

Detection of Behavior Using Machine Learning

Athri Kumar Sagara Anantha Krishna¹, Darshan Dyamavvanahalli Rudreshi², Indraneel S³, Gunda Umamaheshwar Gupta⁴, Vamsi Krishna Adusumilli⁵, Md Tabish Alam⁶

Abstract As in the era of this modern global human values end up crucial for persona development of human so this paper is designed to predict human behavior through diverse parameter, signature and **handwriting** analysis thru new parameters and in conjunction with loops of 'i' and 'f' by using the usage of numerous pc orientated techniques and with the help of **MATLAB** tools together with **BPN, SVM** as a first-rate device.

Key Words : handwriting , MATLAB , SVM , BPN

1.INTRODUCTION

If we have a look at handwriting evaluation and signature analysis is known as graphology that is used for figuring out, evaluating persona characteristics of human. Signature is the fast depiction of handwriting. Every personality tendencies of a person is represented by using a neurological sample in mind. These brain patterns produce a unique neuromuscular motion which has similarities for all and sundry who has unique persona trait. While writing, actions occur unconsciously. Pen stress, baseline implemented whilst writing can screen precise persona tendencies. Similarly handwriting represents the viable way of intellectual reputation and together with this it profiles the human conduct in place of social skills, success, thinking styles, or behaviour. With the help of graphology handwriting analysts predict the attitudes, qualities, sentiments or postures. In this paper, a way has been proposed to expect the conduct of someone from the capabilities extracted from his/her signature. The persona trends discovered by using baseline, pen strain, height of first letter, period of signature, letter 'i' and letter 'f' as discovered in character's handwriting are explored on this paper. In our task, we're examining the handwriting of a awesome individual to represent the personality of that man or woman

1.1 System Overview

Professional handwriting examiners known as graphologists often predict the persona of a person with the assist of a bit of paper. But the accuracy of the results relies upon at the abilities of the analyst. This guide process of signature and handwriting evaluation is very high priced and time ingesting. Hence the proposed technique makes a specialty of growing a tool for conduct analysis that can predict the persona trends mechanically. The various features in signature via which behavior may be predicted are pen pressure, baseline, peak of first letter, duration of signature, and various parameters of handwriting like peak of bar on letter 't', letter 'g', etc. In this paper a method has been proposed to expect the behavior of someone from six

parameters- baseline, peak of first letter, duration of signature, pen pressure, letter 'i' and letter 'f'.

To make signature and handwriting analysis automatic we measured six major unique sorts of capabilities:

(I) Pen strain, (II) Length of signature, (III) Baseline, (IV) Height of first letter, (V) Letter i, (VI) Letter f and a file to become aware of the persona of the author. Segmentation is used to estimate the capabilities from the virtual signature wherein the letters or phrases are segmented with the aid of picture processing and placed on numerous steps. Signature photograph is uploaded by means of the person through MATLAB code after which the snap shots of signature are uploaded, then these samples of signature emerge as digital signature and then it is fed to SVM, which predict the behavior of character. The system of signature evaluation is executed as proven within the block diagram.

2. DATA ACQUISITION

Signature samples are uploaded to the system. The uploaded photograph is preprocessed, cropped and resized to the suitable orientation. The utility allows users to crop pictures into traces, phrases, and characters after the pics are cropped, the cropped photographs may be proven on the scratchpad then the cropped photograph may be loaded.

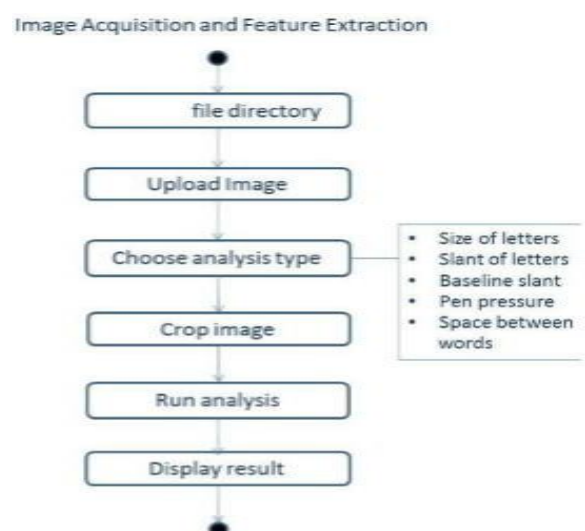


Figure -1: Image Acquisition & Processing

3. PREPROCESSING

The preprocessing consists of characteristic extraction system. In this level, we extract the capabilities of a signature. The parameters which can be had to calculate are as follows:

3.1 Pen Pressure

One-of-a-sort of the most advanced foremost functions in a signature pattern is the strain of writing. The pressure carried out to the paper at the same time as writing shows the notion of feeling, also known as emotional interest, of the author. In order to take a look at the pen stress, the scanned pix is modified into a gray scale image and imply gray degree price is intended by means of the gray level values of the photograph pixels. Mean gray degree price of the image is connected with the pre-decided threshold value, tho of the scanned snap shots. The higher cost of the suggest factor to lighter stress and if the mean is much less than tho, then the writing pressure is fine concept-out to be high such someone has precise deep and persistent feelings.

