

# LIP RECOGNITION FOR PERSON AUTHENTICATION

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**Abstract - Biometric is one of the challenging methods used for human recognition. Existing method is face detection by Viola & Jone's algorithm and lip detection by support vector machine classifier. Viola and Jone's algorithm employs detection is very fast and training are very slow. To get the training fast, Support Vector Machine Classifier is used for face detection. In the proposed method, both face and lip recognition is done by using Support Vector Machine (SVM) Classifier. Finally, Hidden Markov Model (HMM) is used to training and testing the images in the database and produces the result for matched person. The system is implemented in MATLAB.**

**Index Terms – Face recognition, lip detection, HMM and SVM.**

## I INTRODUCTION

The word “biometrics” came from Greek and we can divide it into two roots: “bio” means life and “metrics” – to measure. Biometric is life measurement which means unique physiological characteristics to describe an individual. Biometric is one of the automated recognition of persons based on their biological or/and behavioral characteristics. Automated measurement of biological or/and behavioral characteristics of person for medical, security or psychological purposes. Comparing one to one is verification/verify. Comparing one to many is verification. Problem with traditional approach is forgetting the password/pin number. To overcome this problem, biometric is developed, we don't need to remember the password/pin number all the time, and our body itself act as password. Before biometric, people identification are done with their scar, colour etc., now the current biometric plays with face, lip etc.,

This is the major advantage of doing recognition process in biometrics. Biometric is high in security level compared with traditional approach.

Authentication of identity of the user can be done in 3 three ways: 1) something that person knows (password), 2) something the person has (key, special card), 3) something the person is (fingerprints, footprint).

Biometric is related to something the person is. Biometric has different desirable properties are Universality, Uniqueness, Permanence, Measurability, Performance, Acceptability, and Circumvention. Methods of biometric authentication differ according their degree of safeness: Face recognition, Lip Recognition, DNA, Iris recognition, Fingerprint, Finger Vein, Voice, Typing Rhythm and Hand recognition. Nowadays biometrics is widely used in identification and recognition applications.

## II RELATED WORK

In [1], Lip recognition is investigated by using two methods, face detection and lip detection. Face detection by viola and jone's algorithm and lip detection by SVM classifier. Lip as a biometric has been investigated. In [2], it presents a feature extraction method that bases on quadratic interpolation method of inner lip contours and images were converted into colour space to chromatic space which is used to decrease the teeth effects. In [3], acoustic and visual modalities are important for speech recognition. It presents a new hybrid approach too deals with lip localization and tracking. In [4], to overcome the aforementioned lighting problems, other methods with the iterative strategy, which only rely on the characteristic of contour, are proposed. They improved the active contour model to detect the lip contour. In [5], this paper presents the face recognition with respect to robustness again pose changes, after extracting the facial feature and combining with SVM. Component system produces the best result among all other techniques. In [6], it is static and unscalable once it is trained. Accuracy rate is highly achieved in this paper. We can add the image to database dynamically. In [7], Hidden Markov Model for image, it is used to training and testing the database image and

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produce the matched person result. HMM outperforms the data when compared to GMM and neural network.

### III SYSTEM ANALYSIS

#### A) EXISTING METHOD

Impact of the lip for identity recognition is investigated. Biometric is one of the emerging methods used for human identification. Lip biometric is used for human identification since the lip is unique.

**Fig. 1** shows that block diagram of lip detection. After we getting the original image, two processes are required to get the lip detection.

First Processes is face detection .Face detection is done by powerful method called viola &jone’s algorithm. It is employed for object detection and then it got good performance when applied to face detection. This algorithm detects only facial feature and ignores other thing such as trees, buildings etc.

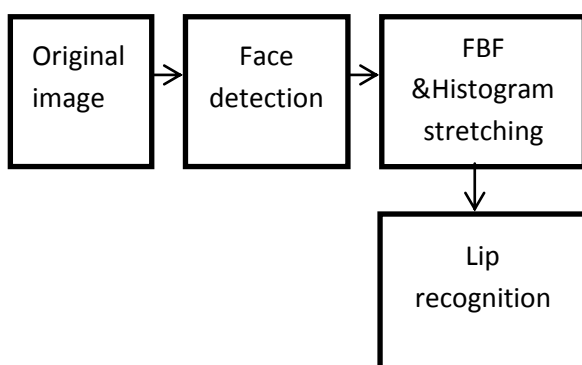
#### Algorithm

Many numbers of algorithms are used for face detection. Still viola &jone’s algorithm is reliable to use. Drawback of using the algorithm is training is slow and low accuracy.

Three steps are used in this algorithm. They are

- 1) Feature evaluation/ extraction
- 2) Feature selection
- 3) Cascade classifier

First contribution is new image representation called integral image which allows the features used by our detector to be computed very quickly



**Fig. 1** Block Diagram of lip detection

Second contribution is a simple and efficient classifier which is built using the AdaBoost learning algorithm

Third contribution is cascade classifier which allows background region of the image quickly discarded.

