A Survey on Decoding Personalities through Handwriting Analysis

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Abstract- A person's personality is a combination of their unique traits and attributes, influenced by their development, ideals, and connections with the community, life experiences, routines, and abilities. Handwriting characteristics can reveal aspects of one's personality, behaviour, and even psychiatric traits. Graphology, the study of handwriting, is used to examine these traits. Previous studies have focused on a limited number of handwriting characteristics, but graphology suggests that a wide range of stroke qualities can reflect psychological traits. This survey explores various methods for feature extraction to predict personality based on handwriting, bridging the gap between personality psychology and graphology. Understanding handwriting features with psychological backing can aid in predicting personality traits, promoting computer-based graphology as a tool for personality prediction.

Keywords- Graphology, Psychological Traits, Personality Prediction, Handwriting, Feature extraction.

I. INTRODUCTION

Physical attributes include things like height, weight, and complexion, while ability traits include things like creativity, efficiency, and intelligence. Social traits include things like sensing, intuition, and thinking. Personality traits can also give an individual other types of features. These personality traits can be described as "emotional, interpersonal, experiential, attitudinal, and motivational styles" [5]."That which permits a prediction of what a person will do in a given situation" is how Raymond Cattell defined personality. By using personality traits, Cattell was able to anticipate behavior.

According to Cattell, a personality trait is "that which defines what a person will do when faced with a defined situation." A person's personality can be identified using a variety of methods, including plain text, documents, handwriting, signatures [5].This article describes how personality traits can be determined from handwritten English text; many scholars are interested in studying the same thing for other languages and scripts. Handwritten texts in Devanagari and Latin scripts, Farsi, Arabic, and other languages have all been investigated, such as however, our survey is limited to English. Graphologists typically analyse a person's handwriting and signature manually. Numerous handwriting samples of particular individuals were examined, and it was discovered that these persons had unique traits. Graphologists search for characteristics in these handwriting samples that are more common than in the handwritten texts of the general public.

The ability of the graphologists to recognize the author from a tiny sample of handwriting varies. But it's a slow and error-free process. Researchers have been developing computer graphology, which can predict a person's personality automatically, as a solution to this issue. Furthermore, it is evident that every individual has a distinct handwriting style; one may infer information about a person's personality, conduct, and even some psychiatric features from their handwriting traits. Thus, researchers were drawn to this brain writing.

Using handwritten text, our primary objective is to analyse graphology research and offer insights into various facets of an individual's behavior and personality. We also go over personality psychology, measuring traits, and a number of other aspects of handwriting analysis. We highlight the outcomes of earlier research utilizing computational graphology to discover

these qualities and relate them to personality traits. The apps that employed handwriting-based customization features are listed below in comparison to earlier research [4] in [1], we offer extensive handwriting characteristics suitable for personality identification. We also included connections between possible personality factors and handwriting characteristics. We wrap off our work with issues that have been pointed up in a particular field.
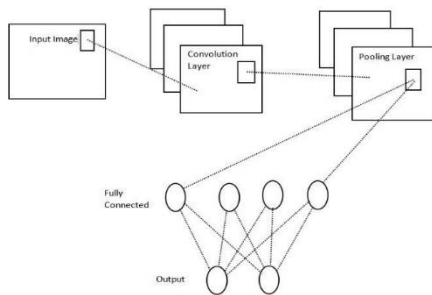
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II. METHODOLOGY

Fig 1 Architecture diagram

A. *Personality Psychology*

Personality psychology provides the theoretical framework for graphology, the study of handwriting and its relationship to personality traits. Here's how personality psychology intersects with graphology:

1. Trait Theory:
Trait theory forms the foundation for graphological analysis. Personality traits such as extraversion, conscientiousness, neuroticism, openness to experience, and agreeableness are often assessed through handwriting analysis. Graphologists interpret various handwriting features, such as size, slant, pressure, spacing, and legibility, about these personality traits.

2. Psychodynamic Approaches:
Psychodynamic theories, particularly those proposed by Freud and Jung, have influenced graphological interpretation. For example, handwriting features may be analyzed in terms of unconscious motives, defense mechanisms, and archetypal symbols. Graphologists may interpret handwriting deviations as manifestations of underlying psychological conflicts or unconscious desires.

