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FACE RECOGNITION USING UNSUPERVISED IMAGES THROUGH DISCRETIONARY BASED SECURITY

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Abstract: Security is an important aspect in all environments. It is related to safety. Safety is one of the elements that complete one's requirement which leads to self-actualization. In this paper complete image face recognition algorithm is proposed for various kinds of faces. The study of face recognition falls into three methods such as face normalization, feature extraction and face matching. Discrete Cosine Transform (DCT) is a well-known feature extraction method which extracts features in the field of face recognition capabilities. The face matching classification for the proposed system is done using distance measure methods like Minkowski Distance method. The proposed method has been successfully tested on SVM based classified image database which is acquired under variable illumination and facial expressions. It is observed from the results that usage of face matching gives a recognition rate which is high while comparing other methods. We are proposing the discretionary based security on face recognition system which is using DCT. This paper discusses security systems that apply traditional access controls by usage of passwords or other methods apply various techniques in biometrics. Discretionary based security is seen to be the future of face recognition and access control systems.

Keywords: Access Control, DCT, Discretionary, face recognition, Security, SVM, Unsupervised.

1. Introduction

Security is an important feature in all environments. Security relates to protection. Safety is one of the elements that completes one's requirement for a meaningful live that leads to self-actualization [1, 2, 3, 4]. Further, every human being has both sets of forces which one set fit tightly to safety and defensiveness out of fear that causes him to regress backward, hanging on the past, and afraid of independence, freedom, and separateness. The other set of force, "compels him forward toward wholeness of self and uniqueness, towards full functioning of all his capacities, toward confidence in the force of external world at the same time that he can accept his deepest, real, unconscious Self." Moreover, the basic dilemma or conflict between the defensive forces and the growth trends is existential, fixed in the deepest nature of human being. In addition, safety has both anxiety and delights, as well as growth has both anxieties and delights. Human would grow forward when the delights of growth and anxieties of safety are greater than the anxieties of growth and delights of safety are considered [1].

Face recognition is a renowned image processing techniques for bio-metric based security system and humans often use faces to recognize individuals and improvement in computing capability over the past few decades now enable similar recognitions automatically. Early face recognition algorithms used simple geometric models, but the recognition process has now complete into a science of sophisticated mathematical representations and matching processes. Major advancements and initiatives in the past ten to fifteen years have driven face recognition technology into the focus. Face recognition can be used for both verification and identification.

In this paper we introduced a new method for classification of Discretionary security based

access input image to database image based on Face Recognition system in section2. Section 3 deals with the mathematical definition of the Support vector machine and discrete cosine transform. The basics of face recognition system using Discretionary security based access control that includes the details of proposed algorithm are discussed in section 4. The experimental results of the proposed system are using highlighted in section 5.The conclusion and future perceptive are mentioned in section 6.

2. Database Security Scheme

Database security is a vital issue in database management because of the sensitivity and importance of data and information of an organization. The data stored in a database management system is often essential to the business safeties of the organization and is regarded as a corporate asset. Thus, a database represents a crucial resource of an organization that should be properly secured. The database environment is becoming more and more complex with the growing popularity and use of distributed databases has become more open through the Internets and corporate intranets. As a result, managing database security effectively has also become more difficult and time consuming. Therefore, it is important for the data base administrator to develop overall policies, procedures and appropriate controls to protect the databases.

Discretionary access control also called security scheme is based on the concept of access rights also called privileges and mechanism for giving users such privileges. It grants the privileges access rights to users on different objects including the capability to access specific data files, records in a specific mode such as, read, insert, update and delete or combination of these. A user who creates database object such as a table or view automatically gets all applicable privileges on that object. The data base management system keeps tracks of how these privileges are granted to other users. Discretionary security schemes are very flexible.

