Improving the Performance of Human Detection Technique using Cascaded Support Vector Machine

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ABSTRACT
Human detection plays an important role in security surveillance and computer vision. The process of human detection is very complex due to variant feature of human such as color, texture and shape and size. The process of feature extraction imparts a major role in human detection technique. Now a days used classification technique to define the feature of human. The classification process define the pattern of feature for the process of detection, the process of features generates a bag of feature for the process of classification technique. In this paper improved the support vector machine classification technique for the classification of human detection. The improved support vector machine is called cascaded support vector machine. The cascading of support vector machine improved the process of human detection. Our proposed algorithm implemented in MATLAB 7.8.0 software and used human video of different location. Our empirical evaluation of experimental result shows that the proposed methods give a better result in compression of support vector machine classifier.

Keywords
Human detection, feature extraction, SVM.

1. INTRODUCTION
The variant of human feature raised problem in the process of human detection. The variant of feature such as color, texture and shape changes according to motion of human body. All feature of human cannot find by a single method. Some authors used various feature extraction technique such as HOG, BOG and LBP. The all method play an individual role in feature extraction technique. The extraction of feature such as LBP is finding the feature in concern of region in process of extraction [1]. The extraction of feature combined the bag of feature set for the purpose of training. The process of training of feature depends on the process of classification technique. The process of classification technique provides the variable separable feature of trained pattern in classification process. Most of cases in human detection used support vector machine classifier. The support vector machine classifier is binary classifier, it classify data into two different regions. The different region separate the process of human feature and detection process are performed [5] .Detection technique algorithms are rapid, perform exhaustive search over the complete image at every scale, and are trained using large data set to achieve high detection rate and very low false positive rates.[2]Observed in experiments ,that Human of continuous view and posture variations form a manifold, which is difficult to be linearly classified from the Negatives. An algorithm that requires multi-view and multi-Posture humans to be correctly classified by a linear SVM in the training process often leads to over-fitting. Some non-linear classification methods such as Kernel SVMs [3] are options to handle this problem, but they are generally much more computationally expensive than linear methods. In addition, the use of the kernel trick in a very high-dimensional feature space, such as a 3780 dimensional HOG feature space, may magnify the curse of dimensionality [3]. In this paper Proposed improved technique for human detection based on Gaussian mixture model and cascaded support vector machine. In process of improved detection technique is proposed and we have used GMM technique. The Gaussian mixture model is kernel based detection, here kernel play a role of hyper plane. The size and efficiency of hyper plane decide the efficiency of detection. In detection process Linear discriminate analysis suffered two types of problem in region detection one is core point problem and another is outlier of feature point, in single class detection [6].A motion based descriptors are combined with histogram of oriented gradient appearance descriptors. The resulting descriptor is tested on several databases [4] In the process of video detection the lower content of visual feature such as color texture and dimensions. The feature extractor process extracts the feature of video database and store in the form of matrix. The processing of feature mapping convert into vector form for processing of fused property of classifier [9] Human or Nonhuman recognition: Image processing is done on captured frames and object is identified as human or non-human [10]. It is the process of feature selection based on CSVM. The optimizations of feature selection process is improved the detection rate of detection model.

2. LITERATURE SURVEY
In this section discuss the related work in the field of human Detection .in current scenario used some conventional and hybrid method of feature extraction. For the accurate classification and detection used machine learning algorithm such as KNN, support vector machine and hybrid classifier. Some work discuss here used in human detection.

1. In this paper, author proposed a piecewise linear support vector machine (PL-SVM) method to tackle human detection problem. Method of piecewise discriminative function can easily up-build a non-linear classification boundary. This non linear classification boundary differ multi view and multi posture human body image background in hi dimensional feature space. Basically PL-SVM training is contemplated to act like an iterative procedure of feature space and SVM training. Just like a piecewise SVM model is answer for a single sub space similarly multiple piecewise SVM model would be answer for multiple subspace [1].

2. This paper the feature selection is integrated by a new learing method with the help of classifier construction for human detection through solving 3 optimization model. Firstly series weak classifiers are trained by the method and it is done by proposed L1-Norm minimization learning and min-max penalty function models. Secondly the weak classifiers are selected by the method by using the integer optimization model for up built a strong classifier. The aim of L1-norm space minimization and integer optimization model is to find minimal VC-dimension for the purpose of weak and strong classifiers space respectively. Finally a

cascade of LML classifier is up-build by this method to reach higher detection rates and efficiency [5].

