

# **Application of graphology to predict personality based on structure of handwriting through an authenticated database**

**By**

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**UNDER THE GUIDANCE OF**

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**PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF  
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**TO WHOM IT MAY CONCERN**

I hereby recommend that the Project entitled “**Application of Graphology to predict personality based on structure of hand writing and signature through an authenticated database**” prepared under my supervision by **Sanchari Das** (Reg. No.141170110059 , Class Roll No. CSE2014/002 ), **Anasuya Majumder** (Reg. No.141170110005 , Class Roll No. CSE/2014/021 ), **Sangita Jana** (Reg. No. 141170110060 , Class Roll No. CSE/2014/025 ), **Rituparna Das** (Reg. No.141170110050 , Class Roll No. CSE/2014/058), of B.Tech (7<sup>th</sup> /8<sup>th</sup> Semester), may be accepted in partial fulfillment for the degree of **Bachelor of Technology in Computer Science & Engineering** under West Bengal University of Technology (WBUT).

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**CERTIFICATE OF APPROVAL**

The foregoing Project is hereby accepted as a credible study of an engineering subject carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite to the degree for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein, but approve the project only for the purpose for which it is submitted.

FINAL EXAMINATION FOR  
EVALUATION OF PROJECT

1. \_\_\_\_\_

2. \_\_\_\_\_

(Signature of Examiners)

## ACKNOWLEDGEMENT

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## **1.INTRODUCTION:**

Handwriting Analysis is a scientific method which identify, evaluate and understand an individual's personality. Strokes, patterns and pressure applied while writing can reveal specific personality traits. Emotional outlay, fears, honesty and defences are the true personality which are determined. Handwriting examiners called graphologists analyze handwriting samples for personality detection. There are various techniques to predict the personality. It begins with collecting the handwriting samples on plain white A4 size paper. Handwriting analysis needs to perform preprocessing steps such as binarization and noise removal etc for better recognition.

Graphology or handwriting analysis is a scientific study of handwriting used to analyze an individual's personality. Our handwriting tells a lot about our personality and helps us come to know ourselves better; it tells us about our nature, our positive and negative traits, our behavior. Factors such as placing of i-dots, t-bars, angles / slant, size, speed, margins, heights, ending strokes, pressure, upper, lower, and middle zones, word spacing, letter spacing and even flourishes and many other factors are considered for a complete graphology analysis and accurate examination. Advancements in Graphology today also help and is used for diagnosis of diseases. Medical Graphology can be an useful psychological / scientific tool to analyze handwriting for diagnosing both physical and mental illnesses. It is also often used for forensic analysis.

At first, we are supposed to collect the samples of as many letters among the twenty six English alphabets. Then we will be collecting the characteristics with respect to those samples from specialists. After that, the mapping of samples corresponding to the respective characteristics is to be done in a database. At the end of completion of database formation, we will be carrying out the authentication of the database with the help of graphologists.

## 2. Review of Literature

In this paper “Off-Line Cursive Word Recognition, *Proceedings of the IEEE*, Vol. 80, pp1150-1161 [J. C. Simon (1992),]”<sup>[1]</sup> we have studied that the state of the art in handwriting recognition, especially in cursive word recognition, is surveyed, and some basic notions are reviewed in the field of picture recognition, particularly, line image recognition. The usefulness of 'regular' versus 'singular' classes of features is stressed. These notions are applied to obtain a graph, G, representing a line image, and also to find an 'axis' as the regular part of G. The complements to G of the axis are the 'tarsi', singular parts of G, which correspond to informative features of a cursive word. A segmentation of the graph is obtained, giving a symbolic description chain (SDC). Using one or more as robust anchors, possible words in a list of words are selected. Candidate words are examined to see if the other letters fit the rest of the SDC. Good results are obtained for clean images of words written by several persons.

From this paper:” Recent achievements in off-line handwriting recognition systems [ B. Verma, M. Blumenstein & S. Kulkarni]”<sup>[2]</sup> we have learned that two main approaches for the problem have been identified:

- 1) a global approach
- And
- 2) a segmentation approach.

The first approach entails the recognition of the whole word by the use of identifying features. The second approach requires that the word be first segmented into letters. The letters are then recognised individually and can be used to match up against particular words. Recently many researchers have been driven to develop off-line recognition systems due to the challenging scientific nature of the problem and secondly its industrial importance. The latter arises from numerous applications of handwriting recognition systems. Some of these include: postal address recognition, reading machines for the blind, processing manually filled-out tax forms, and bank cheque recognition.

In the paper “Line and Word Segmentation of Handwritten Documents [G. Louloudis et al.]”<sup>[3]</sup> explains in detail the segmentation of handwritten documents into lines and words using connected components. There is a huge amount of documents in libraries and in various National Archives that have not been exploited electronically. Although automatic reading of complete pages remains, in most cases, a long-term objective, tasks such as word spotting, text/image alignment, authentication and extraction of specific fields are in use today. For all these tasks, a major step is document segmentation into text lines. Because of the low quality and the complexity of these documents (background noise, artifacts due to aging, interfering lines), automatic text line segmentation remains an open research field. The objective of this paper is to present a survey of existing methods, developed during the last decade and dedicated to documents of historical interest.

From this paper” Handwritten text recognition system based on neural network [ N. Nain and S. Panwar]”<sup>[4]</sup> we studied that offline recognition is performed on a scanned image of handwriting and thus contains no temporal data. In general, handwriting recognition is classified into two types as off-line and on-line handwriting recognition methods. In the off-line recognition, the writing is usually captured optically by a scanner and the full text is available as an image therefore it contains no temporal data. Some existing techniques are fusion based segmentation method. In this approach, over segmentation of words from text based on pixel density between upper and lower base line with multiple expert base validation for character recognition and classification has been developed. feature extraction depends on Euclidean distance between testing point and reference point. Which is used to calculate KNN neighbor. This method could classify images containing single characters. In N-gram, training is done on text corpus and character can be recognized belonging to this corpus only. We propose a system which could extract characters from running text. This has been attained by

addressing all the individual steps of character recognition like: binarization, line segmentation, skew correction, slant correction, baseline , positioning, to individual character recognition.

From this paper “Off-Line Handwriting Recognition using Genetic Algorithm[S. Mathur, V. Aggarwal, H. Joshi, A. Ahlawat” ]<sup>[5]</sup> we have studied that here is recognition of text written in ‘English’, but do not involve any combinations of artificial neural networks and optimization techniques such as genetic algorithms which lead to lower efficiency in recognition as compared to the ones that our approach here presents. Several areas have seen application of neural networks such as the Processing of Verbs and Nouns , Face Detection and Real-time Face Detection . The application of genetic algorithms in various areas like initial population generation methods , mooring pattern optimization , substitution ciphers and designing of reverse logistic networks has proved its advancement over its predecessors. The handwriting recognition model described here works at three stages, segmentation of the handwritten text, recognition of segmented characters with the help of artificial neural networks and lastly selecting the best solution from the four artificial neural network outputs with the help of genetic algorithm.

