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MULTIPLE FACE DETECTION AND RECOGNITION USING KERNEL PROTOTYPE

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Abstract

Multiple face detection and recognition is an important topic in the field of computer vision. It has been widely used for practical and real-time applications in many areas such as digital media (cell phone, smart phone, and digital camera), intelligent user interfaces, intelligent visual surveillance, and interactive games. In this paper proposed a Face detection as a initial process of automatic system in human face and face detect depend on the scenario as a controlled environment, color image. Later Face counting is based on multiple Texel camera measurements. Finally Face recognition system is applied from face detection, feature extraction phases can run simultaneously to recognize the face. Proposed system is more effective in detecting the face with more accuracy than the traditional system.

Keyword: Face Detection, Face count and Face recognition.

1. INTRODUCTION

Face detection is determining face in image and parts of face in image. Multi-face detection plays an important role in the intelligent surveillance. Multi-face detection technology has extensive application prospects of video monitoring system, access control, video conferencing, human-computer interaction and so on. Many of the techniques are proposed for multi-face detection,which can be divided generally into two categories: methods based on external structure features and methods based on interior statistical features. Structure-based methods use predefined rules to determine faces based on the common knowledge such as skin color and facial structure.

Kernels functions have become a powerful tool in Machine Learning A kernel function can be viewed as allowing one to implicitly map data into a high-dimensional space and to perform certain operations there without paying a high price computationally. Face recognition appears to offer several advantages over other biometric methods, a few of which are outlined here: Almost all these technologies require some voluntary action by the user, i.e., the user needs to place his hand on a hand-rest for fingerprinting or hand geometry detection and has to stand in a fixed position in front of a camera for iris or retina identification. Only this small set of features is used to classify the image result in a fast face recognition technique.

Heterogeneous face recognition (HFR) involves matching two face images from alternate imaging modalities, such as an infrared image to a photograph or a sketch to a photograph. Charged with the task of outputting a measure of similarity between a given pair of face images, such challenges manifest performed by most face recognition is face detection, face counting and face recognition. Detection and identification of human faces have been largely addressed mainly focussing on 2D still images. To represent face images using given databases. The matching of image can be done using a Kernel Prototype.Face recognition has been one of the most interesting and important research fields in the past two decades. The reasons come from the need of automatic recognition and surveillance systems, the interest in human visual system on face recognition, and the design of human-computer interface, etc.

