Detection of Disguise in Tamil Script

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ABSTRACT

Disguised writing is any deliberate attempt to alter one's handwriting to prevent recognition. Disguised handwriting is the will full modification of a person's natural writing for the purpose of concealing identity. The purpose of this article is to point out the need to order the inconsistent terminology regarding Disguised writing in unaccustomed handwriting.

This paper approach to detect disguise in Tamil script, a language with rich morphology and complex grammar. In the present study handwriting of every person (both the right hand and left hand) are obtained and analyzed to find out and identify those features that survive the hazards of disguise and such disguised handwriting in comparison with their genuine and disguised handwriting samples of the person writing. A detailed study of letter-forms and the letter was compared with the natural hand writing of the person the similarity was gave its probability for further investigation. The analysis, comparison, evaluation of features and detection of disguise in Tamil script is a crucial task. Through this analysis we can compare the same person handwriting and get the similar characteristics of the handwriting.

Keywords: Forensics, Handwriting, Disguise, Unaccustomed Hand, Authorship, Identification.

INTRODUCTION

Handwriting is the writing done with a writing instrument, such as a pen or pencil, in the hand. Handwriting includes both block and cursive styles and is separate from formal calligraphy or typeface. Because each person's handwriting is unique and different, it can be used to verify a document's writer.

Handwriting is a very complex skill to master, one that involves linguistic, cognitive, perceptual and motor components, all of which have to be coordinated into an integrated fashion. Although we take it for granted, some people, young and old, find handwriting very difficult to perform and feel they need help to perfect the skill. Support from those with expertise and experience is nearly always appreciated. Because handwriting is such a complex skill, there are many children who have difficulty mastering it. This may cause frustration and distress and affect a child's desire to write. It may also cause anxiety for the parents and teachers who watch the child struggle to put his or her ideas on paper. Not all difficulties are the same or caused by the same factors, and any assessment of the problem must take into account the age and experience of the child.

Disguised writing is any deliberate attempt to alter one's handwriting to prevent recognition. Disguised handwriting is the will full modification of a person's natural writing for the purpose of concealing identity. As a subject, it is growing in importance. Nowadays persons can be convicted of forgery on handwriting testimony alone, and this fact motivates many criminals to disguise their handwriting in an attempt to wrong justice.

Disguised writing is the product of number of controlling factors and its success is directly related to the skill, patience, imagination of writer and also depends on amount of writing. It may be viewed as a special form of forgery, since writer deliberately tries to alter the genuine writing for the purpose of hiding the personal identification.

REVIEW OF LITERATURE

- Comparison of Handwriting of Accustomed and Unaccustomed Hand of Individuals and Ascertaining Their Identifiable Parameters, October 2023, Jitender Singh Parmar, Bhupesh Kumar Sharma, Varsha Yadav: A detailed study of spacing between the letters and words, specific connecting stroke, certain letters formation and most importantly the positioning of the signatures below the paragraph written by selected subjects has been carried out. Despite pictorial dissimilarities, it has been observed that, there are some subconscious characteristics that are rarely concealed and may serve as the basis for their relationship with a particular writer or serve as an idea for future research.

- Intentional Handwriting Modifications. Disguise and Auto forgery (2023) Anna Koziczak: The purpose of this article is to point out the need to order the inconsistent terminology regarding deliberate handwriting modifications and to discuss the merits of distinguishing auto forgery as a separate mode of action.

- Evaluating Morphometric Feature Variability of Handwritten Numerals Among Malaysian Malays Using Self-Organizing Maps, April 2023, Loong Chuen Lee, Nur Fatin Syuhada Binti Roslee, Hukil Sino: In this study Forensic handwriting examination involves the determination of authorship of the questioned document encountered in a criminal case. Understanding the variability of morphometric features of handwritten numerals would contribute to constructing predictive models in determining the authorship of a questioned document.

