

# SSGBSAT- a Novel Approach to perform Sentimental Analysis using Graphology

Shaista bin-ti Nazir, Mohammad Shabaz

**Abstract:** Handwriting is one of the means to foretell the actions of a person by analyzing the shapes, sizes, altitude, convention and stress of the letters. In a rapid world where people are growing with the new technologies every day, sentimental analysis has also become a key tool to analyze the handwritten data, expressing the behavior or the etiquette of a people. We also have tried to perform analysis on the data of 100 people collected randomly from the college “universal group of institutes”. The challenge was to perform the analysis on handwritten sample of the students and teachers having different thoughts with varying moods. The seven sentiments that needs to be checked are categorized under (Contempt, Anger, Disguise, Joy, Sad, Surprise, and Fear). SSGBSAT is an active or decisive algorithm that takes input images and performs analysis on it by comparing the given input with the stored images of sentiments in the repository to get the authentic results against the above sentiments. The results obtained are stored in table that shows the percentage of each sentiment in given input. Also, total percentage of each sentiment is compared with the total percentage of other sentiments to get the highest sentiment present in the data.

**Index Terms:** Sentimental Analysis, Personality Traits, Handwriting, Graphology.

## I. INTRODUCTION

Seeing that an extensive research on handwriting analysis since 1500 has been done. Graphology was commenced in the year 1575 by the Spanish psychologist Juan Huarte de San or Juan Y Huarte Navarro who gave his first analysis on handwriting and other researchers also showed their interest in the same area to accord their findings to the world. Research methodology is the important task in the area of research, without this the research and the researcher is incomplete. Methodology adopted in the research should be adequate as it is considered the bedrock to any research which helps in capturing the best and optimum results if carried out well. Generally, a methodology defines the data acquisition, design, evaluation, analysis and execution same has been followed to get the desired outputs. Every person in this world has a unique identity, which involves the way of thinking, art of speaking or presenting oneself. Whatever the work a person does is totally carried out and controlled by our brain. A person can have emotionally charged memories with the negative thoughts.

Revised Manuscript Received on May 10, 2019.

Shaista bin-ti Nazir, M.Tech in Computer Science Engineering from Universal Institute of Engineering & Technology, Lalru, Mohali, Punjab.

Mohammad Shabaz, B.Tech, M.Tech and pursuing his Ph.D in Computer Science Engineering from Chandigarh University, Mohali, Punjab.

The central nervous system, brain and the spinal altogether performs the function to control our emotions. Emotions are directly proportional to the human sentiments. The ability to think, feel, react can define a person’s behavior. So, while writing a person settles all its abilities and emotions on the paper, hence, handwriting is considered to be the key tool to profound or subtle insight to the person’s personality traits or sentiments.

### Data Acquisition

The data was collected from students and the teachers of universal group of institutes of different departments. The data was collected on the piece of paper. Students were given equal size of paper and were asked to write statements “LIFT YOURSELF UP and KEEP YOURSELF UP” on one side of paper and the name and department on the other side.

### Data Evaluation.

To perform the analysis, it is necessary to transform the collected raw data into jpeg.jpg format so that that it can be read easily. Thus the handwritten data was captured with Redmi Note6pro and fed into the computer using wireless network. This jpeg data was stored in five different folders namely ce, cse, me, pharma, and faculty under a sub folder data-srp so that it can be fetched easily at runtime.

### Data Analysis

For the analysis the stored data first needs to be segmented with the proper attention to intensity of the edges to remove the noise. These images are snipped using the crop tool in the Microsoft Office Picture Manager with the standard size of 50%. The SSGBSAT algorithm is applied on the segmented images in the repository. Each input is compared with the seven stored sentiments and after comparisons the output is generated using R programming and stored in the table.1.1 The below given figure shows the ho w this algorithm analyses the input image and compares with other images shown in the plot at different scales.

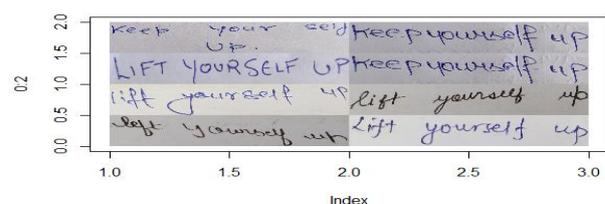


Figure 1.1 Plot of Input image being compared with seven other target images



**II. LITERATURE REVIEW AND RELATED WORK**

Asok Bandyopadhyay and et al. [1]: This paper is to specify the handwritten data of 114 students categorized under three classes, the action, person and event. The authors has tried to perform the analysis on the imagination of the people as the subjects have to write the imagination content video displayed to them and highlight the colored text of the handwritten data.