From this paper “Offline handwriting analysis and personality recognition[ A. Dutta, J. Lladós, and U. Pal]” <sup>[6]</sup> we have learned that:

most companies today need to have lower costs for archiving and transmission of document and in the same time it was posed the security question. The answer has been the digital biometric signature: Biometrics is actually the science of using digital technologies to identify a human being based on the individual’s unique measurable biological characteristic. Applied to handwriting, biometrics enable the comparison between digital signatures in order to avoid falsification and disclaimer. This is a new challenge in forensic examinations because time are not yet ready for experts: more and more often we are called to compare on-line/biometric signature with on-paper ones or two (or more) signatures taken with different software and instruments.

From this page “English sentence database for offline handwriting recognition [U.-V. Marti, H. Bunke]” <sup>[7]</sup> we studied that The availability of large amounts of data for training and testing is a fundamental prerequisite for building handwriting recognition systems with high recognition accuracy. Furthermore, the comparison of various recognition methods has become a focus of attention recently.

Therefore, the acquisition and distribution of standard databases has become an important issue in the handwriting recognition research community . Examples of widely used databases are , and in the offline domain; for online; and as well as PE92(Korea) in the field of oriental handwriting recognition. However, these databases contain mostly isolated characters or single words. There is definitely a lack of databases that contain large amounts of general unconstrained handwritten English sentences, produced by different writers. The NIST database contains instances of the Preamble of the American Constitution, but the vocabulary is too small to be useful for realistic applications. Another database containing English sentences is described in . However, all sentences in this database were written by the same person and the underlying vocabulary is rather small. In this paper we describe the actual version (as of October 2000) of the IAM-database1 that contains full English sentences.

The database consists of 82,227 instances of handwritten words distributed over 9,285 lines of text produced by approximately 400 writers. The underlying lexicon includes 10,841 different words. The database can be used to train and test word and sentence recognizers. All texts come from the LOB corpus, which is electronically available. Hence, it is possible to automatically generate various kinds of language models. This property makes the database particularly interesting for the development of handwriting recognition systems that use linguistic knowledge beyond the lexicon level . However, the handwritten texts can also be used for other tasks in the domain of unconstrained handwriting recognition, such as segmentation or writer identification .

The database described in this paper is freely available to other researchers upon request. An earlier version of the database was described in . Meanwhile, the database has grown and became almost twice as large. Because of space limitations, the description given in is rather short. In the present paper a much more detailed



description is provided. In particular, a complete description of the image processing routines that are part of the database is included. These image processing routines allow a user of the database to perform recognition experiments without the need of developing his or her own low-level image processing and segmentation procedures. A novel feature of the database compared to the version described in is a set of routines that segment lines of text into individual words.

From this paper "An overview of character recognition focused on off-line handwriting. IEEE Trans. Syst. Man Cybern. C Appl. 31(2), 216–232 (2001) [ Arica N., Yarman-Vural F.T]"<sup>[8]</sup> we studied that character recognition (CR) is used as an umbrella term, which covers all types of machine recognition of characters in various application domains. The overview serves as an update for the state-of-the-art in the CR field, emphasizing the methodologies required for the increasing needs in newly emerging areas, such as development of electronic libraries, multimedia databases, and systems which require handwriting data entry. The study investigates the direction of the CR research, analyzing the limitations of methodologies for the systems, which can be classified based upon two major criteria: 1) the data acquisition process (on-line or off-line) and 2) the text type (machine-printed or handwritten).

From paper "Handwritten document retrieval [ G. Russell]"<sup>[9]</sup> we studied that the value of computerized storage of handwritten documents would be greatly enhanced if they could be searched and retrieved in ways analogous to the methods used for text documents. If precise transcripts of handwritten documents exist, then information retrieval (IR) techniques can be applied; however, such transcripts are typically too costly to generate by hand, and machine recognition methods for automating the process of transcript generation are far from perfect . Thus, such transcripts are usually incomplete or corrupted by incorrect transcriptions.

From this paper "Personality Prediction Through Offline Handwriting Analysis [ Farhana Rizvi]"<sup>[10]</sup> we studied that the graphologist provides a window into personality structure . By examining all elements of handwriting and interpreting them separately and together the graphologists generate a thumbnail Outline of the writer's character traits.

With the help of graphology, handwriting analysts predict the viewpoint, behavior, mood or pose. In this paper, a method has been proposed to predict the personality of a person from the features extracted from his handwriting. The personality traits revealed by two aspects. Sentence wise and Paragraph wise . Five parameters will be defined of a sentence, Length of sentence, slop of words, slant, pen pressures, and printed sentences. We can analysis person's handwriting. It's not true that writing and writing styles of persons will be same.

Graphology is the study of handwritings. It is valuable technique or method for the assessment of a person's personality. It gives us help in many organizational processes for example Employment, Job seeking interviews and future planning. Handwriting Analyzer is a scientific method for writer identification and evaluating the behavior. To make this general layout as direction of lines, spacing, speed of writing, impressions. Many European countries are well known in graphology, Particularly in France, Germany, Switzerland, Belgium, Netherlands and Britain. Graphology is taught as a subject. Graphologists are license holders in these countries.

They are applying it in many ways, for example Psychologists taking it as a useful diagnostic tool. It's understood that it is a cheapest and fastest information provider about writer character, emotions and self-awareness and aptitudes. Handwriting features can be identified by Graphologist. These features are used for analysis. Such user defined Handwriting Analyzer will provide a base of features which will be extracted by inputting some information. For such information define some parameters. Scammers can use to read such parameters. Personality predictions through user define Handwriting Analyzer uses a step by step approach. First step is to enable a computer to detect and understand handwriting. Here our software helps us to generate a full picture of our handwriting sample Furthermore. The digital sample collection is easy and cheaper which can be used as input for computer and through image processing technique. Features are calculated and prediction about the personality of the writer is passed there on. Initially, some features are used which are most vital for judging and the prime focus is feature mining and its classification. Here are writing samples of different age groups and different gender

Graphology is classified into different types or kinds of handwritings. This will allow us to tell not only where in certain handwritings look like one another, but also to distinguish the differences between the chirography of one person and that of another, for it very repeatedly happens that although realize there's a difference between two handwritings we are unable to tell in just what particular features the differences exists, so that perceive at once the necessity for adopting some method of classification as a basis for the proper understanding of the subject.

From this paper "Handwriting Recognition – "Offline" Approach [ P. Shankar Rao, J. Aditya] "<sup>[11]</sup>we have studied that the central tasks of off-line handwriting recognition are character recognition and word recognition. Document analysis is the necessary preliminary step in recognition that locates appropriate text when complex, two-dimensional spatial lay-outs are employed . Different approaches have been proposed to offline recognition that have contributed to the present day efficiency of the technique.

Several types of analysis, recognition, and interpretation can be associated with handwriting. Handwriting recognition is the task of transforming a language re-presented in its own spatial form of graphical marks into a symbolic representation . Handwriting interpretation is the task of determining the meaning of a body of handwriting, e.g., a handwritten address.

