

# Specific Trait Identification in Margins Using Hand Written Cursive

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**Abstract:** Margins in handwriting reflect an individual's personality. Margins could either be narrow or wide with each showing certain personality traits about the writer. Narrow left margin indicate writer is attached to his past than to his future. Wide left margin indicates writer leaves behind ones past and continue moving. A wide right margin indicates writer may be afraid to take a future step. A narrow right margin indicates writer may be willing to take a forward step and that he may not be experiencing uncertainties at that period of his life. Balanced size indicates the writer balanced person when it comes to risk taking. The handwriting of 100 adults was submitted for graph logical analysis. The graphologist's answers to questions on the patient's personality, her description of his character and her assessment of his inclination towards past ,present and current were checked by the person's own answers to the questionnaire, by the personality descriptions in the case-sheets, and by the results of the Progressive Matrices Test. In this work carried, the performance was as high as 95%. The feature extraction was done using Zernike moments.

**Keywords:** Margins, Handwriting, Cursive handwriting, SVM,ANN.

## 1. Introduction

Personality [1] may be represented at variety of levels of psychological description. It may be associated with simple properties of the central nervous system such as excitability of individual neurons or with acquired social knowledge and belief .Personality is taken to be *what we are* while behavior is *what we do*. We cannot change what we are but we can change what we do – for short periods of time at least. The ability to change behavior is at the root of the concept of management style. Human behavior [2] refers to the range of behaviors exhibited by humans and which are influenced by culture, attitudes, emotions, values, ethics, authority, rapport, hypnosis, persuasion, coercion and genetics. Human behavior is experienced throughout an individual's entire lifetime. It includes the way they act based on different factors such as genetics, social norms, core faith, and attitude. Behavior is impacted by certain traits each individual has. The traits vary from person to person and can produce different actions or behavior from each person. Everyday conceptions of personality trait [3][4] make two key assumptions. First are stable over time. Most people accept that an individuals' behavior naturally varies somewhat from occasion to occasion, but would maintain the core consistency which defines individual's true nature like the unchangeable spots of the leopard.

## 2. Related Work

A variety of systems have been designed and implemented for identifying the personality using hand writing. The previous and the most recent system consisted of single line multiple line slope features [5] were considered based on line regression [6] and using edge orientation histogram respectively. The network was trained using ANN [7] and SVM [8].The performances

were compared using ANN and SVM. The results with SVM were found to be 97% and that of ANN was 85%.

## 3. Proposed Work

To get a holistic picture of a person's personality, not just the direction of line and its orientation is required but also about the margins. The margin is the space left with no handwriting either to the left or to the right of the handwriting. Margins could either be narrow or wide with each showing certain personality traits about the writer. The proposed work is on identifying personality based on margins. The handwriting of 100 adults was submitted for graph logical analysis [9]. The graphologist's answers to questions on the patient's personality, her description of his character and her assessment of his inclination towards past ,present and current were checked by the person's own answers to the questionnaire, by the personality descriptions in the case-sheets, and by the results of the Progressive Matrices Test.

### 3.1 image Handwriting Acquisition and Database Creation

Data samples of 500 in number were collected from people belonging to different works of life both equally from males & females. In order to make the results time and mood invariant the samples were collected in different days at different points of time. A4 paper with black ball point pen with a hard surface was used for writing .Three paragraphs were given to write. The images were scanned using laser jet scanner with a resolution of 2528x3507 pixels and 300dpi.

### 3.2 Noise Removal & Image Handwriting Pre-Processing

A global threshold of the image is found using Otsu's method [10].The image is then converted into binary image as shown in figure 2. Morphological based operation, image dilation is performed to bridge the gap between the characters in the cursive handwriting as shown in figure 3.

### 3.3 Feature Detection

#### 3.3.1 SIFT Feature

SIFT[11] feature is a selected image region (also called key point) with an associated descriptor. Key points are extracted by the SIFT detector and their descriptors are computed by the SIFT descriptor. It is also common to use independently the SIFT detector (i.e. computing the key points without descriptors) or the SIFT descriptor (i.e. computing descriptors of custom key points). These key points are used to find the extreme points in an image for onset of margin for different lines. Orientation histogram is created.

#### 3.3.2 Zernike Moments

The moment based techniques are being successfully applied to several image processing problems and represents a fundamental tool to generate feature descriptors where the Zernike moment [12] technique has a rotation invariance property which is found to be desirable for handwritten character recognition.

### 4. SVM Classifier

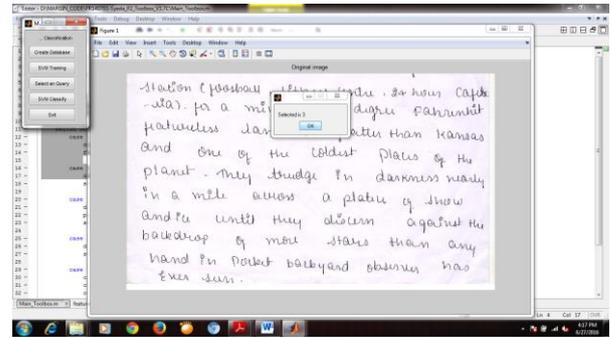
We have used SVM model to perform the classification. All the 10 extracted features from the image are the input pattern for SVM network. Once trained for each image we want to analyze, the output of the net is a value between 1 to 6, that indicates the input pattern belongs to the desired personality.

### 5. Experimental Results

For the experimental stage, 500 samples were collected equally from males and females regardless of socio-economic status from age 18 to 75. The samples were collected from people belonging to different professions. The images were acquired using HP inkjet scanner with 300 dots per inch. These samples were analysed by the graphologists to create an acceptable ground truth. The samples were classified from 1 to 6 based on the margins as shown in the table 1. Figure .1 and Figure .2 shows the handwritten images which are converted into binary images and denoised and trained using SVM classifier and classified as class 3 and class 1 respectively. Thus for the other images same procedure is adopted.

**Table 1:** Correlation of Margin with Personality Trait

Margin Orientation	Personality Trait
Wide Left Margin	Writer is attached to the past
Narrow Left Margin	Writer leaves the
Narrow Right Margin	Writer willing to take forward step and may not be
Wide Right Margin	Writer may be afraid to take a future step as he
Balanced Margin	



**Figure 1:** The image is converted to gray scale, it shows a narrow left margin which is classified as class 3

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### Author Profile

**Taro Denshi** received the B.S. and M.S. degrees in Electrical Engineering from Shibaura Institute of Technology in 1997 and 1999, respectively. During 1997-1999, he stayed in Communications Research Laboratory (CRL), Ministry of Posts and Telecommunications of Japan to study digital beam forming antennas, mobile satellite communication systems, and wireless access network using stratospheric platforms. He now with DDI Tokyo Pocket Telephone, Inc.