3. In order to facilitate and accelerate the parameter selection for SSND. Two algorithms are contemplated and evaluated. The first algorithm is an enhancement of the CS-SVM algorithm which regress the entire solution path in a single optimization. This way, the optimization of a separate model for each hyper parameter set is avoided. The second forces the solution to be coherent via the solution path, hereby offer classification boundaries which are nested (included in each other). Authors also present a low density criterion for selecting the optimal classification boundaries, hereby avoiding the recourse to cross-validation that generally requires in-formation about the "change" class [6].

4. Author introduces a method to accelerate the evaluation of object detection cascades with the help of a divide-and conquer procedure in the space of candidate regions. Compared to the exhaustive procedure that thus far is the state-of the- art for cascade evaluation, the proposed method needed some evaluations of the classifier functions, thus accelerate the search. Besides, author show how the recently developed efficient sub-window search (ESS) procedure can be integrated into the last stage of our method [7].

5. A new work is proposed by the author is known as nonlinear feature map which is both very efficient and highly expressive simultaneously. This method is completely rooted on discretization and interpolation of individual features values and feature pairs. Using this embedding is strictly more general than a linear model and as efficient as the second order polynomial explicit feature map. Some other methods are consistently out. Perform by our method including high range of kernels shown by an extensive empirical evaluation [8].

6. Author proposes a new training algorithm for SVM that efficiently performs annealing with an infinitesimal resolution. Technically, our algorithm can be regarded as a non-trivial extension of the parametric programming and it gives a path of local optimal solutions when the effect of unlabeled data is continuously increased. Interestingly, through the analysis of necessary and sufficient conditions for the local optimality of SVM, author find that the local solution path followed by the infinitesimal annealing steps is not continuous; a solution path actually contains a finite number of abrupt jumps. Our algorithm can exactly identify such jumps and trace the entire path of local optimal solutions [9].

7. Author show that one can build histogram intersection kernel SVMs (IKSVMs) with runtime complexity of the classifier logarithmic in the number of support vectors as opposed to linear for the standard approach. Author further shows that by pre-computing auxiliary table's author can construct an approximate classifier with constant runtime and space requirements, which is independent of the number of support vectors, with negligible loss in classification accuracy on various tasks [3].

8. Author introduces a new general framework for the recognition of complex visual scenes, which is motivated by biology: Author describe a hierarchical system that closely follows the organization of visual cortex and builds an increasingly complex and invariant feature representation by alternating between a template matching and a maximum pooling operation. Author demonstrate the strength of the approach on a range of recognition tasks: From invariant single object recognition in clutter to multiclass categorization problems and complex scene understanding tasks that rely on the recognition of both shape-based as well as texture-based objects. The system had to satisfy by given biological constraints that approached performs amazingly well: It has the ability to learn more from only a few training examples and competes with state-of-the-art systems [11].

9. Author presents a novel multi-level Mixture-of-Experts approach to combine information from multiple features and cues with the objective of improved pedestrian classification. On pose-level, shape cues based on Chamfer shape matching provide sample-dependent priors for a certain pedestrian view. On modality-level, author represents each data sample in terms of image intensity, (dense) depth and (dense) flow. On feature level, author considers histograms of oriented gradients (HOG) and local binary patterns (LBP). Multilayer perceptron's (MLP) and linear support vector machines are used as expert classifiers [12].

10. Author proposed a method is called a novel human detection approach which can handle partial barricade. There are two kinds of detectors exist, first one global detector for the purpose of whole scanning windows and second one is part detectors for the purpose of local regions, both are learned from the training data by using linear SVM. For each ambiguous scanning window, author constructs an occlusion likelihood map by using the response of each block of the HOG feature to the global detector [15]. The barricade likelihood map is segmented by Mean-shift approach. The segmented portion of the window with a majority of negative response is inferred as an occluded region [13].