2. PROPOSED SYSTEM

2.1 Architecture Diagram

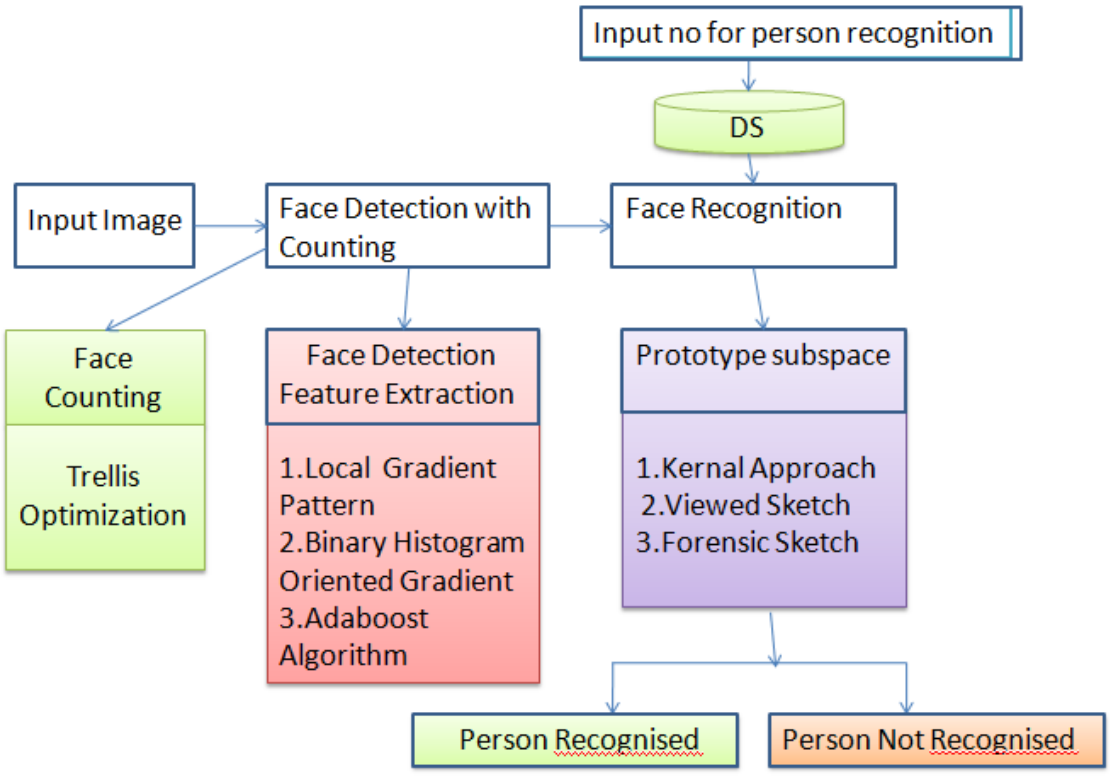


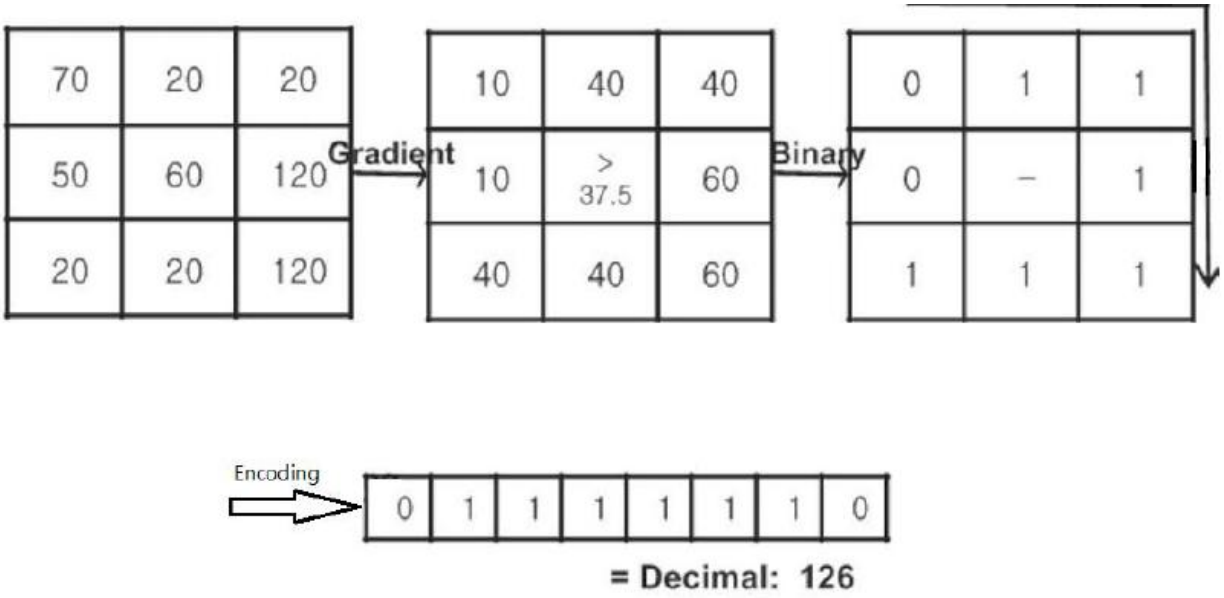
Fig:1- Proposed kernel prototype for face detection and recognition