3. Behavioural Genetics:
Graphology also draws insights from behavioural genetics, which examines the genetic and environmental influences on personality development. While graphology primarily focuses on the observable characteristics of handwriting, it acknowledges that individual differences in handwriting may reflect both genetic predispositions and environmental factors, such as upbringing and life experiences.

4. Cognitive Psychology:
Cognitive psychology contributes to graphology by exploring the cognitive processes involved in handwriting production. Graphologists may consider how cognitive factors, such as attention, memory, motor control, and emotional regulation, influence handwriting style and variability. For example,

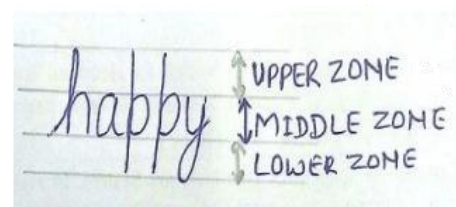changes in handwriting may occur under different cognitive or emotional states.

5. Individual Differences:
Personality psychology emphasizes the study of individual differences in personality traits and behavior. Graphology recognizes that handwriting is inherently individualistic, with each person's handwriting exhibiting unique patterns and idiosyncrasies. By analyzing these individual differences, graphologists aim to gain insights into an individual's personality characteristics and psychological makeup.
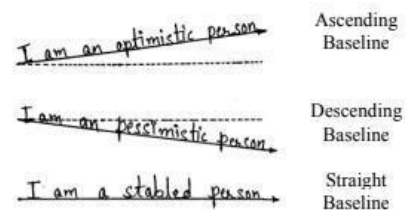
B. *Handwriting Analysis*
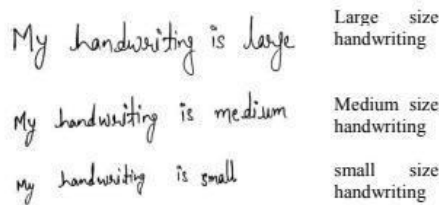
Here's an overview of handwriting analysis:

1. Principles: Handwriting analysis is based on the principle that aspects of a person's personality are reflected in their handwriting. Graphologists believe that the way a person forms letters, shapes words, and structures sentences can reveal information about their emotional state, cognitive processes, and underlying psychological traits.

2. Key Features: Graphologists examine a wide range of handwriting features, including:
- Size: The overall size of the handwriting.
- Slant: The angle at which letters lean.
- Pressure: The intensity of the pressure applied to the writing surface.
- Speed: The pace at which the handwriting is produced.
- Spacing: The distance between letters, words, and lines.
- Shape: The form and structure of individual letters and words.
- Consistency: The uniformity of handwriting features throughout a sample.

[4] Different zones of characters

[4] Different types of baseline

My handwriting is large — Large size handwriting

My handwriting is medium — Medium size handwriting

My handwriting is small — small size handwriting

[4] Different size of handwriting

I write with heavy pressure — Heavy pressure

I write with medium pressure — Medium pressure

I write with light pressure — Light pressure

[4] Different types of pressure

3. Interpretation: Handwriting analysis involves interpreting these features in relation to personality traits, emotional characteristics, and behavioural tendencies. For example, large handwriting may be associated with extraversion and confidence, while small handwriting may suggest introversion or attention to detail. Similarly, a rightward slant might indicate sociability and expressiveness, while a leftward slant could suggest introspection or emotional reserve.

4. Criticism and Controversy: Handwriting analysis is a controversial field within psychology. Critics argue that its validity and reliability are questionable, as empirical research has failed to consistently support the claims made by graphologists. Skeptics contend that handwriting may be influenced by factors such as motor skills, cultural norms, and individual variability, rather than intrinsic personality traits.

C. *Computerized Graphology*

Here's an overview of computerized graphology:

1. Digital Data Collection: Computerized graphology typically involves the collection of digital handwriting samples using electronic devices such as tablets, touchscreens, or stylus pens. Handwriting data is captured in digital formats, allowing for precise measurement and analysis of various handwriting features.

2. Feature Extraction: Computational algorithms are employed to extract relevant features from the digital handwriting samples. These features may include size, slant, pressure, speed, spacing, shape, and consistency of handwriting strokes. Advanced techniques such as image processing, machine learning, and pattern recognition may be utilized to automate the extraction process.