Handwriting identification is the task of determining the author of a sample of handwriting from a set of writers. Identification and verification are processes that determine the special nature of the writing of a specific writer, while handwriting recognition and interpretation are processes whose objectives are to filter out the variations so as to determine the message. The task of reading handwriting is one involving specialized skills. A common complaint and excuse of The field of off-line handwritten word recognition has advanced greatly in the past decade and thus the theme of this paper.

This paper "Instant Hand Writing Analysis [Ruth Gardener] "<sup>[12]</sup> explains several types of charecters and their corresponding charecteristics of that particular charecters. That database was mapped with the samples of charecters which were collected from several handwritings of different people. Here some letters like 'd', 'i', 'o', 'a', 'g', 't', 's' were explained with their corresponding charecteristics. With the help of this paper we were confirmed that the collected letters and their corresponding charecteristics were authenticated.

This paper "Combining Online and Offline handwriting recognition , [Alessandro Vinciarelli]"<sup>[13]</sup> explains the online input data is first transcribrd by the online recognizer.then converted into an offline bitmap and recognized by the offline system.The output of trge two recognizers are then combined probabistically resulting in a classifier out-performing both individual systems.experiments were performed over a dabse of single digits.The error rate of the online recognizeris reduced by 435 when the combination with the offline system is applied .

From "A Survey on offline Cursive Word Recognition,[AlessandroVinciarelli]"<sup>[14]</sup> explains a survey on offline cursive script recognition .The approaches to the problem are described into detail.Each step of the process leading from raw data to the final result is analyzed. This survey is divided into two parts.the first oned dealing with the general aspects of cursive script. The second one focusing on the applications presented in the literature.

### **3.Objective of the Project**

Our interest in handwriting stems from the wealth of information that it can provide about the social and cultural life of individuals and communities, as well as the neurocognitive and physiological mechanisms of the human body. The Description of the physical aspects of the written word, its production and Perception is a central basic research that feeds the discussion of handwriting at Higher level.

We look for commercial or public domain software able to measure anyphysical characteristic of handwriting, such as slant, cursively, character sequence and other temporal aspects, density, regularity, etc. The extracted data has to be available for further processing and interpretation, software that analyse given aspects but don't display the measurements, being not useful for our goals (ex.: a signature verification software not explicating the kinds of HWA it performs). We prefer software that is not script specific (ex.: not restricted to features particular to the Latin script). Since physical aspects rather than semantic are our primary concern, optical character recognition software will not be documented here. A spin-off result of our research was the mapping of the aspects characterizing handwriting and the various scientific fields relating to handwriting analysis. Such an overview did not exist despite the breath of the research and the cultural status that handwriting enjoys.

One of the major parts of our work is to create a database and determine that it is authentic. The database will be consisting some of the characters of English alphabet. Each character will be having different samples and different varieties. Each sample would be having its respective characteristics. Later on, after the samples of different persons which would be collected,will be mapped with that of the database. When match would be found, the traits of the person can be determined.

## **4.SYSTEM DESIGN:**

### **SOFTWARES USED:**

We have mainly used Microsoft Windows 10 as the platform for implementing the Handwriting Recognition System. Also we have used MATLAB as the coding platform to implement the system and depict the procedure of each step and display the corresponding output. The software requirements in the system building the process are as follows.

**Microsoft Windows 10**

**MATLAB**

### **HARDWARES USED:**

The following hardware components needed in combination to our system for successful handwriting analysis are as follows:

**Digital camera**

**4 GB RAM**

**Mouse**

**Monitor**

### **INPUT GIVEN**

Images of handwriting samples of different people are given as inputs.

## 5.METHODOLOGY FOR IMPLEMENTATION

### 5.1. PRELIMINARY THEORITICAL CONCEPTS

#### 5.1.1. Concepts

Handwriting is a mirror which reflects the entire personality of the writer. Handwriting is in fact "Brainwriting" as we can control our mind about WHAT to write, but not HOW to write. In addition to this, Handwriting is peculiar to a particular person. Thus, it proves to be an essential weapon in inferring the personality and emotional outlays of the writer. Analysis of handwriting helps us understand the writer's personality in a way which reveals his/her behavior, motivations, desires, fears, emotional outlays and many other aspects. Handwriting Analysis is the science of interpreting these characteristics. It also discloses the health issues, morality, past experiences, mental problems and hidden talents of the writer.

#### 5.1.2. Sample Collection

A handwritten test document is taken as input along with the time elapsed to complete the document. A device is used to take the input as it is being written for online analysis.

#### 5.1.3. Image Pre-processing

Image pre-processing [1] is the technique in which the handwritten sample is translated into a format which can be easily and efficiently processed in further steps. These steps involve binarization, noise removal, line segmentation, word segmentation and skew normalization. Binarization converts gray scale image into binary image. Quality of the converted image is improved by applying noise removal techniques.

#### 5.1.4. Line Segmentation

After binarization and noise removal, the converted image is processed through a line segmentation [1] technique to split the hand-written document into separate lines based on rising section of the horizontal projection histogram of document image.

In English handwriting [3] document image, most of the time no gaps are present between two lines, which may create incorrect line segmentation due to overlapping between two lines if simple horizontal projection histogram is concern. After creating the horizontal projection histogram of a binary document image, count the number of rising section and height of each rising section. The average height of the rising sections is treated as the threshold. Then consider each and every rising section and check the height of that rising section is greater than or equals to the threshold or not. If yes then based on that rising section of the horizontal histogram, the line was individually segmented from the actual binary document image, otherwise neglect that rising section as a false line segment. These types of the false rising section may occur due to overlapping between two lines or presence of a bar in an upper letter. The most important are that when a rising section is treated as a false line segment and next rising section is treated as a true line segment then the portion of the false line segment is added to true line segment for the segmentation of next line from the actual document image, otherwise, some features are removed.

#### 5.1.5. Methods for Emotion Recognition

Emotions depict the state of mind of a person through different ways like facial expressions, voice of speech, expressions in eyes, body language, text written and handwriting. They have a huge impact on any person and greatly influence his attitude and behavior and as a whole his life. The techniques to detect emotions are wideranging.

