

Behaviour Analysis using Handwritten Data

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Abstract –Graphology is a method for identifying, evaluating personality traits by handwriting. Computer vision looks to copy the human vision by dissecting the computerized picture contributions as the human recognition does. To recognize a feeling won't be a troublesome undertaking for the human yet for any computer vision, distinguishing a feeling will be a troublesome activity to proceed as it is ignorant of the human instinct. Human Behaviour can be distinguished by various structures like Facial Expression. These strategies have been valuable from the previous years to foresee human conduct. This information has end up being extremely valuable for business and showcasing purposes a great deal. Penmanship examination is portrayed as a logical report and the investigation of the penmanship. It is a method of deciphering conduct from the eccentricities of the penmanship. The logical name for Handwriting Analysis is Graphology. The precision of the penmanship investigation relies upon the expertise of the master called a Graphologist who plays out the specialty of Graphology. The manual procedure of penmanship investigation is expensive and inclined to fatigue. Hence the proposed system centres on creating programming for human character expectation by examination of the penmanship. By watching the various highlights present in the penmanship like inclination, pattern, bend, pressure, and so forth the conduct characteristic of the individual is anticipated.

Keywords - Graphology, Handwriting Analysis, Human Behavior, Facial Expression, Web Mining.

Introduction - Handwriting Analysis or Graphology is an art of finding, analysing and predicting the human personality. This is possible by studying the strokes and patterns present in the handwriting. This is also called brain writing as one can understand different shades of human personality like fear, honesty, temper, and straight-forwardness and so on. Each personality trait is represented by a certain neurological brain pattern. Professional handwriting examiners known as graphologists often identify the writer with a piece of handwriting. The accuracy of handwriting analysis depends on how skilled the analyst is. Although human intervention in handwriting analysis has been effective, it is expensive and prone to fatigue. Hence the proposed methodology focuses on developing a tool for behavioural analysis which can predict the personality traits without human intervention.

The manual procedure of handwriting analysis is expensive and inclined to exhaustion. Hence the proposed methodology focuses on developing software for human personality prediction by analysis of the handwriting by observing the different features present in the handwriting like slant, baseline, curve, pressure, etc.; the behavior traits of the person can be predicted.

Motivation - The Human behavior prediction concept is interesting one. We had explored different subjects to anticipate human behavior. Behavior analysis is a rising pattern for the forecast of human conduct. Graphologist executes this technique yet it is progressively inclined to exhaustion. On the off chance that we could build up a framework which would examine one's handwriting and foresee his/her conduct, at that point a great deal of time could be spared. In this way, there was a need to actualize a route for a superior usage of this technique.

Proposed Framework - Proficient handwriting examiners called graphologist frequently distinguish the author with a piece of handwriting. Precision of penmanship investigation relies upon

how gifted the expert is. Albeit human intercession in penmanship investigation has been powerful, it is exorbitant and inclined to weakness. Subsequently the proposed approach centers on building up an instrument for conduct investigation which can anticipate the character characteristics naturally with the guide of a computer without the human mediation.

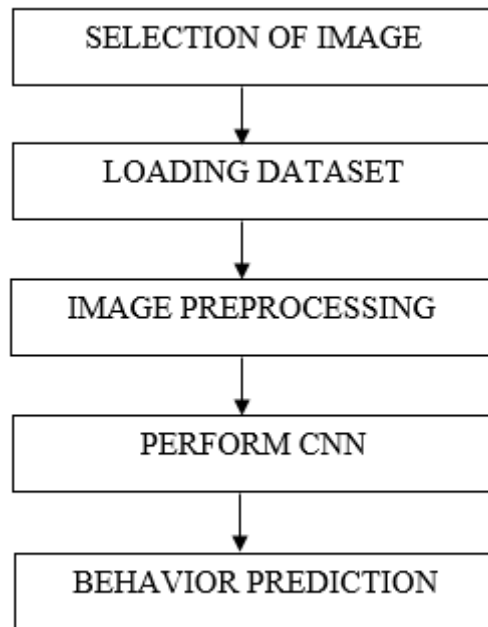


Fig1. Proposed framework

Implementation and Result -

1. **Scanning an image:** Scan the image of handwriting sample of the person with the help of software.

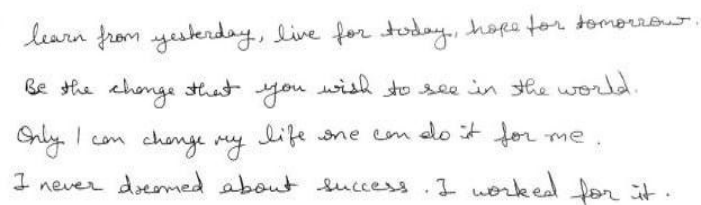


Fig: handwriting sample

2. **Image Pre-processing:** Image Pre-processing is done with an aim to improve data of the image that suppresses unwanted distortions or enhances some image features important for further processing. This Pre-processing includes gray-scaling, bilateral filtering, canny edging and contouring.

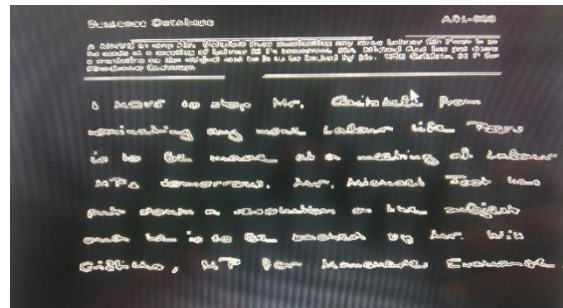


Fig: canny edges

3. Feature Extraction –

Feature extraction is a pivotal assignment that should be completed by specialists. Features might be named full scale or smaller scale highlights which normally characterize gray-scale or basic view individually. In this progression, the composing highlights, for example, pattern, incline, pen-pressure, size, edge, zone and so forth are resolved from the handwriting samples. In recognition and processing of the data, feature extraction is a dimensionally reducing technique and it analyzes the data from a person’s handwriting.