2.1 Local Gradient Pattern:

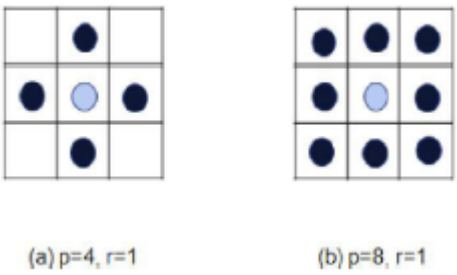
LGP is used for one of the face detection techniques. In which each bit of the LGP is assigned the value one if the neighboring gradient of a given pixel is greater than the average of eight neighboring gradients, and 0 otherwise. LGP representation is insensitive to global intensity variations like the other representations such as local binary patterns (LBP), and to local intensity variations along the edge components. It's always reducing the false positive edge detection.

This sensitivity generates many different patterns of local intensity variations and makes the training of face and human detection by AdaBoost difficult. LGP generates constant patterns irrespective of local intensity variations along edges.

Local Gradient Patterns



The LGP operator can be extended to use different-sized neighborhoods.



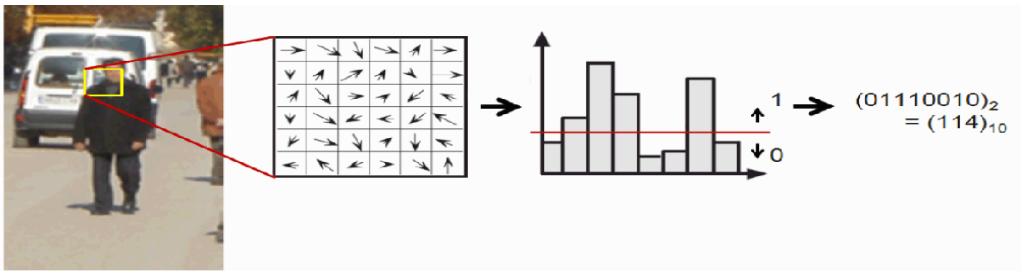
2.2 Binary Histogram of oriented gradients

BHOG are feature descriptors used in computer vision and image processing for the purpose of object detection. The technique counts occurrences of gradient orientation in localized portions of an image. This method is similar to that of edge orientation histograms, and shape contexts and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy.

While the HOG feature represents each block using a 256 bit vector (8 bins 32 bits), the BHOG feature represents each block using the 8 bits, which makes the processing time efficient.

$$BHOG = \sum_{n=0}^{7} s(HOG(n) - Th)2^n,$$

$$s(x) = \begin{cases} 1, & \text{if } x > 0, \\ 0, & \text{otherwise.} \end{cases}$$



2.3 Adaboost Algorithm

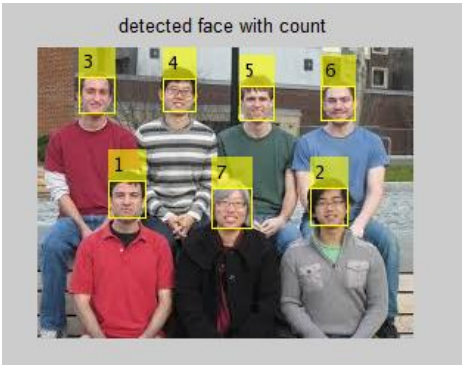
AdaBoost AdaBoost (short for Adaptive Boosting) is a machine learning algorithm formulated by Freund and Schapire that learns a strong classifier by combining an ensemble of weak (moderately accurate) classifiers with weights. The discrete AdaBoost algorithm was originally developed for classification using the exponential loss function and is an instance within the boosting family.