- The authorship of disguised handwriting written with the unaccustomed hand: A preliminary study, November 2021, Anita Rani, Mohinder Singh: In this study a writer may try to disguise their normal handwriting to hide their identity. One of the most effective and less frequent modes of disguise is to write with the un-accustomed hand. The analysis, comparison, and evaluation of features unconsciously left by the writer, including the parameters selected for the present study, can be carried out by a trained forensic document examiner; and they can give whatever opinion is possible and justifiable in facts and circumstances of a case.

- Analysis of Master Disguised Writing with the Aid of Specific Individual Writing Characteristics, February 2020. Bhoopesh Kumar Sharma, Kiran Kumar Yadava Vajjey, Raeesa Bashir and S. Raghu Raghavendra: According to this study of project is based management structures, have to focus on ideas for in forensic investigations, disputed documents are usually encountered in various cases of forgery and disguise. After the proper analysis, it was found that even the cases of master disguise will possess some aspects through which the authenticity of the document and the identity of the writer can be scientifically established.

- Exploring the Similarities between Complete and Initial Signatures of an Individual for the Purpose of Author Identification. Bhoopesh Kumar Sharma, Pooja Prakash, Sharon Ann Philip. August 2019: The present work has been focused on extracting the similarities between the initial and the complete signatures of an individual to aid in the identification of an individual in such complicated cases. This study may contribute to the identification of the author in the matter of disputes where initials have been used intentionally or unintentionally.

- Jaitly, T., Gupta, S., Sharma, M., & Shukla, S. K. (2018). Chronological study to estimate the range of natural variations in size and proportion of letters in handwriting: The study was conducted with the objective of determining the range of natural variation in handwriting considering a period crevice of every two years. The instability of the factor, "Size and Proportion" of letters served as an indicator. "Autodesk Computer Aided Drafting" software was used to set the range of natural variations. The technique helps in solving the cases in contemporary writings and could be served as a non-destructive method of examination.

- Forensic analysis of handwritten documents with GRAPHJ (Erratum) (2018) Luca Guarnera, Giovanni Maria Farinella, Antonino Furnari, Angelo Salici, Claudio Ciampini, Vito Matranga, Sebastiano Battiato: In this study the Handwriting analysis is a standard forensics practice to assess the identity of a person from written documents. Automated forensics tools to perform handwriting analysis from scanned documents are desirable to help examiners extract information in a more objective and replicable way. To this aim, in this paper we present GRAPHJ, a forensics tool for handwriting analysis.

- Luca Guarnera, Giovanni Maria Farinella, Antonino Furnari, Angelo Salici, Claudio Ciampini, Vito Matranga, and Sebastiano Battiato.2018: In this study they use the GRAPHJ, an automated tool to aid the analysis of handwritten documents by forensics experts. The tool has been implemented as a plugin for ImageJ and allows to automate many operations such as detection of elements (e.g., text lines, words and characters) and measurement of quantities (e.g., character height and width). Experiments show that analyses carried out using GRAPHJ are compliant to those obtained by forensics experts using standard manual techniques.

- Huber and Headrick's Handwriting Identification: Facts and Fundamentals January 2018, Heidi H. Harralson, Larry S. Miller: This is a comprehensive update of Huber and Headrick's seminal work on handwriting examination. New coverage includes a review of forensic handwriting examination research, handwriting analysis training and proficiency, revised methods and procedures, an updated listing and clarification of terminology and electronic signatures, the analysis of digitized handwriting, and other related technological advances.

OBJECTIVES
- To analyse the right and left handwriting.
- To determine if there any similarities between the handwriting.
- To estimate the degree of similarities of the letter in both side of the handwriting.

NEED AND SIGNIFICANCE OF THE STUDY
The primary aim of this study is to detect the disguise of handwriting done in the Tamil Script. Disguise of writing is a very common phenomenon observed in cases relating to kidnaps and abduction, especially in the ransom notes; and one of the easiest methods employed to disguise is to write using the unaccustomed hand. This study focuses on such a method of disguise and it focuses on the Tamil script as till date, there have been no study done in this aspect.