Some of them are described below:

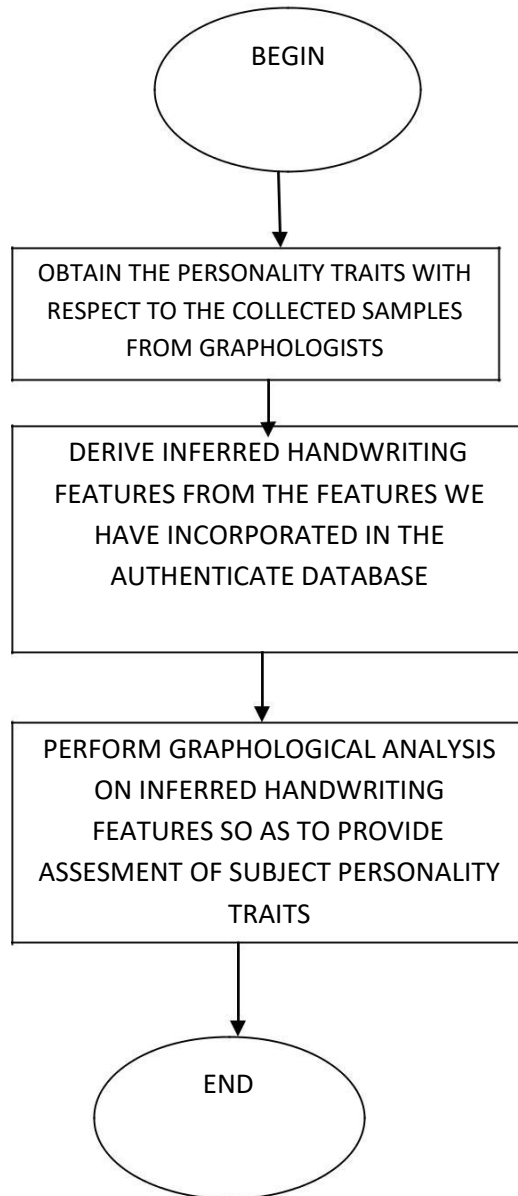
#### 5.1.6. Emotion Recognition through Handwriting Analysis

Handwriting is unique to every person and it is an instant photograph of how we think, feel, and behave at that moment. It is a form of expressive moment frozen on the paper, through which physiological and psychological functions are revealed. The handwriting of a person undergoes certain variations with his changing frame of mind and emotions. The person's disposition, whether glad or contented, happy or excited, sad or disappointed, are spoken out through his handwriting. These emotions [3,4] can be characterized through various handwriting indicators or traits of writing like Baseline, Slant, Pen-pressure, Size, Strokes,

Spacing, Margins, Loops, i-dots, t- bar etc are listed in **Table 1.1**. These features and emotions depicted by them are further described in following subsections.


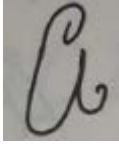

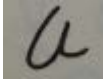

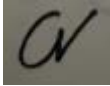

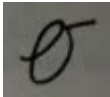
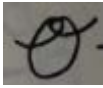
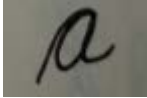
| Dynamic features         | Static features            |
|--------------------------|----------------------------|
| Pressure Acceleration    | Horizontal Midpoint        |
| Cartesian Displacement   | Width of a word            |
| Horizontal Displacement  | Vertical Midpoint          |
| Vertical Displacement    | Height of a Word           |
| Displacement in Pressure | Height of a Capital Letter |
| Number of Pen-Ups        | Height of an Upper Zone    |
| Duration of Writing      | Height of a Middle Zone    |
| Cartesian Acceleration   | Height of a Lower Zone     |
| Horizontal Acceleration  | Height of Ascender         |
| Vertical Acceleration    | Height of Descended        |
| Pressure Acceleration    | Space between Word         |

## 6. IMPLEMENTATION DETAILS





## Database

### Character lowercase "a":

|   |   |
|---|---|
|    | likes the simple and unadorned, straight forward in most things and usually signifies, intelligence if writing is good form |
|    | Vulgar, bad taste, probably ostentatious.   |
|    | Honest, reserved , if all ovals are closed, then secretive.   |
|    | talkative and honest  |
|   | gross deceiver  |
|  | hidden greed, perhaps due to resentment   |
|  | selfish, dishonest, cunning, evasive  |
|  | not totally honest with others  |
|  | dishonest to both self and others   |
|  | misrepresents self  |

### Character lowercase "d":

|   |   |
|---|---|
|  | Idealistic and/or religious aspect present, as stroke reaches into upper zone; if stem retraced, then very dignified.                         |
|  | Thin skinned, very sensitive. The loop on the upper zone denotes imagination regarding self. Compulsive about imagining unintentional sights. |





Unreliable and dishonest



Talks about self



Secretive about individual affairs



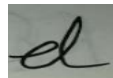
Humble, independent worker



Aesthetic, poetic taste, flirtatious.



Slow spoke



Diplomatic (adjusts truth to fit situation)



Protective, musical, creative

**Character lowercase "f":**



Articulate.



perhaps narrow minded



artistic ability, intelligence, simple straight forward approach



resentful and uncompromising



strong reaction against interference



sensual



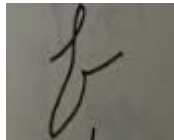
food orientation, spicily if pressure is also present.



Physical orientation, active, energetic, poor organization in some area.



Fluid or smooth thinker, original.



austere and unconcerned about image



Forms own opinions.

Character lowercase “g”:



resentment in sexual area



twisted attitude in sex and money matters



restricted or twisted attitude regarding money or sex



resentment with repression in the sexual and material aspects of life



strong interest in biological drives and materialistic matters



supervisory ability , stands on own, stubborn , independent and determined



selective of friends, clannish



good imagination, dramatic ability, friendly, interested in physical activity



literary ability, verbal fluency, fluid thinker



unknowledgeable or unfulfilled concerning sex and or money

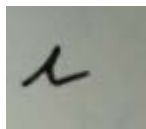


sexual or material irresponsibility

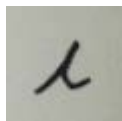


frustration in sex or money

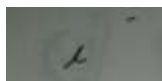
**Character lowercase "i":**



Fast thinker, in a hurry



Good imagination, dreamer



Curiosity seeker, impatient and enthusiasm



Detail conscious, accurate, precise, concentration



Careless absent minded



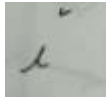
Frustrated attention demanding, imaginative, artistic, individualist, dislike routine work, likes fads, loyal to ideas and standard.



Neurotic



Observant

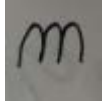


Sarcastic

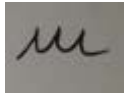


Critical

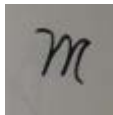
**Character lowercase “m”:**



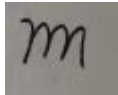
gentle, works with hands, melds, creates, logical, accumulative, analytical thinker, builds decisions on known facts



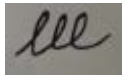
works with mind, bright thinker, fast comprehension, shifts facts quickly



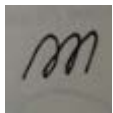
Quick-tempered. critical fault finder



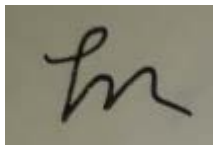
accident prone, under mental strain



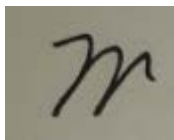
clairvoyance



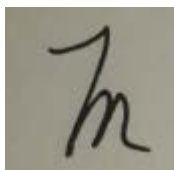
worries about others



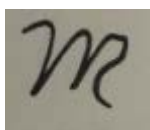
attempt to cover up worrying



dishonest

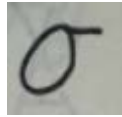


pride

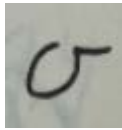


repression, shrewdness

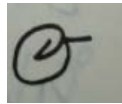
**Character lowercase "o":**



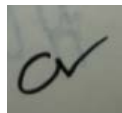
**Honest, reserved, if all ovals are closed, then secretive**