Manimala S and et al. [2]: This paper has defined the behavioral analysis more accurately with the features such as size, slant of the words, space between words, breaks in writing, pressure, margin, baseline, and loop of ‘e. The data has been taken from “I am handwriting Database”. Authors have used the techniques like image processing, acquisition, extraction and segmentation to remove unwanted noise from the data to improve the accuracy and forecast the behavior of a person more quickly. The estimated weighted accuracy of 93.77 % is achieved.

Ricard Coll and et al. [3]: This paper presents an experimental framework corresponding graphological features and main aim is to build a model to measure the qualities of the writer and provide resourceful manpower for human resource experts to save both time and efforts and make the selection process easy.

Shitala Prasad and et al. [4]: This paper has done a great research on the personality of an individual using the handwritten text. Support vector machine algorithm is will calculate the features of any person using image processing techniques to predict the nature of the subject. According to the authors the research has calculated the 94% of accuracy.

Prachi Joshi and et al. [5]: This paper put forward the personal feature traits of those in particular between the age group of 20-35 years when they tackle many interviews. Polygonalization method is used to evaluate the baseline while margin will be calculated using the method of vertical scanning. Supervised machine learning algorithm, Feature Vector Matrix and similarity matrix method are key approaches used over data sets. The planned system can be used as a corresponding tool by the graphologist to recover the accuracy of graphological analysis and also makes the process rapid.

Hemlata and et al. [6]: This paper gives a blueprint of handwriting analysis or handwriting analysis system (HAS). This paper mainly focuses on the analysis of handwritten data process to detect the identity of a person based on their handwriting features in their handwritten documents. Appearances of text like baseline, pressure, size, spacing, slant, and are taken into consideration. According to these appearances the values of the personality of writer is identified. Rule based system is used for the classification.

Jayson Diaz and et al. [7]: The intention of the research is to put forward a software that can perform analysis for handwriting to a large dataset based on technology. It

measures four main characteristics such as height, distance, pressure and contour from 21 traits of handwriting rhythms called the L-Z scales and these scales were used because these are perceptible.

Akshita Chanchlani and et al. [8]: This research paper has outlined a behavioral system or a tool to achieve high analysis rate on the nature of the person with the help of artificial neural networks and character recognition and detection systems. The proposed system will automatically detect the traits of the person by letter slants.

Syeda Asra and et al. [9]: This paper is to identify person’s extrovert and introvert behavior based on spacing between words and characters in the handwritten text. Authors have used the Support Vector Machine classifier or Artificial neural network for patterns to extract, the noise and segment the feature followed by recognition and 90% accuracy is achieved.

Ashish Kathait and et al. [10]: This paper has done a tremendous research. The authors have implemented the neural network with multiple inputs and multiple layers so that they can recognize and organize the patterns under different classes, calculating various values of the text. The intent was to focus on single character to evaluate it the most and achieve the best results. It will help in deciding the career of that individual.

**III. DATASET**

S	Name	Date	Name MF	Column pt	Angle	Degree	Ar	Sad	Surprise	Fear
1	Shreshth	CE	M	75.02	88.22	88.40	83.83	71.09	64.97	85.41
2	Shreshth	CE	M	82.19	87.66	87.90	88.68	76.39	68.67	86.61
3	Aad	CE	M	96.61	87.66	68.67	82.19	87.90	76.39	85.08
4	Akshat	CE	M	117.89	101.29	75.42	83.83	101.68	85.81	102.67
5	Akshat	CE	M	117.89	101.29	75.42	83.83	101.68	85.81	102.67
6	Bhuvan	CE	M	100.86	96.49	78.87	84.60	96.74	78.27	93.58
7	Bhuvan	CE	M	100.86	96.49	73.10	84.60	96.69	82.54	97.07
8	Bhuvan	CE	M	100.02	94.47	73.03	87.98	94.72	83.00	95.62
9	Chandan	CE	M	94.08	85.81	87.83	81.74	86.20	75.12	88.95
10	Dhruv	CE	M	108.32	95.47	72.82	88.84	87.73	81.73	86.78
11	Dhruvan	CE	M	98.40	88.22	68.69	83.77	88.78	77.89	86.89
12	Dhruv	CE	M	85.81	88.29	68.61	75.88	88.48	71.16	80.11
13	Dhruv	CE	M	125.92	125.13	87.23	104.20	125.89	102.46	127.16
14	Jayant	CE	M	125.99	107.21	78.95	88.86	107.58	89.94	108.75

Table 1 shows the dataset after performing SSGBSAT.



