

# Identifier Technique For Human Writing HMM SVM Method

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**Abstract-** *Handwriting Identification words had been still the maximum tough tasks in pattern reputation. Methods of identifying the phrases are complicated styles, handwriting have many variations in fashion. Despite large progress achieved in modern-day years, performance of handwriting acknowledgment structures continues to be difficult for humans in terms of both accuracy and speed, thinking about the interaction among the individual and laptop. Handwriting Identification is a tough vital research area particularly in forensic and biometric programs. It is utilized in fields like graphology expert, that may analyze the conduct of a person based at the handwriting. There are several techniques available for handwriting recognitions. However none of these techniques are exceptional specifically for a massive quantity of classes. .*

**Keywords-** Hidden Markov modal (HMM), Support vector machine (SVM).

## I. INTRODUCTION

Identification is the most exciting studies in sample Identification. Many packages which might be integrated in handwriting, like reading assist for blind, bank take a look at and conversion of any handwritten file into textual shape .There is an in depth contribution given by using the handwritten man or woman Identification inside the development of the excessive tech System.

The handwriting Identification system is the process through which an user transmits any handwritten data into the computer by using the scanner, touch screens and any other devices. Such input may exist in the form of paper documents, images and photographs etc. the data can be acquired by using these techniques. After data acquisition it may be classified for developing handwriting Identification system. It will include sets of characteristic features, the writing style variation and the various constraints on the writing that have a great influence on the recognition. The above defined technique can be applied to handwritten character Identification system. Handwriting Identification using different techniques is also used for analysis handwritten

signature Identification and optical character Identification. Similarly biometric identifiers are also associated with the particular users. It is also more reliable methods. This biometrics has advantages over other security approaches. It includes: Non-repudiation, Screening and Accuracy and Security. Various biometric identifiers are used for developing various applications.

Biometric human can be presented by two types

1. Physical
2. Behavioral

Brief description as follows:

1. Physical: Physical biometrics means identifying the person. by his face, hand , figure and hand geometry.
2. Behavioral: Behavioral biometrics means identifying person by his behavior like signature, voice.

In this project worked on behavior of human, where the person identified on the basis of his/her handwriting. Thos figure shows the biometrics of the person by which person can identify .In this work talking about to identify the person on a behavioral basis as show in fig.

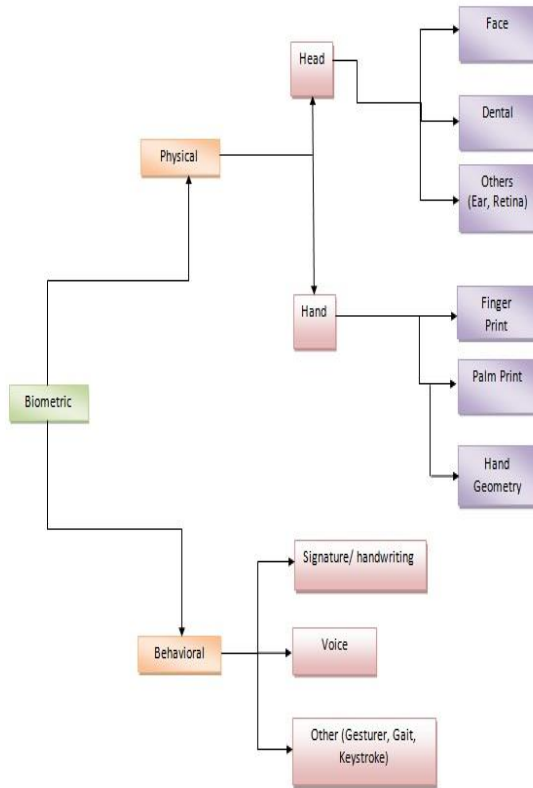


Figure 1.1 Types of Various Biometric

## II. TYPES OF HANDWRITING IDENTIFICATION TECHNIQUES

The classification of handwriting Identification can be divided among two major groups as show in figure 1.3.

### 1. Online Handwriting Identification

In such handwriting Identification device, the 2 dimensional coordinates of successive input factors are represented as a characteristic of time and the order of strokes made by means of the writer. The online technique is superior to that of offline Identification handwritten characters because of the temporal records availability.

Nowadays, for virtual devices private virtual assistant (PVA) or drugs, on line handwriting Identification has turn out to be a useful device and because of this selection the call for of pills is increasing. Offline handwriting Identification may be labeled in different categories

1. Hidden Markov Model (HMM)
2. Support Vector Machine (SVM)
3. Combined HMM-SVM Classifier

### HMM:

Hidden Markov Model is the crucial within the area of handwriting Identification. The HMM include the first order Markov chain whose states are hidden from the observer, so the inner behavior of the version stays hidden. The hidden states of the model capture the transient structure of the facts. Hidden Markov Models describe the sequences of occasions, HMM is having the benefit that the temporal dynamics of the handwriting capabilities can be rapt due to the presence of the country transition matrix.

**SVM** Support Vector Machine (SVM) turned into first derived in 1992, in by way of vavnik COLT-ninety two. Support vector machines (SVM) are a set of related supervised learning strategies used for classification and regression .