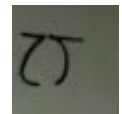
**talkative and honest**



**gross deceiver**



**hidden greed, perhaps due to resentment**



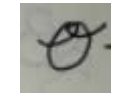
**Lack of moral value**



**Selfish, dishonest, cunning, evasive**



**Rationalizes, is not truthful with self**



**Dishonest with both self and others**



**Tells white lies**



**Talks behind others' back**

Character lower case "s"



Stubborn, investigative, curious



Yielding, gives in, pushover



Secretive



Shrewdness, greed



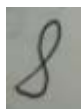
Tenacity



Artistic taste

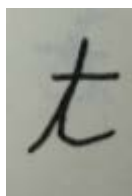


Writer stands on ceremony, does things "according to Hoyle"



Imagination in addition to the above

Character lower case "t"



Repressed nature and inexpressive



Talkative and articulate, sensitive about work, bothered by criticism; does not do as others do just because she must conform.



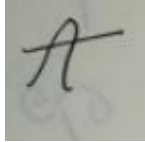
Resentful and stubborn



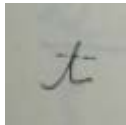
Idealistic thinker and high goals.



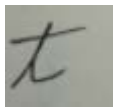
Timid, work along, and is often called independent worker; does not take chances



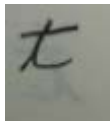
Slow worker, indolent



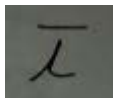
Does not compete, has less will power and vitality, sensitive.



indecisive, gives up



Firm, tendency to always be right; good will power

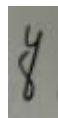


Daydreamer, shows her annoyance, unrealistic goals

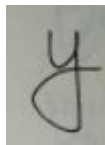
**Character lowercase “y”:**



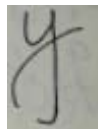
**Twisted attitude in sex and/or money matter.**