IV. METHODOLOGY

S.no	Symbol/Functions	Description
1	C1	Contempt
2	A1	Anger
3	D1	Disguise
4	S1	Sad
5	S2	Surprise
6	J1	Joy
7	F1	Fear
8	Max1	Maximum
9	timg	Target image
10	iimg	Input image

Table 2 shows the Nomenclature for SSGBSAT Algorithm.

Algorithm SSGBSAT (max1, res, timg, img, paste, plot)  
//as shown in Table 2.

Step1 Read the images from the repository using the function

readjpeg (c1, a1, d1, s1, f1, j1, s2);

1.1 Check if the images are fetched a result is true Raster the image

```

1.2 Plot the image the graph
    If (imageexists("raster image"))
    {
        Plot (0:2, type='n')
    }
    
```

Step 2 Store the length of the target images in L

L <- (a, b, c, d, e, f, g)

2.1 check the length of the images with the target images

if(length(timg)==length(img))

2.2 Now check the pixel and calculate the rate of sentiment and print the percentage.

```

{
    paste(100*sum(timg==img)/length(img1),"%")
}
    
```

Step 3 Store the result of sentiments individually as result<-L (c1, a1, d1, s1, f1, j1, s2)

step 4 Check the result of each sentiment with the maximum value.

max1<-which.max(result)

step 5 Display the desired output

V. IMPLEMENTATION

The steps that were followed in carrying out the sentimental analysis on the handwritten data are as follows.

1. Crop the images to remove the unwanted noise and set the resolution of each image at 50%
2. After cropping sort, the bitmap data and store into different folders department wise so that it can easy to fetch.

3. Store the predefined set sentiments as target images in a different location.
4. Apply SSGBSAT on the input images individually to get the percentage of sentiments on each image.
5. Repeat the algorithm for all the images.
6. Calculate the total percentage of contempt, anger, disgust, joy, sad, surprise, fear.
7. Compare results of each sentiment with the with other sentiments.
8. e.g.: compare the total percentage of Joy with the results of Anger, disguise, contempt, fear, sad, and surprise.
9. Now the desired output is obtained

VI. RESULTS

As visualize in Figure 1 and Figure 2, it is clearly shown that contempt sentiment is more in students, which shows their neutrality. The approach of SSGBSAT to perform handwriting analysis is the basic and finest approach which is tested on students. Further, we are going to test this approach on job-seekers and employees in future to find out the requirements of employer. This opens a window for job-seekers about what is missing.

In Figure 2, CE stands for Civil Engineering, CSE stands for Computer Science Engineering and ME stands for Mechanical Engineering.

