Lip Movement Feature Detection and Classification Methods

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ABSTRACT

Computerized lip reading has been one of the most actively researched areas of computer vision in recent past because of its crime fighting potential and invariance to acoustic environment. However, several factors like fast speech, bad pronunciation, and poor illumination, movement of face, moustaches and beards make lip reading difficult. In present work, we propose a solution for automatic lip contour tracking and recognizing numbers 1-10 of English language spoken by speakers using the information available from lip movements. In this method first, we are detecting Face then in that ROI Lip detection. Lip movements as the only input and without using any speech recognition system in parallel. The approach used in this work is found to significantly solve the purpose of lip reading when size of database is small. In this paper also compare LBP and HOG feature with Support Vector Machine Classification. The system is use for the modern sign in PASSWORD systems.

Keywords: Lip detection, Lip Movement, Contour Tracking, LBP, HOG, SVM

I. INTRODUCTION

Due to rapid growth in the field of design and technology improvement it is impossible to detect any problem. Thus, a computer connected with internet cannot be considered to be secured. Now the exploration is how to access different types of account and manage all of them at once. There are so many intruders now so managing your accounts with security is major problem. In all the accounts on internet, security begins with the authentication process. Authentication generally involves one or more basic factors. In any of the methods, key elements like passwords can be hacked and misused. So here we propose an algorithm to secure the user's information using Lip Based Password. User wants to avoid the unauthorized access and protect the accounts. Firstly, User needs to register with specified information and train lip for security purpose. In first part Face detection will be done using viola jones algorithm [5] then ROI mouth Detected using LBP and HOG. Lip time interval moment will be capture and its feature will save in database. When user login to they can perform Lip, recognition is performing for same account he/she wants to use.

It is possible to understand the speech even in the absence of an acoustic signal using a machine. It is a type of electronic lip reading. The systems which performs such recognition, aid the people who are unable to produce the sound phonation needed for audible speech. Such systems can be used to identify

speech under noisy environments or when privacy is required in a public place. Are some methods developed earlier for Silent Speech Interface? One of the methods used ultrasound and optical camera to detect tongue and lip movements [1]. Another technique used electromagnetic device for tracking tongue and lip movements [2]. Electromyography of speech articulated muscles and the larynx can also be used for SSI [3], [4]. But these methods are expensive, invasive and cause discomfort to the users.
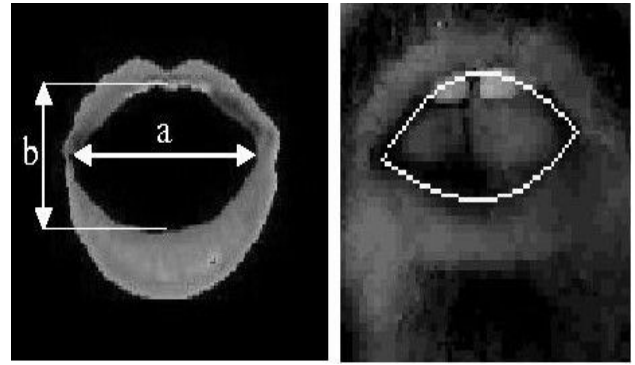
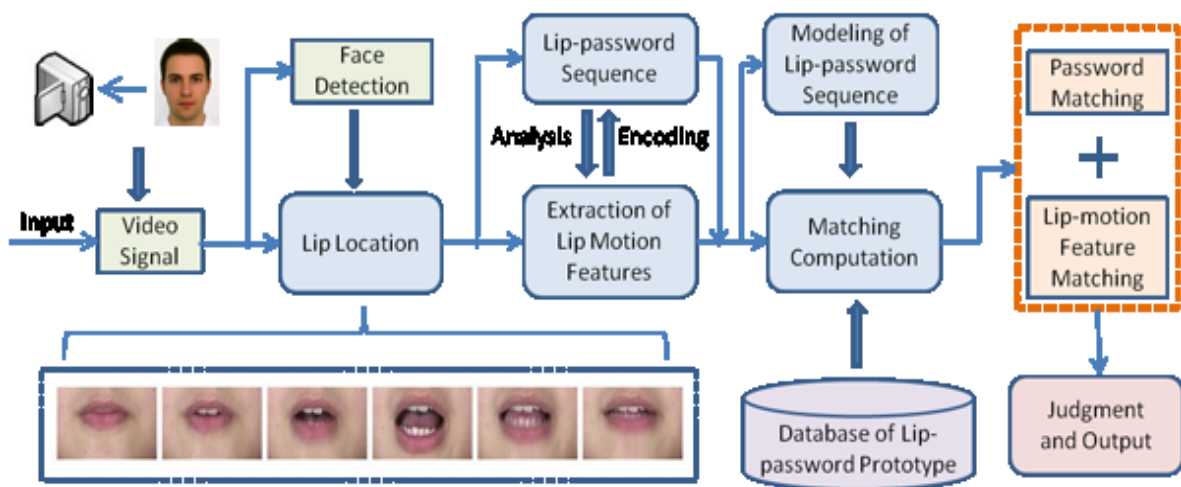