**Restricted and twisted attitudes regarding money and sex.**



**Loyal, gregarious; interested in saving money.**



**In the Y, the button of the money bag is missing, and the writers' money just disappears due to poor saving habits.**

**Resentment with repression in a sexual and material aspects of life**

**Strong interest in biological drives and materialistic matters.**

**Supervisory ability, stands on own, stubborn, independent, determined.**

**Many variety interests, restless, perhaps narrow minded.**

**Selective of friends, clannish.**

**Good imagination, dramatic ability, friendly, interested in physical activity, "on display", strong libido.**

**Literary ability, verbal fluency, fluid thinker.**

**Unknowledgeable or unfulfilled concerning sex and/o money.**

**Sexual and/or material irresponsibility.**

**Frustration on sex and money**

**Abnormal attachment of mother childhood and/or past.**

**Altruistic**

**Despondency about sex and/or money.**





**Initiative, optimism about sex and/or money.**

### 5.1 CODE FOR LINE SEGMENTATION:

```
I=imread('hand.jpg');
imshow(I)
J=rgb2gray(I);
imshow(J);
K=im2bw(J);
imshow(K)
[r,c]=size(K);
count=0;
x(1:r)=0;
for i=1:r
    count=0;
    for j=1:c
        if K(i,j)==0
            count=count+1;
        end
    end
    x(i)=count;
end

k=1;
i=1;
th=20;
while (i <= r)

    if (x(i)>th)
        start=i;
        en=i;

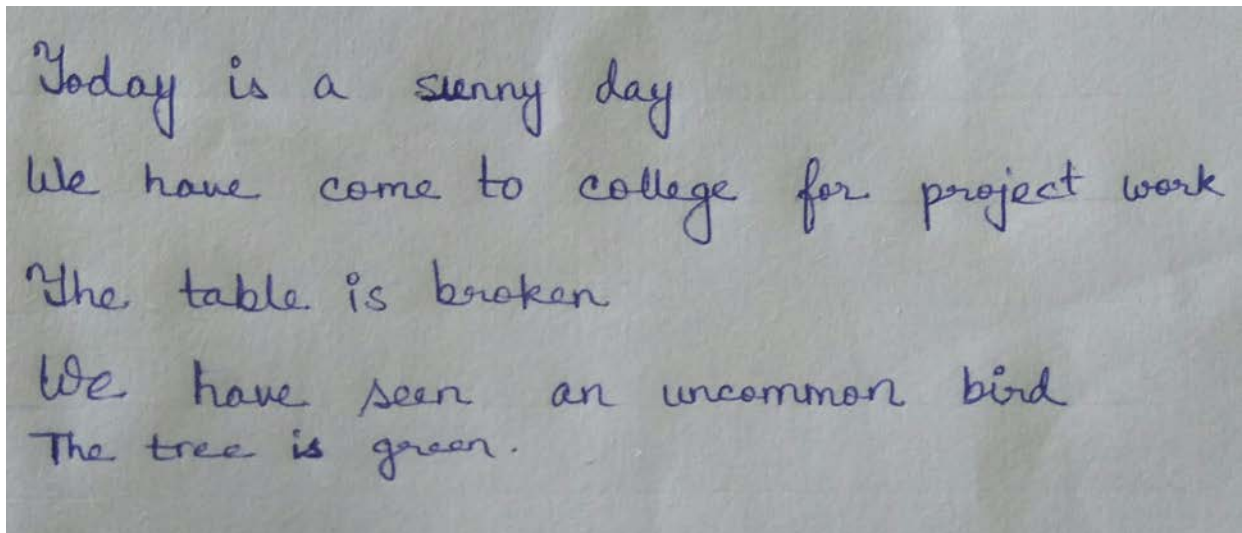
        while (x(en) > th && en <= r)
            en=en+1;
        end
        i=en+1;
        line=K(start:en,:);
        L{k}.line=line; % L(:, :, k)=line;
        k=k+1;

        figure, imshow(line);

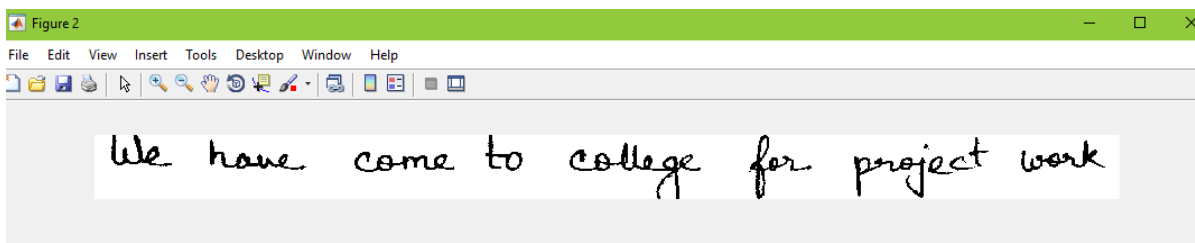
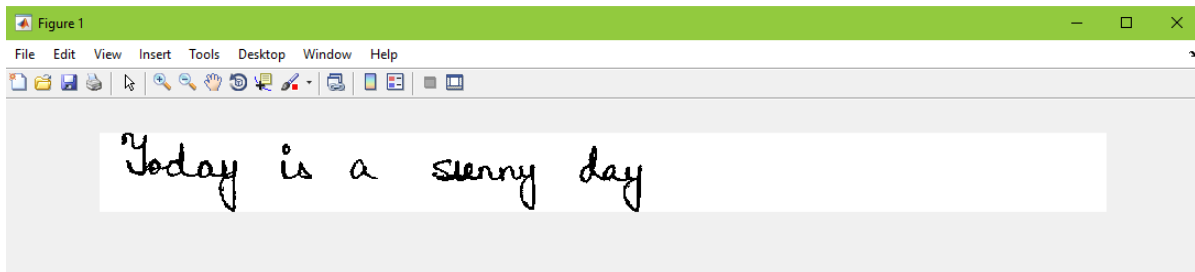
    else
        i=i+1;
    end
end

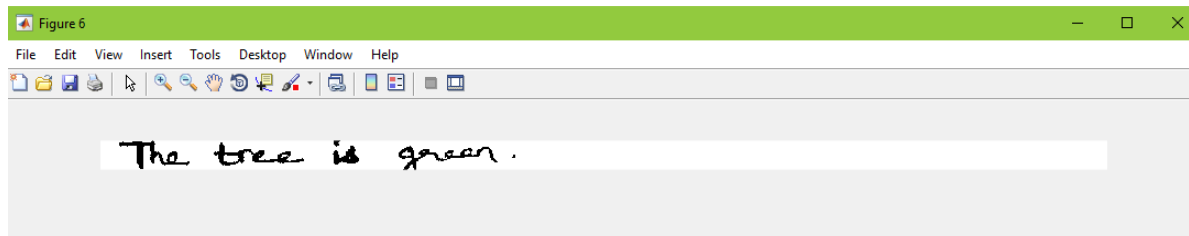
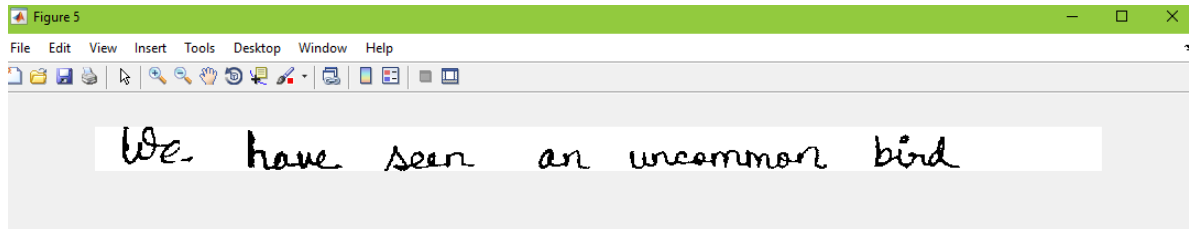
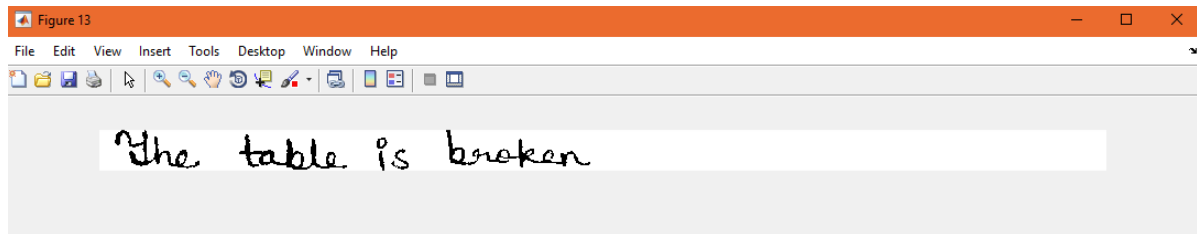
saveData(L);
```