3. Pattern Recognition and Classification: Once the features are extracted, machine learning algorithms or statistical models are applied to recognize patterns and classify handwriting samples into different categories or personality types. These algorithms may be trained on large datasets of labelled handwriting samples to learn the relationships between handwriting features and personality traits.

4. Analysis and Interpretation: Computerized graphology software generates analytical reports based on the extracted features and classification results. These reports may provide insights into an individual's personality characteristics, emotional states, cognitive processes, or behavioural tendencies. Interpretations may be based on established theories and empirical research in psychology, supplemented by computational analyses of handwriting data.

5. Applications: Computerized graphology has various applications across different domains, including:
   - Personnel selection and recruitment: Assessing job candidates' personality traits and suitability for specific roles.
   - Forensic investigations: Analyzing handwriting samples in legal cases to identify individuals or detect deception.
   - Psychological assessment: Providing insights into an individual's psychological well-being, personality profile, or cognitive functioning.
   - Educational assessment: Evaluating students' learning styles, academic performance, or behavioral characteristics based on handwriting analysis.

6. Advantages: Computerized graphology offers several advantages over traditional handwriting analysis methods, including efficiency, objectivity, and scalability. Automated analysis can process large volumes of handwriting data rapidly and consistently, reducing the need for manual interpretation.

III. APPLICATIONS

1. Psychological Evaluation and Counselling: To help with individualized counselling sessions, mental health professionals can utilize handwriting samples to get insight into the emotions, tendencies, and personality qualities of their clients.

2. Recruitment and Human Resources: HR divisions are able to evaluate applicants' dispositions and fit for particular positions inside companies, which helps with the selection and placement of individuals.

3. Education and Academic Assessment: Classroom management, instructional tactics, and individualized learning plans can be informed by an understanding of individuals' personalities and learning styles through the application of handwriting analysis in educational institutions.

4. Personal Development & Self-Reflection: People can use the project to analyse themselves and obtain understanding of their traits, skills, and opportunities for growth. This can help those set goals and advance personally.

5. Forensic analysis and behavioural Profiling: In criminal investigations, law enforcement agencies can use handwriting analysis for forensic analysis and behavioural profiling, which aids in the identification of suspects, the interpretation of their motivations, and the creation of psychological profiles.

IV. DISCUSSION

The Department of Information Technology at the Indian Institute of Information Technology in Allahabad, India's Shitala Prasad, Vivek Kumar Singh, and Akshay Sapre completed a related study titled "Handwriting Analysis based on Segmentation Method for Prediction of Human Personality using Support Vector Machine." Their research uses an SVM classifier with an RBF kernel to accurately predict a writer's personality attribute based on six distinct handwriting features, with a 90.3% accuracy rate. The Mechanical Engineering Department of the National Institute of Technology Karnataka, India's Navin Karanth, Vijay Desai, and S. M. Kulkarni completed a related project titled

"Development of an Automated Handwriting Analysis System." Without the use of machine learning, their approach takes eight features from a handwriting feature and forecasts the specific attributes provided by each feature. Their prediction is reported with an accuracy within 80% to 100% range for each feature.

Champa H N, Assistant Professor, Department of Computer Science and Engineering, University Visveswaraya College of Engineering, Karnataka, India, and Dr. K R Ananda Kumar, Professor, Department of Computer Science and Engineering, SJB Institute of Technology, Karnataka, India, completed a similar study titled "Artificial Neural Network for Human Behavior Prediction through Handwriting Analysis." Three aspects of handwriting are taken into consideration in their work: pen pressure, baseline, and the 't-bar' of the letter 't'. A neural network with up to 12 hidden layer nodes is used to predict the various personality traits indicated by these features. Their prognosis has been reported to be approximately 99% accurate.

V. CONCLUSION

In conclusion, this survey paper aims to enhance our understanding of how handwriting influences personality trait prediction. We have considered a variety of handwriting features and their psychological and graphological implications. Through this survey, we have explored the analysis of handwriting to detect personality traits, highlighting the complex interplay between handwriting and personality.

VI. REFERENCES

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