This study will help to find characteristics of handwriting that are similar between the accustomed and unaccustomed handwriting of the people and thus, help in the future detection of the author of such disguise writings.

METHODOLOGY

Handwriting samples were collected in the copying method, where a standard passage was given to everyone and asked to write the passage with both hands on two separate A4 plain sheet. In this way 50 handwriting samples were collected from the students. None of the subject were given any prior training to write with their unaccustomed hand. The handwriting sample obtained from the subject was produced with the ballpoint pen.

DATA ANALYSIS

Data was analysed by the manual method using hand magnifying glass to detect the Class and Individual characteristics and the characteristics was then observed to calculate the Percentage using MS Excel.

DATA ANALYSIS AND INTERPRETATION

1. Stem அ

- Out of 50 samples, 16 sample have a similar way of formation of the stem in the letter. This means that 32% of the total samples have a similar way of formation of the stem in the letter.
- Among the left-hand samples, 22 samples have formed the stem as a separate stroke, 3 sample have a loop formation and 25 sample have a blind loop formation. This means it was separate stroke in 44%, loop in 6%, and blind loop in 50%.
- Among right-hand samples, 18 samples have formed the stem as a separate stroke, 9 sample have a loop formation and 23 sample have a blind loop formation. This means it was separate stroke in 36%, loop in 18%, and blind loop in 46%.

2. Stem எ

- Out of 50 samples, 15 sample have a similar way of formation of the stem in the letter. This means that 30% of the total samples have a similar way of formation of the stem in the letter.
- Among the left-hand samples, 31 samples have formed the stem as a separate stroke, 3 sample have a loop formation and 16 sample have a blind loop formation. This means it was separate stroke in 62%, loop in 6%, and blind loop in 32%.
- Among right-hand samples, 12 samples have formed the stem as a separate stroke, 12 sample have a loop formation and 26 sample have a blind loop formation. This means it was separate stroke in 24%, loop in 24%, and blind loop in 52%.

3. Boat ழ

- Out of 50 samples, 28 sample have a similar way of formation of the boat in the letter. This means that 56% of the total samples have a similar way of formation of the boat in the letter.
- Among the left-hand samples, 31 samples boat was present and 19 sample boat was absent. This means it was present in 62% and absent in 38%.
- Among right-hand samples, 22 samples boat was present and 28 sample boat was absent. This means that it was present in 44% and absent in 56%.

4. Dot ○

- Out of 50 samples, 43 sample have a similar way of formation of the dot in the letter. This means that 86% of the total samples have a similar way of formation of the dot in the letter.

- Among the left-hand samples, 13 samples dot was present and 37 sample circle was present. This means dot was present in 26% and circle was present in 74%.
- Among right-hand samples, 10 samples dot was present and 40 sample circle was present. This means dot was present in 20% and circle was present in 80%.

5. Buckle

- Out of 50 samples, 40 sample have a similar way of formation of the buckle in the letter. This means that 80% of the total samples have a similar way of formation of the buckle in the letter.
- Among the left-hand samples, 37 samples buckle was present and 13 sample buckle was absent. This means it was present in 74% and absent in 26%.
- Among right-hand samples, 38 samples buckle was present and 12 sample buckle was absent. This means it was present in 76% and absent in 24%.

6. Curve

- Out of 50 samples, 29 sample have a similar way of formation of the curve in the letter. This means that 58% of the total samples have a similar way of formation of the buckle in the letter.
- Among the left-hand samples, in 18 samples it was sharp and in 32 samples it was smooth. This means it was sharp in 36% and it was smooth in 64%.
- Among right-hand samples, in 19 samples it was sharp and in 31 samples it was smooth. This means it was sharp in 38% and it was smooth in 62%.