**INPUT:**



**OUTPUT:**





## 5.2 CODE FOR WORD SEGMENTATION:

```
clc
clear
close all

load L
size(L)

I=L{1}.line;
%I=imread('word.jpg');
%imshow(I);
%J=rgb2gray(I);
%imshow(J);
%K=im2bw(I);
%imshow(K)
K=I;

figure,imshow(K)
%pause
[r,c]=size(K);
count=0;
x(1:c)=0;
```

```

for i=1:c
    count=0;
    for j=1:r
        if K(j,i)==0
            count=count+1;
        end
    end
    x(i)=count;
end

i=1;
th=0;
while (i <= c)

    if (x(i)>th)
start=i;
en=i;

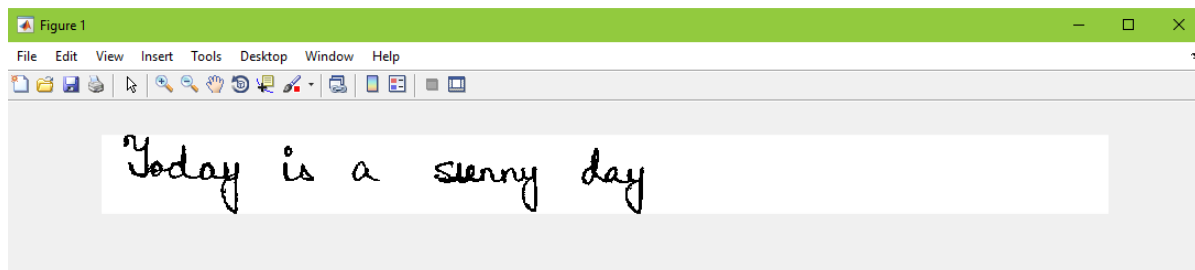
while (x(en) > th && en <= c)
    en=en+1;
end
i=en+1;
line1=K(:,start:en);
%L1{k}.line=line;
%k=k+1;
figure,imshow(line1);

    else
        i=i+1;
    end
end

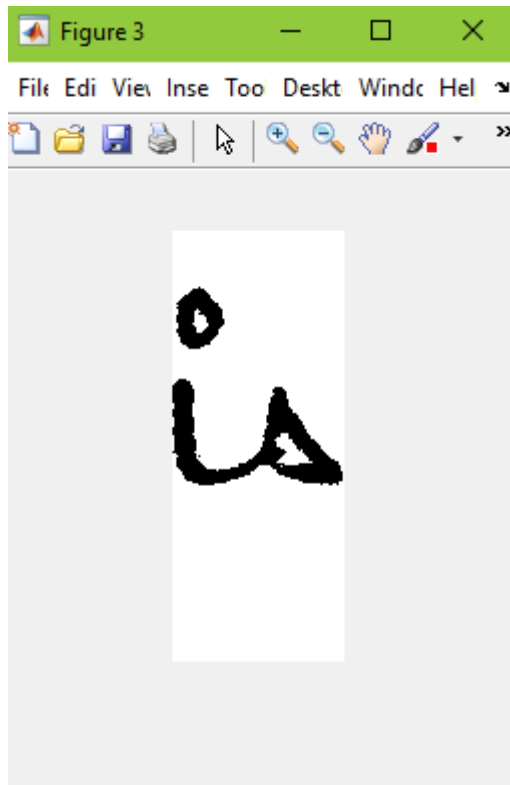
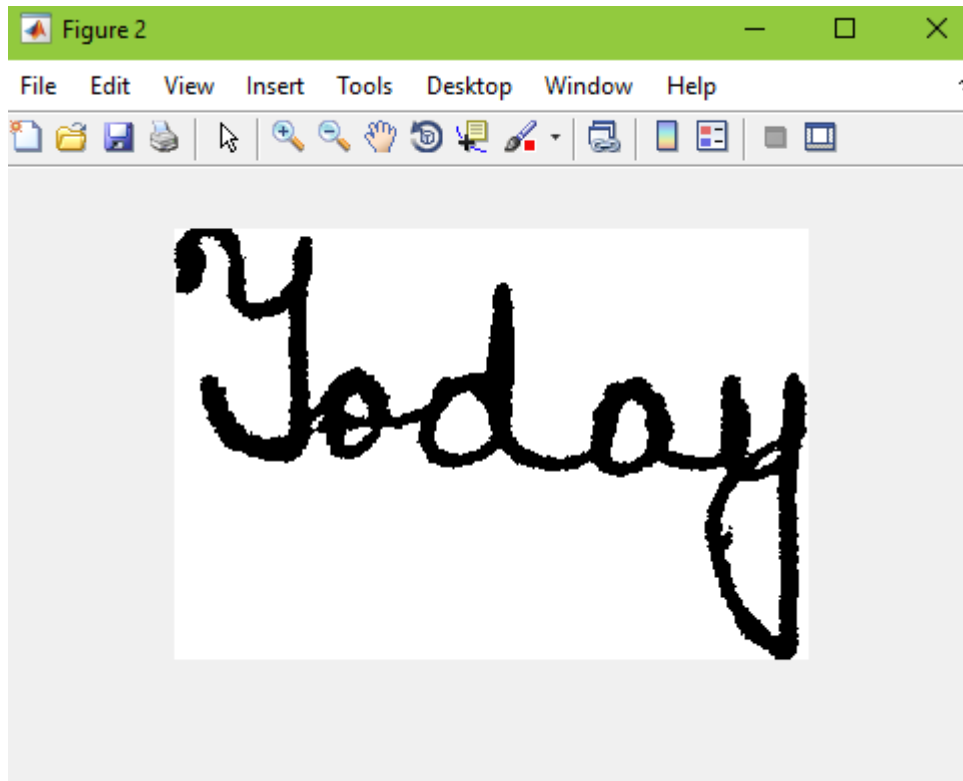
%saveData(L1);

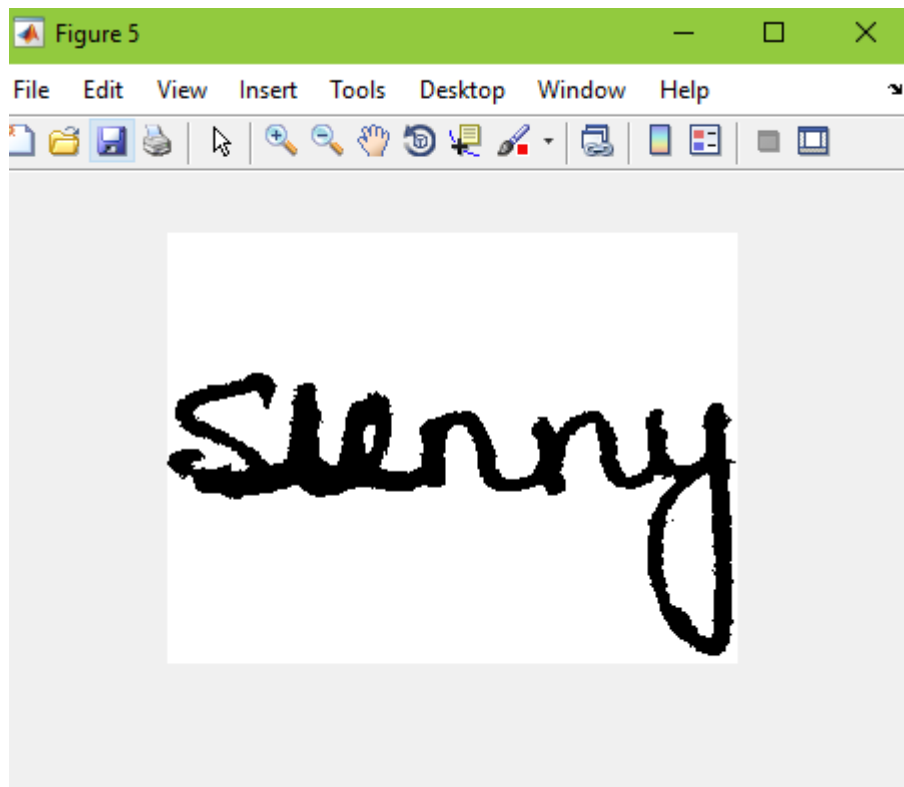
```

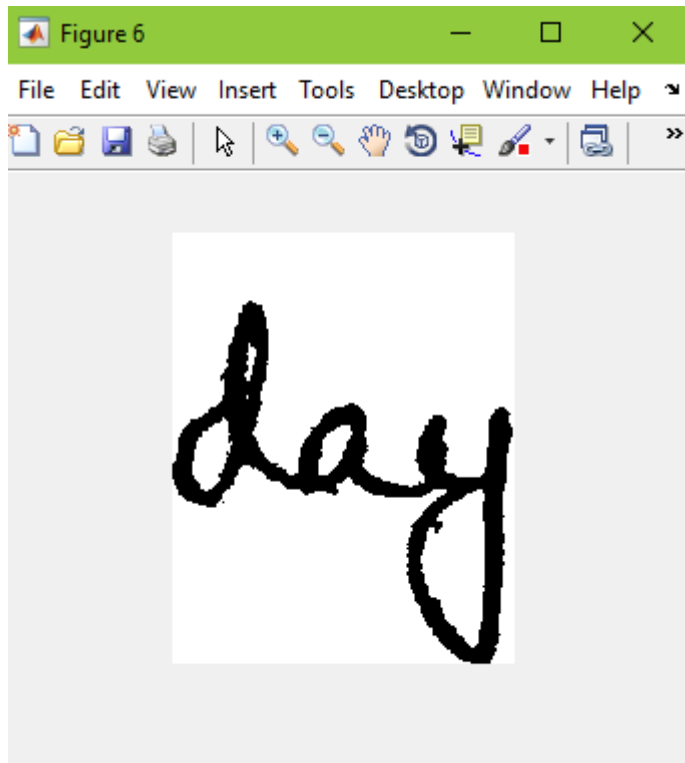
## INPUT:



## OUTPUT:







### 5.3 CODE FOR CHARACTER SEGMENTATION:

```
clc
clear
close all

load L
size(L)

I=L{1}.line;
%I=imread('word.jpg');
%imshow(I);
%J=rgb2gray(I);
%imshow(J);
%K=im2bw(I);
%imshow(K)
K=I;

figure,imshow(K)
%pause
[r,c]=size(K);
count=0;
x(1:c)=0;
for i=1:c
    count=0;
    for j=1:r
        if K(j,i)==0
            count=count+1;
        end
    end
    x(i)=count;
end

i=1;
```

```
th=10;
while (i <= c)

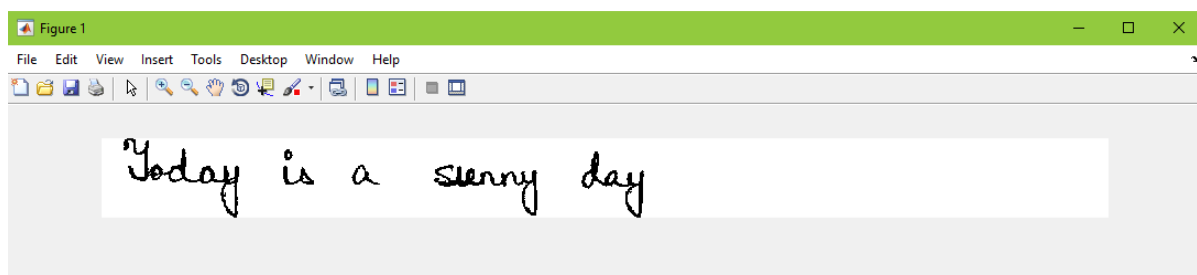
    if (x(i)>th)
start=i;
en=i;

while (x(en) > th && en <= c)
    en=en+1;
end
i=en+1;
line1=K(:,start:en);
%L1{k}.line=line;
%k=k+1;
figure,imshow(line1);

    else
        i=i+1;
    end
end

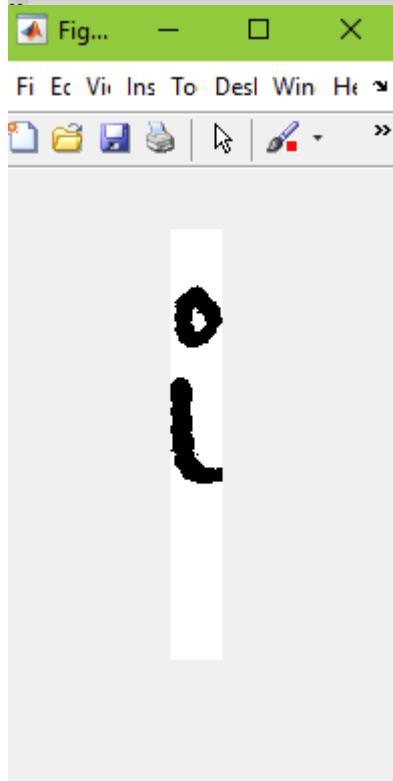
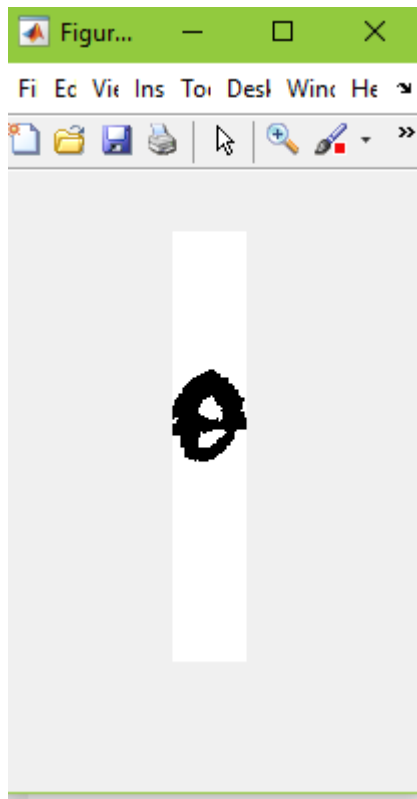
%saveData(L1);
```

## INPUT:

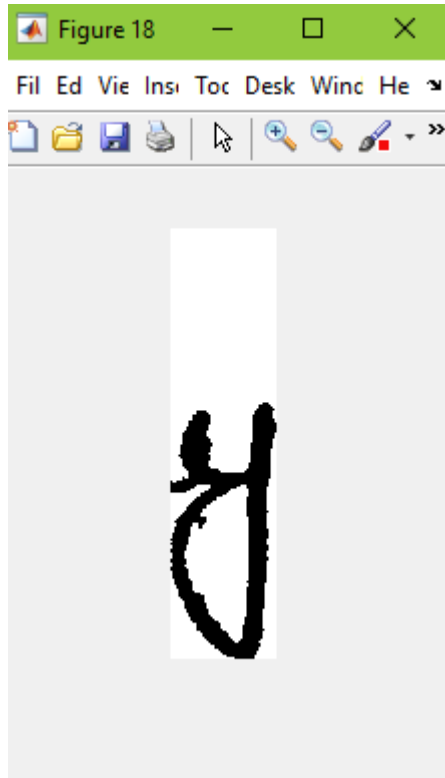


## OUTPUT:









## 7.RESULTS

**AFTER MAPPING A SAMPLE OF THE LETTER “Y” WITH THAT OF THE DIFFERENT TYPES FROM THE AUTHENTIC DATABASE:**



PEOPLE WITH GOOD IMAGINATION AND FRIENDLY

**THE SAMPLES WHICH WE HAVE COLLECTED BASED ON THE ABOVE NATURE:**

y

y

y

y

**AFTER MAPPING A SAMPLE OF THE LETTER “a” WITH THAT OF THE DIFFERENT TYPES FROM THE AUTHENTIC DATABASE:**



PEOPLE WITH SIMPLICITY AND INTELLIGENCE

**THE SAMPLES WHICH WE HAVE COLLECTED BASED ON THE ABOVE NATURE:**

a

a

a

a

## **8. CONCLUSION AND FUTURE WORK:**

Handwriting analysis has both its believers and sceptics. It can give hints or clues to parts of a person, but it has not proven that it can accurately give in depth pictures of a person's abilities or personality. More conclusive research needs to prove the validity of this practice before it is continues to be used with such blind faith. If experts insist on using traditional handwriting analysis it is imperative to use it with other things, and not let a decision reside solely on how hard a person presses down on paper with their pen. **But if we can analyse anyone's personality and his mental condition by this method, then it will be very beneficial for us.**

For example, we can determine any kind of physical or mental disabilities of a child, we can determine whether a frustrated person is suicide prone or not etc.

Depending upon this, people can be advised to live a better life and solution of any upcoming problem can also be concluded.

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