3. Support vector Machine

Initially, Support Vector Machine is based on the Structural Risk Minimization principle for which error-bound analysis has been theoretically motivated, Isabelle Moulinier et al., 1997 [7], Simon Tong and Daphne Koller [2001] [13] are considered. Support vector machines have met with significant success in numerous real-world learning tasks. However, like most machine learning algorithms, they are generally applied using a randomly selected training set classified in advance, authors are Inderjit S. Dhillon, Subramanyam Mallela, Rahul Kumar,[2002] [8] are discussed. This method is defined over a vector space in which the problem is to find a decision surface that “best” separates the data vectors into two classes discussed by Isabelle Moulinier et al., 1997 [7]. Pang-Ning Tan, Micheal Steinbach and Vipin Kumar (2006) are introduced the simplest linear form, an SVM is a hyper-plane that separates a set of positive from a set of negative with maximum margin[13].

The illustration of hyper-planes that separate the training data by a maximal margin. All vectors lying on one side of the hyper-plane are labeled as .1, and all vectors lying on the other side are labeled as 1. The training instances that lie closest to the hyper-plane are called support vectors [10].

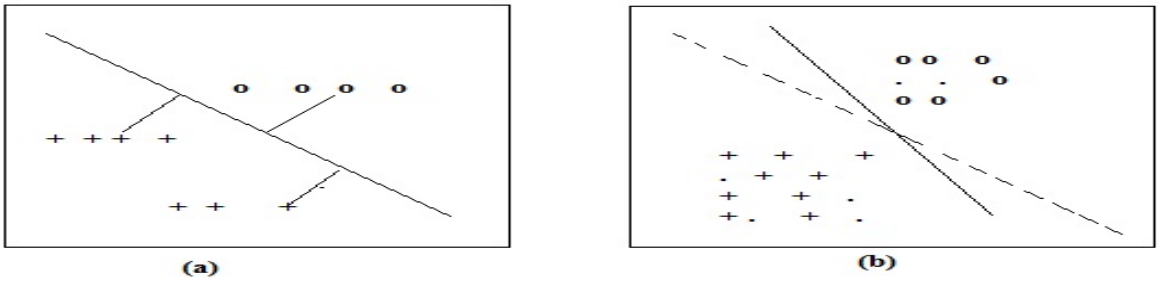

Figure 3: (a) A simple linear support vector machine (b) A SVM (dotted line) and Transductive SVM (solid line). Solid circles represent unlabeled instances.

The formula for the output of a linear SVM is **U = W.X** **(3.0)**

Where w is the normal vector is also called Database to the hyper-plane, and *x* is the input vector is known as Input Data. In the linear case, the margin is defined by the distance of the hyper-plane to the nearest of the positive and negative.

The hyper-plane can be found in the database images (and this is referred to as linear SVMs) or it can be found in a higher-dimensional space by transforming the images into a representation having more dimensions (input variables) than the whole database in data images (referred to as nonlinear SVMs). Mapping the image data, in this way, into a higher dimensional space, and then reducing the problem to a linear problem, provides a simple solution.

An advantage of the method is that the modeling only deals with these support vectors, rather than the whole training dataset, and so the size of the training set is not usually an issue. A disadvantage is that the algorithm is sensitive to the choice of parameter settings, making it harder to use.

3.1. Discrete Cosine Transform

Discrete cosine transform (DCT) has been used as a feature extraction step in various studies on face recognition [9, 11, 12, 14, 15 and 18]. Until now, discrete cosine transforms have been performed either in a holistic appearance-based sense [6], or in a local appearance-based sense ignoring the spatial information to some extent during the classification step by feeding some kind of neural networks with local DCT coefficients or by modelling them with some kind of statistical tools [,9,11,12,14,15 and 18].

Ahmed, Natarajan, and Rao (1974) first introduced the discrete cosine transform (DCT) in the early seventies. Ever since, the DCT has grown in popularity, and several variants have been proposed (Rao and Yip, 1990) [12]. In particular, the DCT was categorized by Wang (1984) [17] into four slightly different transformations named DCT-I, DCT-II, DCT-III, and DCT-IV. Of the four classes we concern with DCT-II suggested by Wang, in this paper.

$$y(k,1) = w(k)\sum_{n=1}^{N} x(n)\cos\frac{\pi(2n-1)(k-1)}{2N}, k = 1,\dots,N \quad \textbf{(3.1.1)}$$

Where

$$w(k) = \begin{cases} \frac{1}{\sqrt{N}}, & k = 1 \\ \frac{\sqrt{2}}{N}, & 2 \le k \le N \end{cases} \quad \textbf{(3.1.2)}$$

N is the length of x; x and y of the same size. If x is a matrix, DCT transforms its columns. The series is indexed from n = 1 and k = 1 instead of the usual n = 0 and k = 0 because vectors run from 1 to N instead of 0 to N-1.Using the formulae **(3.1.1) and (3.1.2)** we find the feature vectors of an input sequence using discrete cosine transform.