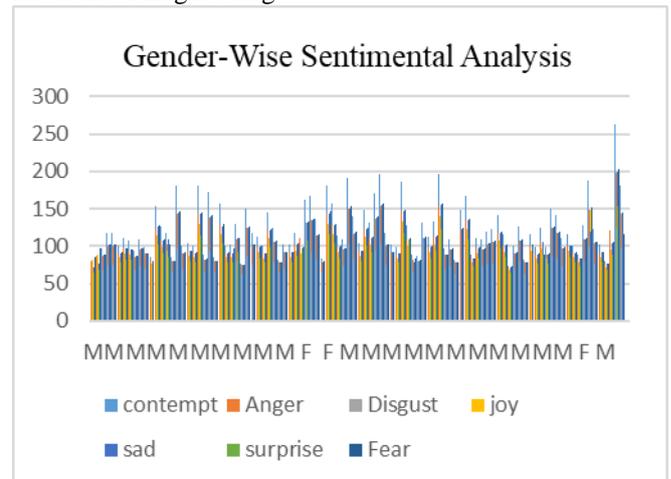


Figure 1 shows gender-wise sentimental analysis

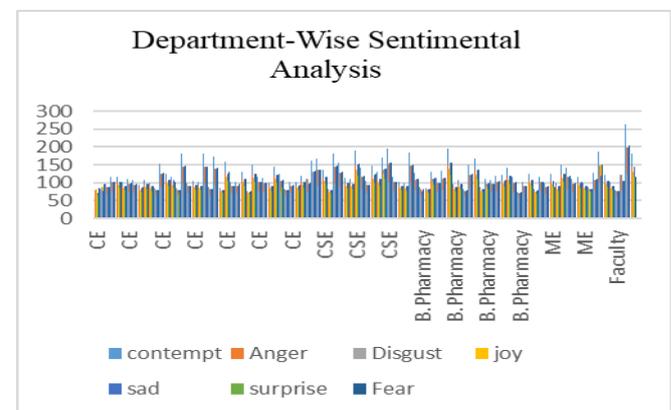


Figure 2 shows department-wise sentimental analysis



## VII. CONCLUSION

The prepared methodology gives a well-defined approach to perform the analysis on the handwritten data of 100 people including 91 students and 9 faculty members. The methodology will compare the seven different personality traits of a person. This algorithm is very efficient as it calculates the percentage of the sentiments on the handwritten text. Not measuring the speed can be the drawback of this methodology. Calculating the speed can provide the better and more accurate results [11]. It reveals the rate of trueness of seven sentiments present in a person while he/she was writing the text. It can be used to predict the negative behavior of any person at early stage so that counseling can be done to keep the person away from the same [12]. This is simple technique and anyone can apply it on the data and it is not restricted to take one character only instated a whole statement can be checked to get good results. The accuracy rate of percentage was achieved.

## ACKNOWLEDGMENT

Completing a research and coming up with a conclusion cannot be accomplished without proper guidance. Having a perfect guide to assist is a blessing. Here I heartedly acknowledge to all those who guide me throughout my entire research especially Mohammad Shabaz.

## REFERENCES

1. Ashok Bandyopadhyaya, Bhaswati Mukherjeeb, Abhisek Hazrab, "Perception Based Decision Support System for Handwriting Behaviour Analysis," 7th International conference on Intelligent Human Computer Interaction, IHCI, 2015.
2. Manimala S, Megasree G, Poornima G Gokhale & Sindhu Chandrashekhar, "Automated Handwriting Analysis for Human Behavior Prediction," International Journal of Computer Science and Engineering (IJCSE), ISSN(P): 2278-9960; ISSN(E): 2278-9979 Vol. 5, Issue 5, Aug - Sep 2016.
3. Ricard Coll, Alicia Fornés, Josep Lladós, "Graphological Analysis of Handwritten Text Documents for Human Resources Recruitment," Computer Vision Center - Computer Science Department Universitat Autònoma de Barcelona Spain {rcoll, afornes, josep}.
4. 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, (0975 - 8887) Volume 8- No.12, October 2010.
5. Prachi Joshi, Aayush Agarwal, Ajinkya Dhavale, Rajani Suryavanshi, Shreya Kodollikar, "Handwriting Analysis for Detection of Personality Traits using Machine Learning Approach," International Journal of Computer Applications, (0975 - 8887) Volume 130 - No.15, November 2015.
6. Hemlata, Manoj Sachan, Shailendra Kumar Singh, "Personality Detection using Handwriting Analysis: Review," The Seventh International Conference on Advances in Computing, Electronics and Communication - ACEC, 2018.
7. Sunday Olatunbosun, Aaron Dancygier, Jayson Diaz, Stacy Bryan, and Sung-Hyuk Cha, "Automating the Lewinson-Zubin Handwriting Personality Assessment Scales," Proceedings of Student-Faculty Research Day, CSIS, Pace University, May 8th, 2009.
8. Akshita Chanchlani, Pratima Kharade, Rutuja Kapase, Sonal Janvalka, Aakanksha Jaitly, "Predicting Human Behavior through Handwriting," International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887, Volume 5 Issue X, October 2017.

9. Syeda Asra, Dr. Shubhangi DC, "Identification of Personality Trait by Handwriting Analysis Using SVM Classifier," IPASJ International Journal of Computer Science (IJCS), Volume 5, Issue 11, November 2017.
10. Ashish Kathaitand Ajit Singh, "Automated Prediction of Human Behavior System for Career Counselling of an Individual through Handwriting Analysis /Graphology," HCTL Open International Journal of Technology Innovations and Research (IJTIR), Volume 12, December 2014.
11. Parmeet Kaur Grewal, 2 Deepak Prashar "Behavior Prediction Through Handwriting Analysis," IJCST, Vol. 3, Issue 2, April - June 2012
12. Ashish Kathait and Ajit Singh, "Automated Prediction of Human Behavior System for Career Counselling of an Individual through Handwriting Analysis/Graphology," HCTL Open International Journal of Technology Innovations and Research (IJTIR), Volume 12, December 2014

## AUTHORS PROFILE



**Shaista bin-ti Naziris** is a scholar, pursuing her M.Tech in Computer Science Engineering from Universal Institute of Engineering & Technology, Lalru, Mohali, Punjab.



**Mohammad Shabaz** has done B.Tech, M.Tech and pursuing his Ph.D in Computer Science Engineering from Chandigarh University, Mohali. He is currently acting as HOD in Computer Science Engineering at Universal Institute of Engineering and Technology (UIET), Lalru. His Publication includes many UGC, Scopus and ESCI.