E-Graphologist for Personality Profile

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Abstract— **Deep learning of a person's signature can reveal his personality profile like fear, honesty, emotional state, thinking style and much more. Analyzing signature can help in predicting social skills, thinking style, work habits, achievements, etc. of the writer. Type and style of signature can be judged by graphologist based on curved start, single line, dot on letter, etc. Similarly pattern recognition and image processing are used to analyze signature and handwriting in our system. Here the signature is considered as image and then prediction is performed through different stages such as gray level conversion, calculating threshold value, binary conversion etc. The most preferred technique by researchers for personality prediction is 'Artificial Neural Network'.**

Keywords— *Signature Analysis, Personality Prediction, Graphology, Artificial Neural Network, Human Personality, Personality, Signature.*

I. INTRODUCTION

Signature analysis is a technology to predict the personality of a writer based on his signature and handwriting. The characteristics used to predict personality of a writer are curved start, underline, single line, dot on letters, traits and strokes of writers signature.

It is said that deep learning of signature of any person reveals the true personality of a person like fear, honesty, emotional state, thinking style and much more. Here in this Project we are going to predict the personality by analysing the signature of people.

PERSONALITY PREDICTION METHOD OFTEN FOLLOWS A PROCESS WITH THE FOLLOWING STEPS:

• Scan the signature image.
• Pre-processing.
• Image segmentation.
• Feature Extraction.
• Classification.
• Predicting Writers Personality.

Most of the researchers usually try to improve the accuracy of personality prediction system using parameters like Curved Start, End Stroke, Shell, Zones, etc.

II. HISTORY AND OVERVIEW

A. History

Graphology started in early 1622. The interest of scientist, artist and philosophers to know the relationship between handwriting and personality increased and the idea of graphology was immerged. Analyzing the handwriting and trying to predict the personality of the writer was started in early 1872. Bunker made his unique discovery in 1915. He realized that all his students have different style of writing every single letter, he came up with the point that the letters did not have the meaning but the strokes does. Graphology says that the person who writes O having its head open is a talkative person. He then cross checked with all other letters like 'a', 'g', 'd', 'q' as well and found that this was true. Not just the letter 'o' but the letters like 'q', 'g', 'd', 'a' with the open top also had the same meaning.

B. Overview

The richest information about different emotional states and thinking styles of the person is carried out by signature. The signature analysis is very effective indicator for prediction of personality. It tells the true personality of a person. It tells about fears, anger, confidence, honesty and much more about an individual. This can happen with the help of features like underscores below signature, appearance of dot on the letter, curved start, ending stroke, and streaks disconnected.

Signature analysis is renowned part of Graphology, it judge graphical analysis of the structural type of writing, such as appearance of dots on letter as in i, j, dots below line, curved start, single line or single underscore, double line or double underscore and many more.

Neural Network is an iterative method. Weights to the bias and links in the neural network are assigned randomly. To check the precision of the system error is calculated using the following formula.

Error = Actual value - Predicted value.

Implementation Technique:

1) Image is taken from the database for pre-processing

2) Normally signatures are made by black or blue color so the color is converted to gray for making further prediction easy

3) Now gray scale image is changed to binary by setting

the background as white and keeping the foreground unchanged.

4) Here noise is removed by removing single black pixel on white background and single white pixel on black background

5) Now segmentation of an image is performed i.e vertical and horizontal where vertical is again divided into left and right whereas horizontal is again divided into top, middle and bottom.

6) The features of the signature are extracted for making prediction like is it curved start, dots on letter, underline, etc. as discussed in the succeeding section.

Fig 1. General architecture of Personality Prediction System.

III. FEATURES FOR PERSONALITY PREDICTION

These are some features that are used for predicting personality.

1. **Underline to signature[1][5]** : Writer has healthy ego and is confident.
2. **Dot followed by signature[1][5]:** Doubts their own actions and stops the progress.
3. **Signature in upward direction[3][5]:** Writer is optimist, active and ambitious.
4. **Signature in downward direction[3][5]:** It indicates the pessimistic nature of writer, has no goals, and is depressed.

5. **If the initial of the signature is capital and also bigger than that of other letters in signature**[6][15]: Writer forms his impression in the first meet itself.

6. **Smoothly curved signature**[1]: Such people are gentle, flexible, outgoing, and charming.