After AdaBoost training, we obtain a strong classifier H(C), where C includes LBP, LGP, and BHOG feature images.

$$H(\mathbf{C}) = \sum_{\mathbf{x} \in S_T^{LBP}} h_{\mathbf{x}}(\mathbf{L}(\mathbf{x})) + \sum_{\mathbf{x} \in S_T^{LGP}} h_{\mathbf{x}}(\mathbf{G}(\mathbf{x})) + \sum_{\mathbf{x} \in S_T^{BHOG}} h_{\mathbf{x}}(\mathbf{B}(\mathbf{IH}(\mathbf{x}))),$$

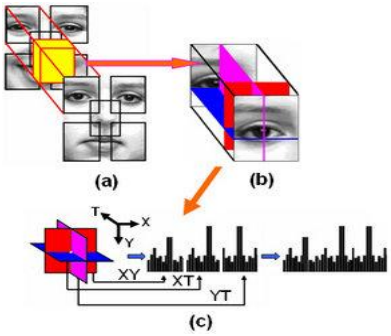
2.4 Trellis Optimization algorithm:

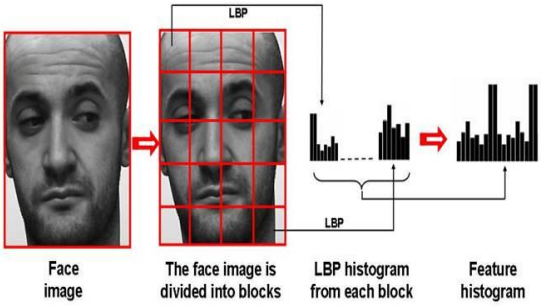
A trellis optimization algorithm is used for sequence estimation, based on multiple Texel camera measurements. Since the number of states in the trellis exponentially grows with the number of persons currently on the camera locations.



2.5 Local Binary Pattern

LBP is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis.





2.6 Support Vector Machine

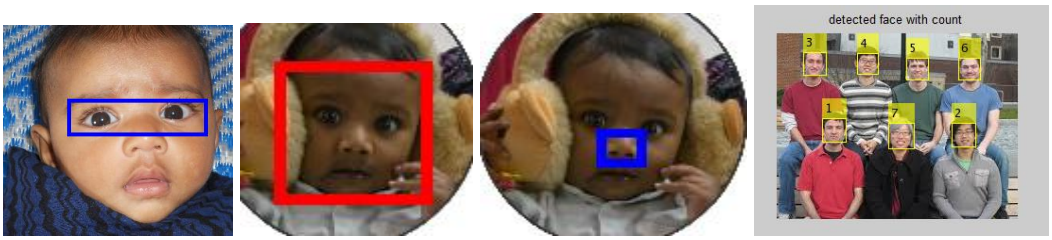
The final step in object recognition using Histogram of Oriented Gradient descriptors is to feed the descriptors into some recognition system based on supervised learning. The Support Vector Machine classifier is a binary classifier which looks for an optimal hyper plane as a decision function. Once trained on images containing some particular object, the SVM classifier can make decisions regarding the presence of an object, such as a human being, in additional test images.

2.7 Heterogeneous Face Recognition

Prototype random subspaces are used for heterogeneous face recognition. PRs are used for matching similarities for image. The random subspace method (RSM) is one way to create an ensemble that is particularly geared at small sample size, high-dimensional data. Each classifier is built on a lower dimensional subspace of the original, high-dimensional feature space. This strategy addresses both aspects of a successful accurate and diverse classifiers.Subsamping the feature space reduces the dimensionality for the individual base classifiers, therefore allowing for more accurate classifiers. Resampling of features introduces diversity, i.e. decor relates the classifier decisions, which improves the performance of the overall ensemble.

3. EXPERIMENTAL RESULTS

In this paper we mainly focused on multiple face detection using Adaboost algorithm. Proposed methodology has been implemented in Mat lab 2013a and obtained good results.



4. CONCLUSION

It is learning tool, acquire knowledge through data mining of various images available in the database and have hashing techniques for retrieval and process. Successful tool will enable the stakeholders to identify the correct person on demand. The Effectiveness of the results depends upon on the image quality and characters.

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