## III. METHODOLOGY

In this chapter we have studied Combined HMM-SVM classifier: Methodology, Processing, Curvelet Transform, Invariant Statistical Features and Advantage of combined HMM-SVM classifier

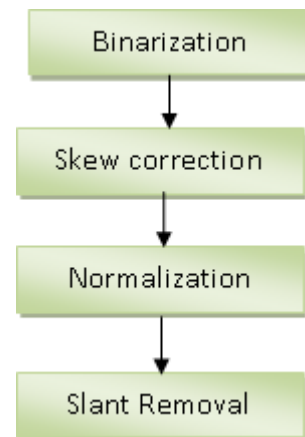


Figure 1.2 : Flow graph of preprocessing

## IV. SIMULATION RESULT

In the HMM – SVM combined classifier experimental results is to find the healthier accurateness. For this intention several different techniques such as HMM are tested features. Experimental results shown better for each feature, is combined of HMM and SVM classifier with optimum efficiency., in the study of HMM classifier when we applied with 300 sample of thirty user accuracy is found 97.31 and In this study, the HMM –SVM combined classifier with different degree was tested, and the result is when we applied on 300 sample of thirty users then accuracy also increase. In my experiments with 300 samples of thirty users accuracy is

found 98.44 which is optimum in all previously exist handwriting verifier algorithm those are applied with 300 samples.

**Tabulation result of 300 samples of 30 user**

The values of consequent presentation parameter for handwriting verifier are tabularized as shown below Table 4.1

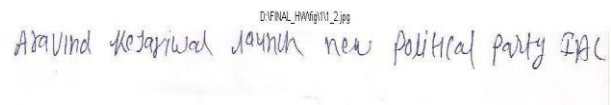
No. of Samples	HMM Accuracy (%)	HMM-SVM Accuracy (%)	SVM Accuracy (%)
10	90	90	In SVM all 300 samples are executing in one time  <b>98.44</b>
20	94.30	94.73	
30	96.29	96.73	
40	97.22	97.20	
50	97.86	97.87	
60	96.42	98.24	
70	95.45	98.30	
80	97.33	98.60	
90	97.66	98.83	
100	96.80	98.94	
110	97.08	99	
120	97.32	99.11	
130	96.69	98.36	
140	96.18	98.48	
150	96.42	98.58	
160	96.66	98.66	
170	96.83	98.73	
180	96.98	98.87	
190	97.11	98.87	
200	97.31	98.92	
210	97.35	98.98	
220	97.32	99.12	
230	97.36	98.21	
240	97.37	98.91	
250	97.31	98.93	
260	97.67	99.01	
270	97.44	98.12	
280	97.56	98.23	
290	97.39	98.81	
300	97.31	98.93	

In this result we represent outcomes 0 and 1 are represented by false and true respectively.

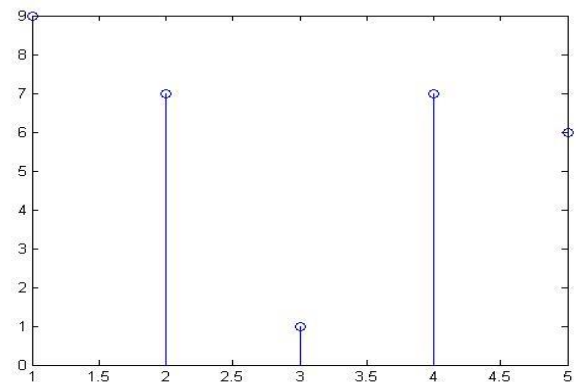
Actual class (user)	Dected class	True(1)/false(o)
1_1.jpg		1 1
1_2.jpg		1 1
1_3.jpg		1 1
1_4.jpg		1 1
1_5.jpg		1 1
1_6.jpg		1 1
1_7.jpg		1 1
1_8.jpg		1 1
1_9.jpg		1 1
1_10.jpg		14 0
2_1.jpg		2 1
2_2.jpg		2 1
2_3.jpg		2 1
2_4.jpg		2 1
2_5.jpg		2 1
2_6.jpg		2 1
2_7.jpg		2 1
2_8.jpg		2 1
2_9.jpg		2 1
2_10.jpg	no match	missed data

**Fig 4: Graphical representation of feature extraction of a sample.**

Snapshot:



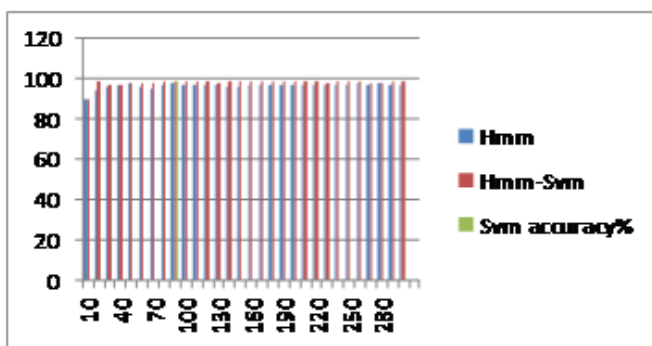
**Fig5: Sample picture**



**Fig 6: Curvelet view**



**Fig 7: HMM+SVM View**



**Fig 3: Graphical representation between samples and accuracy**

**Tabulation result of 300samples of 30 user**

**V. CONCLUSION**

Handwriting identifier and analysis are part of larger domain of work which finds application in graphology and forensic science. Handwriting identifier is a challenging aspect as same user's handwriting tends to differ depending upon

type of Pen being used, the writing surface and so on. Beside, Handwriting is not considered as unique biometric property. It is rather a pattern associated with different users. Therefore handwriting verifier differs from other similar verifier like signature biometric. In this work we have presented a Novel technique of Handwriting verifier by first extracting statistical moments and curve let features from the user's handwriting pattern and then forming a statistical state machine with HMM. Further the technique was improved by the HMM-SVM combined classifier. HMM-SVM classifier improve the accuracy also resolve the problem of multiple detection of class.

The system can be improved by incorporating more features that describes shapes and slants of the characters of handwritten text like Zernike moments, shape contexts and so on.

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