3. HYBRID FUTURE EXTRACTION

Hybrid feature extraction is a combination of two different feature extraction of video processing. The combined feature extraction technique is block oriented (BO) and histogram oriented gradient (HOG) [14]. HOG features are used in the hybrid feature. The given video sample of 64 × 128 pixels is divided into cells of size 8 × 8pixels, each group of 2 × 2 cells is integrated into a block in a sliding fashion, and blocks overlap with each other. To extract HOG features, we firstly calculate the gradient orientations of the pixels in the cells. Then in each cell, we calculate a 9-dimensional histogram of gradient orientations as the features. Each block is represented by a 36-dimensional feature vector, which is normalized by dividing each feature bin with the vector module [15]. Each sample is represented by 105 blocks (420 cells), corresponding to a 3780-dimensional HOG feature vector. Block Orientation (BO) features derived from Haar-like features, as a complement to the HOG features for human detection. Each of the 420 cells is first divided into left-right and up-down sub-cells of video, and then the horizontal and vertical gradients of the cell are calculated by BO features are extracted on a whole cell, it is discriminative between stroke and region patterns and can depress local texture and noise. The HOG features are indistinctive, while the BO features can distinguish one from the other very well [15]. The combination of HOG and BO feature extraction process generates a feature matrix is called hybrid feature matrix. These hybrid feature matrix converted into vector matrix and process the feature of human data in classification process. The process of feature extraction is shown in figure1.

4. METHODOLOGY

In this section, we discuss human classification framework based on a two-stage ensemble classifier model comprised of support vector machine (SVM). The human features are

extracted from the human using preprocessing function. SVM acts as a classification mechanism that projects N-dimensional features from the preprocessing function into an M-dimensional feature space. The resulting vectors are fed into a SVM that categorizes them onto one of the relearned noise

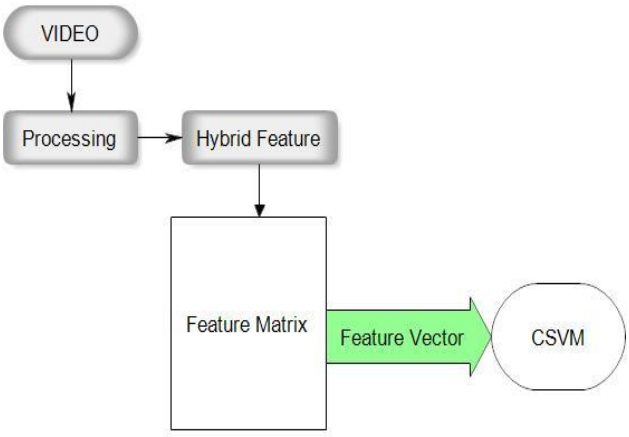

Figure 1. Process of feature extraction of video using hybrid feature extraction.

classes. The proposed scheme is a good example of how different neural network models can be cascaded to reduce the complexity of human detection. They mapped features from each frame of the word onto the SVM output to form a trajectory of winner vector for a given word. The SVM learns this trajectory for each detection scheme is comprised of a hierarchical organization of SVM and SVM. SVM receives inputs from the Wavelet transform function bank and maps onto an M-dimensional space where M is the dimensionality of the SVM output node distribution. The transformed feature vectors are fed into the SVM, which classifies them. We call the feature space generated from the Wavelet transform function output as primary feature space and M-dimensional feature space from SVM output as secondary feature space. The vectors from the secondary feature space are called secondary feature vectors. The concept behind the use of SVM as an intermediate stage is that it can perform and enhanced it. Topology preserving feature mapping from its input space to output space, and these mapped features, which are of reduced dimension, can represent the necessary information in the input features. Thus, the training and detection of the upper stage (SVM) can be done in a reduced dimension compared to the higher dimension of the primary feature space.