So, the conditions of light and heavy pen pressure are

Light Pen Pressure: threshold 'th0'	Heavy Pen Pressure: Mean Grey level < threshold 'th0'
---	--

3.2 The Slant of Baseline

Baseline of Signature discloses lots of accurate information about the author. The baseline is the line beside which the signature flows. The fashion line that we calculate is called the regression line and this regression line is calculated with the aid of Least-Squares Linear Regression. For Standard reference attitude (θ0) is nicely idea-out to be 90o. θ is associated with θ0 to categorise the slant top. To calculate the slant, the formulation is

$$\theta = \tan^{-1} \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

After going through various researches and through psychological facts on human behavior we made following table shown below.












Formation of 'f'		Personality Traits
	Narrow upper loop	Narrow-minded
	Angular Point	Resentful, uncompromising
	Angular Loop	Strong reaction against interference
	Cross Form	Concentration
	Balanced	Well-organized, managerial ability

Table -1: Personality Traits Predicted by Various Signature Styles

Signature Categories	Psychological Behavior	Personality
Light pen pressure	Person can bear traumatic experiences without being extremely affected and emotional experiences do not make a lasting impression.	
Heavy pen pressure	Deep thinker and lasting feelings and feels situations extremely.	
Raising the baseline	Optimistic, determined hopeful.	
Falling baseline	Exhausted, suspicious, not hopeful	
Straight baseline	Strong-minded, stay on track, self-motivated, control emotions, dependable, steady	
Erratic baseline	Unpredictable, emotionally unsettled,	
Far spaced words	Needs more space, enjoys secrecy	
Close spaced words	The closeness of sentiment and intelligence	
Size of the first letter is capital	The person has more pronounced self-esteem	
Size of first letter is small	The person is more grounded	
Long length of signature	Reliable, assertive, tedious	

Table -2: Formation of f personality traits

Letter 'i'		Interpretation
	High, Flying dot	Curiosity seeker, impatience and enthusiasm
	Round, justly placed dot	Detail conscious, accurate, precise and concentration
	Absence of dot	Careless, absent minded
	Circle	Frustrated, attention demanding, imaginative, Artistic, dislikes routine work, loyal to ideas and standards
	Left-faced dot	Neurotic
	Right-faced dot	Observant

Fifth parameter i.e. The formation of letter 'i' provides a variety of correct facts about the author. The 'i' is the handiest letter in English language that refers completely to

the author. Table -3 suggests the not unusual formations of 'i' and the corresponding personality tendencies.

This paintings is applied by using numerous techniques first by using pre-processing and extracting functions by way of the use of various functions in MATLAB code. The input to the gadget is a scanned photograph of a signature sample. The behavioral inspection is done by means of inspecting several capabilities such that pen strain which calculates the emotional country of a person and baseline slant, the slant of the signature size of letters, and then these extracted features of digital signature are fed to SVM which take the enter in the RBF shape. Then those outputs which we get are a fixed of behavior personalities of the character.

3.3 Support Vector Machines

SVM are supervised getting to know fashions with related gaining knowledge of algorithms that examine statistics and apprehend styles, used for category we used RBF to give input to the SVM basically SVM takes input as a feature. SVM gives the higher and precise end result.

3.4 Radial Basis Function

RBF is a actual-valued characteristic whose price relies upon handiest on the distance from the foundation Sums of radial foundation functions are commonly used to approximate given functions. This approximation manner can also be interpreted as a simple form of neural network. RBFs also are used as a input in help vector class.

4. IMPLEMENTATION

Based on the MATLAB codes and preprocessing strategies to locate the capabilities of handwriting we follow the ANN and

then predict the conduct of human based totally on pen pressure. After scanning the signature with the aid of PC then, we ought to estimate the function of signature. By executing numerous MATLAB codes to calculate pen strain, alignment, and so on. The method that is used to educate this is challenge is the lower back-propagation set of rules and its method, so first we talk the (MSE) or Mean Squared Deviation (MSD) of an estimator measures the average of the squares of the mistakes this is, the average squared variance between the calculated values and target cost . In imply rectangular error, we have a look at the suggest of the square of errors or deviation of output from the target fee. It describes a relation among output and preferred output.