7. Hairline

- Out of 50 samples, 35 sample have a similar way of formation of the hairline in the letter. This means 70% that of the total samples have a similar way of formation of the hairline in the letter.
- Among the left-hand samples, in 23 samples hairline was present and in 27 samples hairline was absent. This means it was present in 46% and absent in 54%.
- Among right-hand samples, in 15 samples hairline was present and in 35 samples hairline was absent. This means it was present in 30% and absent in 70%.

8. Serif

- Out of 50 samples, 39 sample have a similar way of formation of the serif in the letter. This means 78% that of the total samples have a similar way of formation of the serif in the letter.
- Among the left-hand samples, in 20 samples serif was present and in 30 samples serif was absent. This means it was present in 40% and absent in 30%.
- Among right-hand samples, in 25 samples serif was present and in 25 sample serif was absent. This means it was present in 50% and absent in 50%.

RESULT AND DISCUSSION

Disguised handwriting is the wilful modification of a person's natural writing for the purpose of concealing identity. Methods of disguise vary with the ability and imagination of the writer. An extreme change of slant is the most popular means and the least effective method of disguise. Other writers concentrate more on letter formation and ignore slant changes. However, disguised handwriting fails to accomplish its objective in the same way that a forged signature fails to imitate genuine writing.

In the present study of detection of disguise in the TAMIL script, the following letters were selected to examine the accustomed and unaccustomed handwritings of both the left-handed and right-handed writers:

- அ
- எ
- ழு
- ்
- கூ
- ெ○
- ரு
- ○ா

These letters were taken in accustomed (right) as well as unaccustomed (left) handwritings in order to compare both types and see if the writing changes with the change of hand. In the case of left handwriting, most strokes were found to be similar to right handwriting, but the letters showed variations in the form of loop, blind loop, separate stem, boat, dot, buckle, curve, hairline, serif etc. in handwriting produced due to unnatural and uncontrolled holding of the writing instrument. Writings created with the left hand showed a similar range of general characteristics such as movement and proportion.

Wherever a writer formed the letters as a separate stroke with their right hand, the same writer while writing with the left hand formed separate strokes too. It was observed in all the samples of left handwriting that the overall movement remain the same though the same degree of quality could not be achieved.

This could be because of the fact that the activities of each hand are controlled by the hemispheres of the opposite brain, when a writer writes with his left hand, he/she could not receive the proper signals for executing the exact formation of letters, as the writer may not be used to writing with the opposite hand.

The formation of curves was found to be similar in both hands, except that the one with left hand, consisted of a greater number of tremors and angularity. A greater degree of sharpness was observed in all the characteristics in the left handwriting as compared to the right handwriting. This is mainly due to the ease of formation of curves with right hand due to habituation and the left hand is not accustomed to make smooth strokes.

Table: Illustrated images of comparison between letter forms of right and left hand

Letter	Right hand	Left hand
Writer 1		
Writer 2		

Writer 3		
Writer 4		
Writer 5		

It has to be noted that in this study, no prior training or time to train themselves was given to the participants to write using their hand and that too with the TAMIL script; but even then, there was some similarities observed in the formation of letters between the samples obtained from both their hands. It is definitely possible that if they had been given the chance to practice beforehand for some time before obtaining their handwriting samples, there could be a better level of result obtained and greater degree of similarities observed.

All the results were presented in the form of observations and illustrated with the help of figures. No statistical tools were applied.

CONCLUSION

In the present study of detection of disguise in the TAMIL script, the following letters were selected to examine the accustomed and unaccustomed handwritings of both the left-handed and right-handed writers: அ, எ, ழு, ஃ கூ, ெஓ, ரு and ஓா. These letters were taken in accustomed (right) as well as unaccustomed (left) handwritings in order to compare both types and see if the writing changes with the change of hand. Writings created with the left hand showed a similar range of general characteristics such as movement and proportion.

It can be said that though there is a variation seen in some characteristic features, the overall method of formation of the letters, the pauses, pen strokes have a small degree of similarity which can play a major role in detecting the disguise using unaccustomed hand; not as confirmatory evidence to match but to eliminate the samples based on the characteristic features.

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