Figure 1: Lip Contour

II. SYSTEM WORKING FLOW

Figure 2: System Block Diagram

System Input: Real Time Camera Capture.

Output: Display Lip Identification Result.

Implementation of Algorithm for Problem Description: Tracking & Identification of Person.

Step 1: Start

Step 2: Real-time Camera Capture.

Step 3: Converted into frames.

Step 4: Applying Contrast Enhancement and Histogram Equalization.

Step 5: Face Detection using Viola Jones Algorithm.

A. Feature Extraction

Feature Extraction is important stage for the Lip Movement Classification system. Here In this paper two basic methods are described one is Histogram of

Step 6: Crop the Lip Region of Interest (ROI).

Step 7: Extract Histogram Oriented Gradient (HOG) Features.

Step 8: Match the Feature from database and Classify using SVM.

Step 9: Repeat above steps for all Lip detected in Frames.

Step 10: Extract Label to each Lip with him/her Name as identification.

Step 11: Stop

Gradient (HOG) and other is Low Binary Pattern (LBP).

I. LBP:

Low Binary Pattern is a simple yet very efficient texture operator which labels the pixels of an image

by Thresolding the neighbourhood 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. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic grey-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyse images in challenging real-time settings [7].
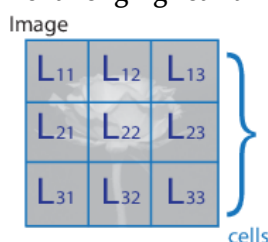

Figure 3: LBP Descriptor

B. Classification

I. SVM :

A support vector machine (SVM) is machine learning algorithm that analyses data for classification and regression analysis. SVM is a supervised learning method that looks at data and sorts it into one of two categories. An SVM outputs a map of the sorted data with the margins between the two as far apart as possible. SVMs are used in text categorization, image classification, handwriting recognition and in the sciences [10]. Those standard SVM is A non-probabilistic double classifier binary straight classifier, i. E. It predicts, for each provided for input, which for two could reasonably be expected classes those enter is A part about. Since an SVM is a classifier, afterward provided for A set of preparing examples, every stamped Similarly as having a place with a standout amongst two categories, an SVM preparing algorithm manufactures a model that predicts if another case falls under person classification or the opposite. Likewise focuses over space, mapped Along these lines that the illustrations of the separate Classes are isolated Toward an acceptable hole that is totally Likewise time permits.
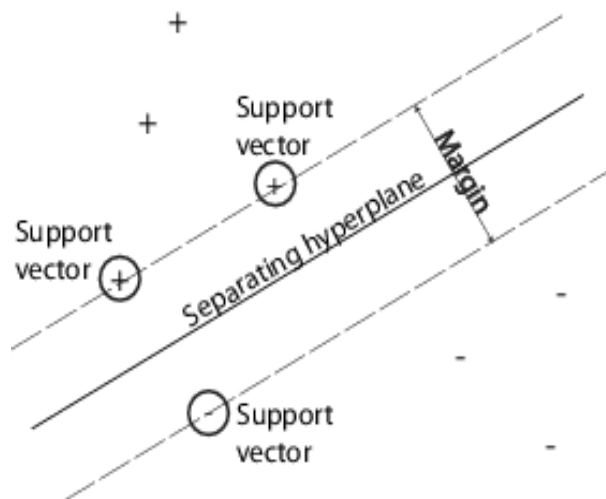

Figure 4: SVM Classifier

III. COMPARATIVE STUDY

TABLE I: Feature Extraction

Method	Advantage	Disadvantage
LBP [13]	Save memory with a non-uniform pattern there is 2p possible combinations while for uniform LBP there are patterns of p(p-1)+2. It does calculation in integer	It is less accurate.
HOG [15]	HOG (Histogram of Oriented Gradients) can be used to detect any kind of objects, as to a computer, an image is a bunch of pixels and you may extract features regardless of their contents.	Complete processing is time consuming.