4. The Basic algorithm for Face Recognition System using Discretionary Access control

The basic algorithm for face recognition System contains discretionary access control and Mathew Turk and Alex Pentland [16] expanded the idea of face recognition which involves face normalization, feature extraction and face matching. It can be seen in the flow chart diagram in figure 4.1 that the system receives input image from the authorized user from the list of authorized users in the database in the discretionary access control based face recognition system unlike the other face recognition systems. Initially, we get the input image of the authorized user in the local database. Here support vector machine find out the required database image for the input image with the help of hyper-plane which separates the database images closer to the input image and finally the required database image for the input image is transferred to the local database. The input image of size N x N is compared with the size of database image, if the input image and database image are not equal, is to be resized the image. While implementing an image processing solution, the selection of suitable illumination is a crucial element in determining the quality of the captured images and can have a huge effect on the subsequent evaluation of the image.

Once a normalized face obtained, it can be compared with other faces, under the same nominal size, orientation, position, and illumination conditions. This comparison is based on features extracted using DCT. The input images are divided into *N x N* blocks to define the local regions of processing. The *N x N* two-dimensional Discrete Cosine Transform (DCT) is used to transform the data into the frequency domain. Thereafter, statistical operators that calculate various functions of spatial frequency in the block are used to produce a block-level DCT coefficient.

To recognize a particular input image or face, the system compares this image feature vector to the feature vector of database faces using a nearest neighbor classifier [5] (Duda and Fart, 1973). After obtaining the Distances for N x N Matrix one needs to find the averages of the each column of the matrix, and then find the average of all these averages, if the overall average is negative we may say there is a match between the input image and database image.

5. Experimental Results

The DCT and distance measure techniques applied in face recognition system those are experimented under standard execution environment by considering the synthesized data of the students of Sri Vasista Educational Society. The phenomenal growths of Face Database images are observed.

The graph clearly shows the performance of various Face Databases to find the Recognition Rate is shown clearly.

S. No.	Face Database	Recognition Rate (%)
1.	100	96.54
2	200	92.65
3	300	92.76
4.	400	93.67
5.	500	89.34
6.	600	87.45
7.	700	87.66
8.	800	85.67
9.	900	86.45
10.	1000	88.67

Figure 5.1: Tabular representation of Recognition Rate on Face Databases

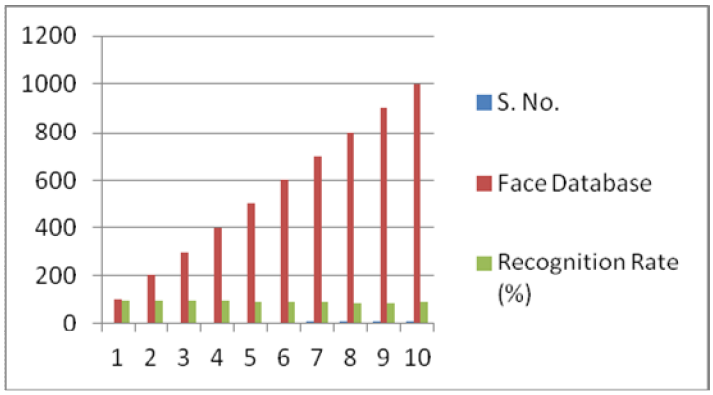

Figure 5.1: Bar Diagram representation of Recognition Rate on Face Databases

6. Future perspective and Conclusion

In this system we are providing security for the database images from the unauthorized users. Then the secured images are processed for further face recognition mechanism which includes resizing of unsupervised images, normalizing, feature extraction and finally face matching. This system is applicable in the highly secured and scalable environments. As per the experiment results the face matching rate for the different sets of unsupervised input images to that of unsupervised database images slightly different. To avoid this problem high performance computing systems like cloud computing can be used to get high recognition rates is possible.

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