4. Classification (using CNN) –

Feature extraction involves reduction of the number of resources required to describe a large set of data. While performing analysis of complex data one of the major problems stems from the number of variables involved. Analysis with a large number of variables generally requires a large amount of memory and computation power; also it may cause a classification algorithm to over fit to training samples and generalize poorly to new samples.

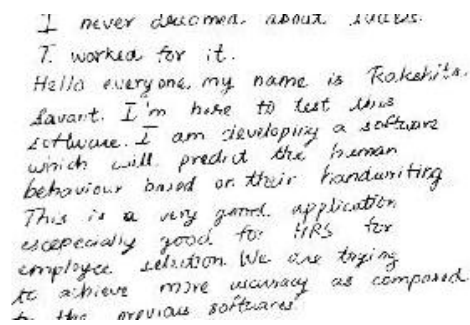
Writing Categories	Psychological Personality Behavior
Large Letters	Likes being noticed, stands out in a crowd
Small Letters	Introspective, not seeking attention, modest
Medium Letters	Adaptable, fits into a crowd, practical, balanced
Right Slant	Sociable, responsive, friendly
Left Slant	Reserved, observant, self-reliant, non-intrusive
Vertical Slant	Practical, independent, controlled, self-sufficient
Light Pen Pressure	Can endure traumatic experiences without being seriously affected. Emotional experiences do not make a lasting impression
Heavy Pen Pressure	Have very deep and enduring feelings and feels situations intensely.
Raising Baseline	Optimistic, upbeat, positive attitude, ambitious and hopeful
Falling Baseline	Tired, overwhelmed, pessimistic, not hopeful

Straight Baseline	Determined, stays on track, self-motivated, controls emotions, reliable, steady
Erratic Baseline	Wavering, lacks definite direction, emotionally unsettled, unpredictable
Far Spaced Words	Desires more space, enjoys privacy
Close Spaced Words	Closeness of sentiment and intelligence

5. Results –

The proposed system can be used as a twin tool by graphologist to improve the accuracy and anticipate the behaviors of a person faster. The estimated weighted accuracy of 93.77 % is achieved.

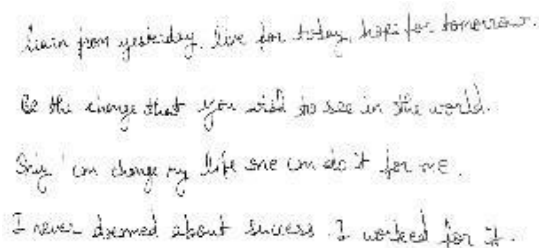
Simulated result 1:



I never dreamed about success.
I worked for it.
Hello everyone, my name is Rakshita.
Savant. I'm here to test this
software. I am developing a software
which will predict the human
behaviour based on their handwriting.
This is a very good application
especially good for HRs for
employee selection. We are trying
to achieve more accuracy as compared
to the previous softwares.

The system will show the result as the person is Adaptable, Sociable, Optimistic, and Responsive.

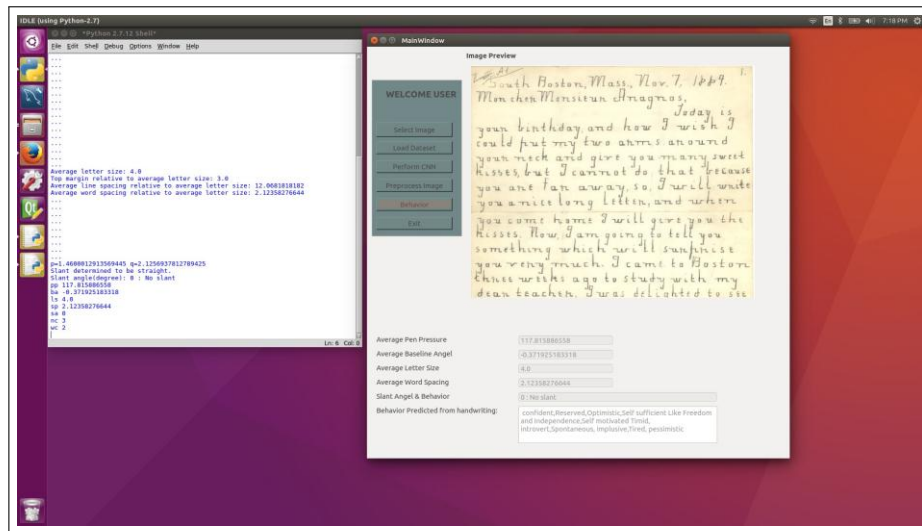
Simulated result 2:



Learn from yesterday, live for today, hope for tomorrow.
Be the change that you wish to see in the world.
She can change my life she can do it for me.
I never dreamed about success. I worked for it.

The system will show the result as the person is Optimistic, Not hopeful, Practical, Try to avoid energy draining situations.

Simulated result 3:



Conclusion:

We are implementing the application in which, the input will be the handwritten image to the application, and the image will be forwarded to the system for pre-processing. The handwritten word from the document is broken up into the predefined features. A continuous process of determining the relative positions of these features and comparing them with the database of feature-graphs goes on until a match is obtained. The output will be the predicted behaviour of that person.

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