TABLE II : CLASSIFICATION METHODS

| Method	Advantage	Disadvantage
SVM [8]	Firstly, it has a regularisation parameter, which makes the user think about avoiding over-fitting.	SVM moves the problem of over-fitting from opti-mising the para-meters to model selection.
ANN[12]	Relatively easy to use. Great for complex/abstract problems like image recognition.	Black box that not much can be used from.

IV. RESULT ANALYSIS
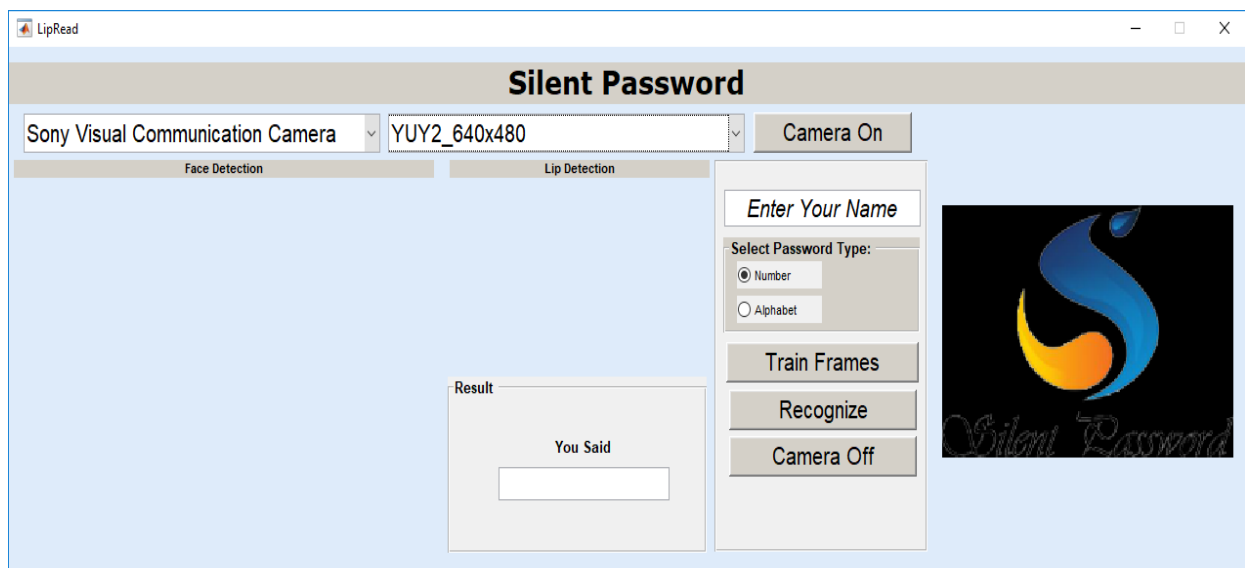
Figure 5: System GUI Design

TABLE III: Analysis

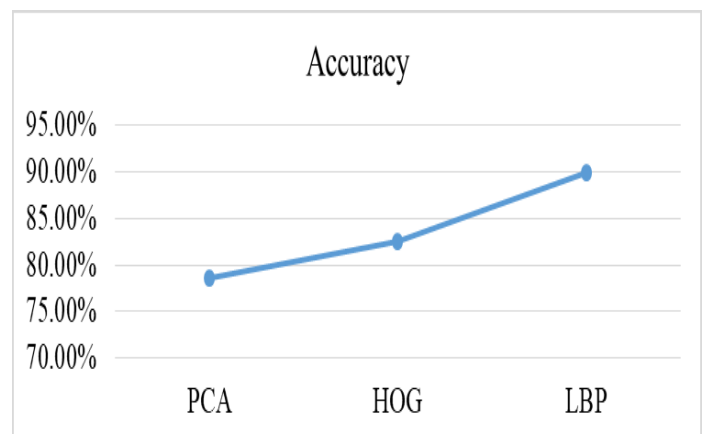| Method	Accuracy	Time
PCA	78.55%	5.45sec
HOG	82.45%	5.00sec
LBP	89.86%	4.66sec

Figure 6: Analysis

As shown in the figure 7 the System GUI is work with different resolutions and selection panel for every task. In figure 8 shown the accuracy of different features with SVM classifier as in Table III.

V. CONCLUSION

The paper is all about studied different methods for features extraction and classification to lip recognition. The work deals with real-time algorithms and techniques for Lip detection and Lip sequence tracking in videos. In these paper among all presented method LBP Feature and SVM Classifier are incorporated into the Viola-Jones face detection algorithm, allowing the algorithm to classify lip with greater efficiency. This lead to solution for the online password security.

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