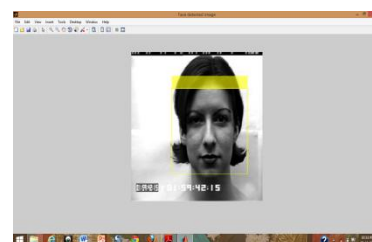
After detect the face from original image, next process is fast box filtering and histogram stretching. It removes the noise from the image. Contrast is enhanced and produces smoothening result. Based upon the intensity value, morphological operation is used. Morphological is nothing but it is used to extract the lip portion.

After we extracting the lip portion, lip is recognized by using Support Vector Machine Classifier. Lip biometric has been investigated

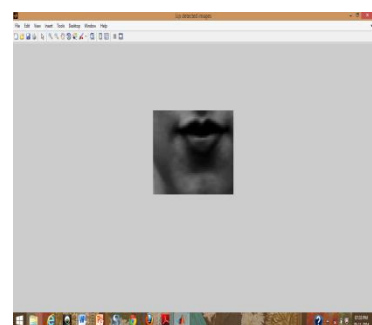
#### RESULTS



**Fig. 2** Database Image



**Fig. 3** Face Detected Image



**Fig. 4** Lip Detected image

#### B) PROPOSED METHOD

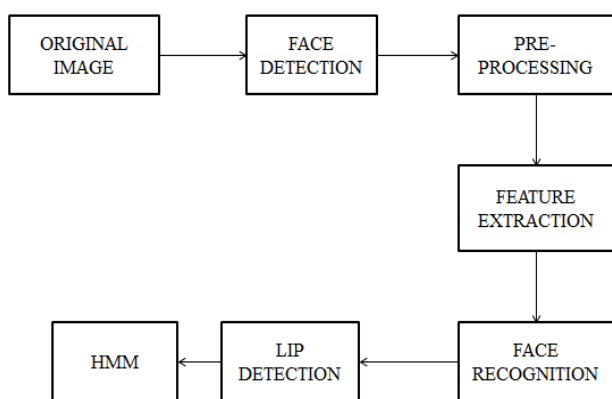
In existing method, training is slow and accuracy is low. To overcome, SVM is used for face detection.

Though people are good at face identification, recognizing human face automatically by computer is very difficult.

Face recognising has been applied in security system, credit card verification and criminal identification, teleconference and so on. Face

recognition is influenced by many complications such as the directions of imaging and variety of posture, size and angle. While by using SVM for face detection, it do support for variety of posture, size and angle. Even to the sample people, the images taken in different surroundings may be unlike.

Facial feature extraction has become an important issue in automatic recognition of human face. Detecting the basic feature as eyes, nose and mouth exactly is necessary for most face recognition methods. We can tell the characteristics of the organ easily by locating the feature points from a face image. Mouth has almost the same importance as eyes for face recognition. Comparing to all the feature from the face, mouth is unique characteristics for verification.



**Fig. 5** Block Diagram of Face and Lip detection

**Fig. 5** shows the Block diagram of face and lip detection.

After we getting the original image, next step is face recognition.

Face recognition has three modules:

- 1) Face detection,
- 2) Pre-processing and
- 3) Feature Extraction.

Face detection, it detects only facial feature and ignores other thing such as tree, building etc. It is responsible for segmentation of face.

Pre- Processing, it adjusting the size and colour of the image. Noise could be removed.

Feature Extraction, Extraction of the feature from the face region.It provides a feasible way to locate the positions of two eyeballs, near and far corners of eyes, midpoint of nostrils and mouth corners from face image. It improves the accuracy of face recognition.

Face Recognition is for verification and recognition purpose. It achieves good accuracy by using Support Vector Machine classifier.

Finally, Lip is detected by using SVM. SVM has nowadays been widely used in solving the classification problem of face recognition for a very simple reason.

More effective feature extraction module to reduce the influence of illumination, position, orientation, scale and expression. More effective classification method to enhance the quality of end results of a face recognition system. Algorithms proposed, NN(Neural Network), GA(Genetic Algorithm), HMM(Hidden Markov Model) and SVM (Support Vector Machine). SVM is a supervised learning method. Accuracy rate is increased by using SVM.

**TABLE 1** Viola &Jone’s Vs. SVM

VIOLA & JONE’S ALGORITHM	SUPPORT VECTOR MACHINE CLASSIFER
Training is very slow	Training is fast
Dynamic and Scalable	Static and Unscalable
Less Accuracy	Good Accuracy
It cannot support for variety of posture, size and angle	It supports for all the type of posture, size and angle
Used for object detection and face detection	SVM’s are useful for medical science, Object detection and face detection

After the processes of lip detection, HMM is used for training and testing the images.

Training is the first step, which is trained all the images in the database. In the database, I collected the two images for same person with the different posture.

Testing is the second process, once I testing the one image of a person from the database, after recognizing the face and lip and it could have matched with the person from the database.

## RESULTS



**Fig. 6** Input image

face detection



Fig. 7 Face detection

mouth



Fig. 8 Lip Detection

#### HMM RESULTS

Test Image



Fig. 9 Test Image

face detection



Fig. 10 Face detection

mouth



Fig. 11 Lip detection

Matched Person



Fig. 12 Matched person

#### IV CONCLUSION

Both face and lip detection is done by using SVM. HMM is used for training and testing the image. It gives double security of using HMM than the GMM. It achieves good accuracy and training speed is fast compared to viola and jone's algorithm.

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