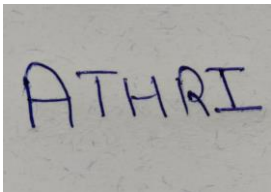
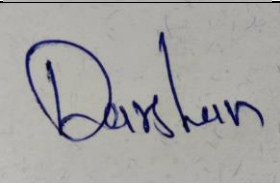
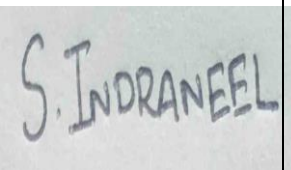
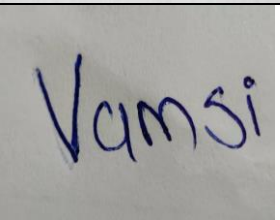

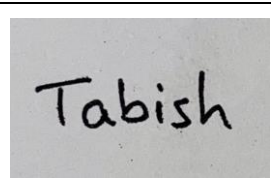
$$MSE = \frac{1}{n} \sum_{i=1}^n (Y_i - \hat{Y}_i)^2$$

$$n \text{ } i \text{ } 1$$

Where Y = calculated value and Y is expected value Mean square error of the signature.

4.1 Back propagation Algorithm

In 1969, a way for learning in a multi-layer community, lower back-propagation, was designed by Bryson and Ho. The Back propagation Algorithm is a practical approach for isolating the contribution of each weight. Back-propagation set of rules is utilized in multilayer feed forward community based totally upon gradient descent studying rule. The essential goal of returned-propagation algorithm is to assign the right weights to these superiorities.

Sr. No	Name	Signature	Mean Square Error	Pen Pressure	Alignment	Height of the first letter	Length Of Sign	Behavior
1	Athri Kumar Sagara Anantha Krishna		0.5642	2.825	0.371	0.9	4.1	Cheerful, Positive attitude,
2	Darshan Dyamavvanahalli Rudreshi		0.6484	1.856	0.117	0.7	3.6	Dependable, Steady
3	Indraneel S		0.536	2.213	0.423	1.2	3.9	Determined Hopeful
4	Vamsi Krishna Adusumilli		0.6479	1.748	0.223	1.1	3.5	self- motivated
5	Gunda Umamaheshwar Gupta		0.3336	2.448	0.378	0.4	3.3	Determined Grounded , Deep thinking
6	Md Tabish Alam		0.6506	1.875	0.332	0.5	3.2	Cheerful

REFERENCES

CONCLUSION

A method has been evolved to expect the behavior of a person from the features extracted from his handwriting. Six parameters, baseline, top of first letter, period of signature, pen stress, letter 'i' and letter 'f' are enter to the ANN which outputs the persona trait of the author. The evaluation of pen pressure makes use of gray-degree threshold fee, various MATLAB gear and codes have been used. Hence advanced MATLAB codes were used to predict behavior it will be proved useful to treat folks hence.

- [1] Ameer Bensefia, Ali Nosary, Thierry Paquet, Laurent Heute, "Writer's Identification By Writer's Invariants", Proceedings of the eighth International Workshop on Frontiers in Handwriting Recognition, 2002, pp.274-279.
- [2] Champa H.N, KR Ananda Kumar, "Automated human behavior prediction through handwriting analysis", First International Conference on Integrated Intelligent Computing, IEEE Computer Society, 2010, pp. 160-165.

- [3] Champa HN, KR Ananda Kumar, "Artificial Neural Network for Human Behavior Prediction through Handwriting Analysis", International Journal of Computer Applications, Vol. 2, May 2010, pp. 36-41
- [4] Lorette, G., Bercu, S., Menier, G., Anquetil, E., "On-line cursive handwriting analysis and recognition: paradigms and systems", Handwriting Analysis and Recognition: A European Perspective, 2002
- [5] N. Mogharreban, Shahram Rahimi, M. Sabharwal, "A combined crisp and fuzzy approach for handwriting analysis", IEEE Annual Meeting of the Fuzzy Information Processing Society, 2004, pp. 351-356.
- [6] Ling Gang; Verma, B., Kulkarni, S., "Experimental analysis of neural network based feature extractors for cursive handwriting recognition", IJCNN, pp. 2837-2842, 2002.
- [7] Parmeetkaur Grewal, Deepak Prashar, "Behavior prediction through handwriting analysis", IJCST Vol 3 2012.
- [8] Ruth Gardner, "Instant Handwriting Analysis: A Key to Personal Success", Llewellyn Publications.
- [9] Shitala Prasad, Vivek Kumar Singh, Akshay Sapre, "Handwriting Analysis based on Segmentation Method for Prediction of Human Personality using Support Vector Machine", International Journal of Computer Applications, Vol. 8, October 2010, pp. 25-29.
- [10] Sung-Hyuk Cha, Sargur N Srihari, "Apriori Algorithm for sub category classification analysis of handwriting", Proceedings of the sixth International Conference on Document Analysis and recognition, 2001, pp. 1022-1025.