7. **Angular Connections in signature:** Tells that the writer has very strong personality, is aggressive, is competitive, and also has a powerful will.
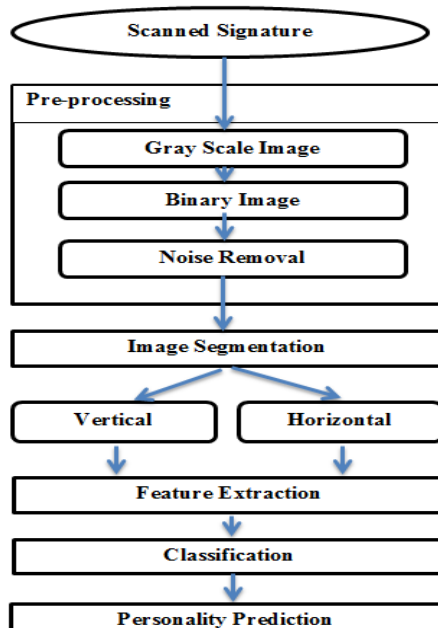
IV. COMPARITIVE STUDY FOR CLASSIFIERS

Sr.no	Classifiers	Pros.	Cons.
01.	ANN	It is flexible and has general function approximation framework. It has the ability to build a powerful model by adding extra (more) layers.	Large amount of computing power and training data is needed for the machine to perform good .
02	SVM	Framework of a Kernel is very flexible and powerful. SVM works well with small training data as well.	It takes very long to test large datasets. It is also hard to explain variable weights, individual impact and final model
03	DNN	It lowers the necessity of feature engineering, where feature engineering in machine learning takes lot of time.	It requires very big dataset to train and the training of this data is very expensive

V. LITRATURE SURVEY

In [1] BPN and structured identification algorithm is used to detect ascending underline and dot structure with the accuracy of 100% and 95% respectively. In [2] personality is predicted using both handwriting and signature. Eight features with multi-structure algorithms and six features with ann were classified with the accuracy 87-100% and 52-100% respectively.

In [3][5][6][7] handwriting and signature features like baseline, pen pressure and slants were detected to predict writers personality [3][5][7] used ANN for feature extraction whereas [6] used SVM for the same and obtained the accuracy 93.3%. In [3] handwriting features like 't-bar' and loop of 'y' were extracted using template matching algorithm. Shell, dot structure, underline, streak and shape was identified in [5] using ANN and BPN.
The main aim of [4] was to show a complete methodology to develop a system for predicting personality of a writer using as a fundamental part of the right people with the features such as pen pressure, slant, zones, connections, spacing, margin, letter size, speed, and clarity to increase the concern of developing more efforts in this area.

In [8] two areas were considered for predicting personality in which the first area is to identify the styles n strokes of the capital letters such as 'O' ,'T' and 'A' using Learning Vector Quantization(LVQ). The second area was Signature analysis in which features like like curved start, end stroke, shell, middle streaks, underline were identified using ANN and extreme margin, streaks disconnected and dot structure were identified with multi structure algorithm. LVQ was also used for training data in second area(signature analysis). For 100 test data the system accuracy was only 43% because while training the data, most of the data was not identified.

In [9] the signature analysis was carried out using WACOM pen tablet (online signature analysis) to identify the features like position of pen in x-axis and y-axis, angle of the pen and pen pressure. Methodologies like Template matching and Hidden Markov Model (HMM) were used to train off-line signature data.

In [10] analysis is done on the features such as T-bar, margin, slant and baseline where Polygonalization and Template matching are used for identifying the slant of the baseline and compared input with model signature to identify in which class will that signature belong to.

In [11] [12] [15] [16] features like baseline, pen pressure and slant of handwriting was detected using ANN. In [14] loops of 'i' and 'f' were also considered. Whereas in [17] new feature like "unique stroke" of letter 'a', 'd', 'i', 'm', 't' were detected using structured analysis.

In [13] the features like page margin, line spacing, slant, zones and direction are extracted. Lex and Yacc software was used for analysis along with context free grammar with nearly 50 rules for accurate prediction.

In [14] the effort for developing handwritten Indian Script (Devnagarari) of numeral database are created which consist of 22,556 samples. A multistage method was implemented for recognizing there handwritten data separately as well as in mixed script more accurately.

VI. CONCLUSION

In this research paper we learned how to predict the personality based on signature using features such as underline to the signature, dot structure, skewness of the signature ending stroke, smooth curve, angular connections etc.

Graphology is useful to get the complete picture of one's personality.

VII. FUTURE SCOPE

Time required for training shell data and end streak is much high and still the accuracy is very low(56% , 58%) respectively, we need to increase the accuracy.

We also need to include features like speed and clarity and connections for more accurate prediction of one's personality in our system.

Predicting personality based on English and Regional signature can also be considered.

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