Steps of algorithm

1. Select video data set
2. Put value of hybrid feature and CSVM
3. Start training process of selected featured in video dataset
4. Generate process of bag-off feature
5. Generate frequent feature set
6. Compare the value of distance vector with classifier set
7. If value of HD greater than vector value
8. Processed for the classification
9. Human is detected.
10. Exit

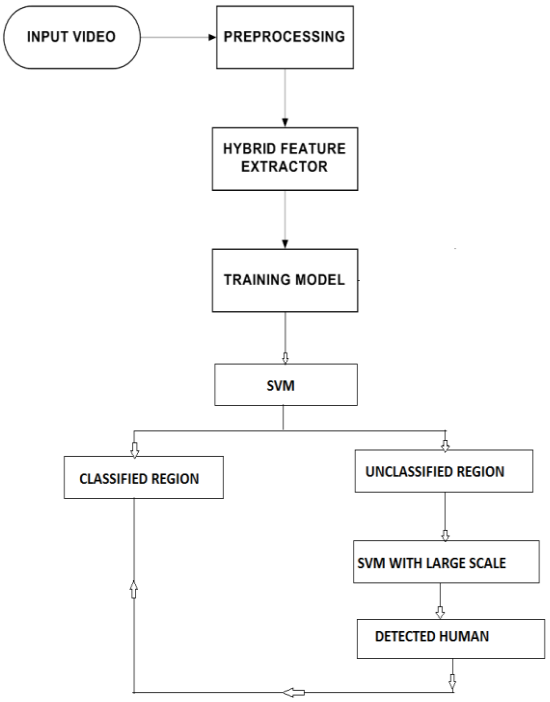

Figure 2. Block diagram of proposed methodology.

5. EXPERIMENTAL ANALYSIS

For the evaluation of performance of cascaded support vector machine and hybrid feature extraction used MATLAB 7.8.0 software. And collect some video from party. For the measurement of the performance measure false positive and false negative parameter.

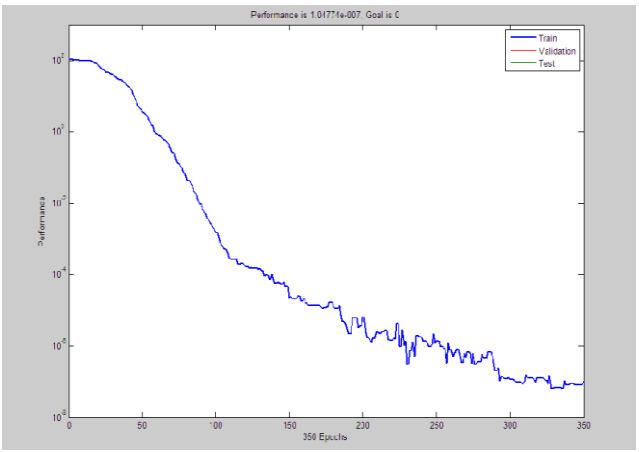

Figure 3. Training of CSVM with NEWRB.

Figure 4. Process of detection using hybrid feature and cascaded technique.

Table 1. Performance evaluation table 1 for basket ball player using PL-SVM and CSVM methods.

Method	Detection Rate	False positive	False negative
PL-SVM	89.8148	5.4969	.0084804
CSVM	94.8148	4.4968	.0076804

Comparative result graph of basket ball player for PL-SVM and CSVM

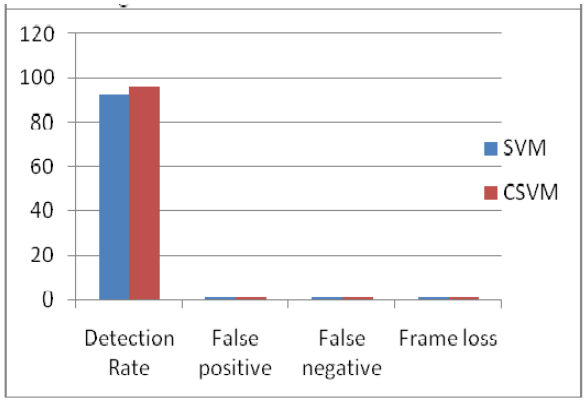

Figure 5: Shows the comparative result graph for basket ball player using PL- SVM and CSVM methods and find the value of detection rate, false positive, false negative.

6. CONCLUSION

In this paper proposed a cascaded support vector machine classifier for human detection. The detection of human faced a problem of feature extraction and pattern classification. For the extraction of feature used hybrid feature extraction technique. The hybrid feature extraction technique compromised with HOG and BO feature method. The analysis of feature pattern used cascaded support vector machine classifier. The cascaded support vector machine classifier reduces the value of false positive and false negative value. Also reduces the frame loss value using hybrid feature extraction process. In future used feature optimization process for the reduction of false positive value.

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