Abhishek Kumar Chauhan, Prashant Krishan, "Moving Object Tracking Using Gaussian Mixture Model And Optical Flow", International Journal of Advanced Research in Computer Science and Software Engineering, April 2013

[9] J.Joshan Athanesious, P.Suresh, "Systematic Survey on Object Tracking Methods in Video",International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) October 2012, 242-247.

[10] M.Sankari, C. Meena, "Estimation of Dynamic Background and Object Detection in Noisy Visual Surveillance", International Journal of Advanced Computer Science and Applications, 83

[11] Sen-Ching S. Cheung and Chandrika Kamath, "Robust techniques for background subtraction in urban traffic video".

[12] K.Srinivasan, K.Porkumaran, G.Sainarayanan, "Improved Background Subtraction Techniques For Security In Video Applications"

[13] D.G. Lowe. Object recognition from local scale-invariant features. In Proc. of the Int. Conf. on Computer Vision (ICCV), 1999.

[14] N. Gelfand, N. J. Mitra, L. J. Guibas, and H. Pottmann. Robust global registration. In Proc. of the third Eurographics symposium on Geometry processing, page 197, 2005.

[15] A. E. Johnson and M. Hebert. Using spin images for efficient object recognition in cluttered 3d scenes. IEEE Trans. Pattern Anal. Mach. Intell., 21(5):433–449, 1999.

[16] S. Ruiz-Correa, L. G. Shapiro, and M. Meila. A new signature-based method for efficient 3-d object recognition. In CVPR (1), pages 769– 776, 2001.

[17] R. Triebel, R. Schmidt, O. M. Mozos, and W. Burgard. Instancebased AMN classification for improved object recognition in 2D and 3D laser raneg data. In "Proc. of the International Joint Conference on Artificial Intelligence(IJCAI)", 2007.

[18] A. S. Mian, M. Bennamoun, and R. A. Owens. 3d recognition and segmentation of objects in cluttered scenes. In WACV-MOTION '05: Proceedings of the Seventh IEEE Workshops on Application of Computer Vision, pages 8–13, 2005.

[19] M. A. Fischler and R. C. Bolles. Random sample consensus: a paradigm for model fitting with applications to image analysis and automated cartography. Commun. ACM, 24(6):381–395, June 1981.

[20] http://www.robots.ox.ac.uk/~vgg/data/fgvc-aircraft/

[21] wanceng zhang, xian sun, kun fu, chenyuan wang and hongqi wang, "object detection in high-resolution remote sensing images using rotation invariant parts based model," ieee geoscience and remote sensing letters,2014.