Personality Prediction Through Handwriting Analysis Using Svm

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Abstract- *Personality of an individual can be predicted through his/her handwriting. Handwriting analysis is a scientific method of identifying, analyzing and understanding of personality trait through the strokes and pattern in handwriting. Handwriting reveals the personality traits including Optimistic, Energetic, Introvert, Extrovert trait etc. Graphology has been controversial for more than a century. Empirical studies fail to show the validity claimed by its supporters. In this research, performance evaluation is done by using Support Vector Machine(SVM) to classify the five personality traits on the basis of handwriting pattern and style. Human behaviour is analyzed on the basis of a sentence that include all the English alphabets. Using this, I was able to get accuracy of 59% using SVM.*

Keywords- Personality prediction, Support vector Machine(SVM), OpenCV, Pen pressure, Handwriting analysis.

I. INTRODUCTION

PERSONALITY prediction using handwriting analysis is the ability of the computer system to predict personality on the basis of pattern and strokes in handwriting.Graphology is the study of human personality through handwriting, that let you know temperament, genetic factors that lead our behaviours, biological basis, characters. Our behavioral habits and reactions character acquired through life based on life experiences.

The present Graphologist is a professional whose formation and ethics is beyond the image that some have of one who "predicts" through a magnifying glass hanging from the neck. It is demonstrated that there is an existing relationship between personality, conducts, intellectual level and volatile level, temper, and character in handwriting.

Human personality recognition is becoming more and more important in the modern world. It helps human to simplify their jobs and solve more typical problems. Handwriting reasoning is a scientific method of identifying, recognizing and perceive personality over the move and patterns notify with the handwriting. In Graphology,

handwriting is analyzed through structural graphic elements in order to derive information about the writer personality.
In this project personality of an individual is predicted on the basis of a sentence which include all the English alphabets in cursive writing to better understand the present state of mind of the person in a better way.

II. DATA MODELLING AND PROCESSING

Dataset used in this research is self made. It is created with by taking handwriting sample of 45 students who were instructed to write the sentence-"The quick brown fox jump over the lazy dog" in cursive writing and without space on a A4 size sheet.

This images of these sheets were cropped and used to create a training dataset for this project using labelbox.io software which is used to label the image data with the five personality traits selected for this project such as Energetic trait, Introvert trait, Extrovert trait, Optimistic trait, Sloppy trait.
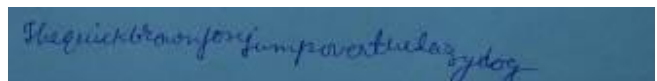
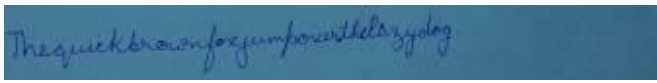**Energetic data sample**

Extrovert data sample
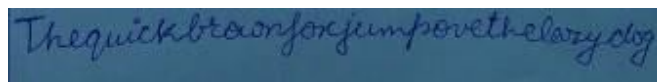
Sloppy data sample

Introvert data sample

Optimistic data sample

Labelling criteria of the data sample:

The labelling of the data sample is done on the careful analysis of the pattern and writing style of each English alphabets in the sentence which a person pertaining to a specific personality would used while writing.

Due to the limitation of the data samples, Support Vector Machine model is used to prevent overfitting of the model and provide the result with maximum accuracy.

This is described in detail by the following table:

Introvert Trait	Very less distance between words and between the letters, light pressure writing, smaller size of world, left slant writing.
Extrovert Trait	Distance between the letters and the words, larger size of word, i dot with circle.
Energetic Trait	High pressure writing, right slant, i dot firmly, high t-cross.
Sloppy Trait	Downward and wavy stroke baseline writing, variant slant writing, no i dot, low t-cross.
Optimistic Trait	Upward stroke baseline, average pressure writing, straight slant writing, i dot high.

III. SUPPORT VECTOR MACHINE

In machine learning, **support vector machines** (**SVMs**, also **support vector networks**) are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier(although methods such as Platt scaling exist to use SVM in a probabilistic classification setting). An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall.
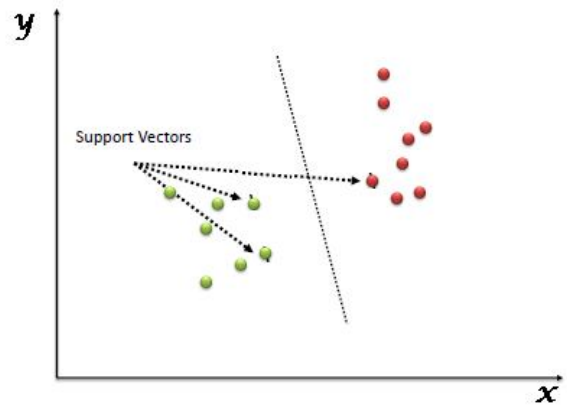
In addition to performing linear classification, SVMs can efficiently perform a non-linear classification using what is called the kernel trick, implicitly mapping their inputs into high-dimensional feature spaces. When data are not labeled supervised learning is not possible, and an unsupervised learning approach is required, which attempts to find natural clustering of the data to groups, and then map new data to these formed groups. The clustering algorithm which provides an improvement to the support vector machines is called **support vector clustering** and is often used in industrial applications either when data are not labeled or when only some data are labeled as a preprocessing for a classification pass.

Using Sci-kit learn SVM is applied to the data in the following format:

class sklearn.svm.SVC(C=1.0, kernel='rbf', degree=3, gamma='auto', coef0=0.0, shrinking=True,probability=False, tol=0.001, cache_size=200, class_weight=None, verbose=False, max_iter=1, decision_function_shape=None, random_state=None)

IV. RESULT AND ANALYSIS

For testing the trained SVM model input image is feed to the model to predict the personality of the person who has handwriting in the given image.

Below is the input image:

Image has different lighting conditions in different areas. In that case, we go for adaptive thresholding. In this, the algorithm calculate the threshold for a small regions of the image. So we get different thresholds for different regions of the same image, if the pixel value is greater than the threshold value it is assigned one value(white) otherwise it is given another value(may be black) and it gives us better results for images with varying illumination.

Output:Prediction of personality trait by the trained SVM model on the image.

On the given image of handwriting the model predict the output **Extrovert Trait** which is shown on the image above the bounding box drawn around the sentence.

V. CONCLUSION AND FUTURE SCOPE

Handwriting analysis is an emerging field for personalityrecognition. The various personality analysis techniques of this field can be implemented for getting correct personality

trait information. Although graphology is an establishedscience, due to human error and ambiguity in thehandwriting sample, accuracy of handwriting analysis ispersonality identification through handwriting analysis willprove to be a good and helpful system for personality traitsidentification. Such system can be built using Support Vector Machine technology where a system is pre-trained to identify characteristics of handwriting and map it to a corresponding personality trait Tests carried out on a sheet of A4 paper .In this project the accuracy of the model is around 59% approx.

Many types of methods can be used for identification of human behavior .Techniques which can be used like Hidden Markov Method(HMM),K-means classifier etc. can be used to increase the extraction of behavior through signature and its various parameters.

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