

THE SUMMARY OF Ph.D. DISSERTATION

School of Integrated Design Engineering		ANDO, Shingo
Title Quantification of individuality which appears on handwriting characters and its application		
Abstract <p>Handwriting character recognition is one of the most important technologies in present time. It is applied to pen-move interface for PDA, postal code reader, and so on. On the other hand, writer recognition aims at identify or verify the writer of the handwriting character. The writer recognition is studied very much as a form of biometrics individual identification. The information, which is used for the writer recognition, is the individuality of written characters. But only the recognizing performance such as identifying rate and verifying rate was discussed, and it has rarely been caught on a viewpoint of quantification of individuality. Accordingly, I proposed new method toward 3 cases of applications about the individuality, which appears on handwriting characters, and aimed at establishment of individuality quantification methodology in this dissertation.</p> <p>Chapter 1 describes the background and the purpose of this study.</p> <p>Chapter 2 describes a principle of verification method using local individualities. It is a novel method for off-line signature verification. Correspondence estimation is a critical process in this method. Because it is indispensable to compare the local individualities accurately. Furthermore, genetic algorithm (GA) is used to extract the local individualities automatically. In registration process, the correspondence estimation is done among 10 reference signatures, and more than one local individuality is extracted by GA. In verification process, after the correspondence estimation is done, a target signature is verified with similarity of the local individualities. An experiment was done toward 20 people (800 samples of signature) to verify the validity of the proposed method. As a result, the average error rate was 2.63%, and the result was lower than the method using global individuality by about 10%.</p> <p>Chapter 3 describes a method of text-independent writer verification. In the proposed method, modified thinning and shredding disposal, which are novel image processes, are introduced to extract global individuality of handwriting character automatically. In verifying, modified maharanobis distance, which is one of the statistical pattern recognition, is used. An experiment was done toward 20 people (4 kinds of text) to verify the validity of the proposed method. As a result, the correct acceptance rate was 95.00%, and correct rejecting rate was 95.04%.</p> <p>Chapter 4 describes automatic handwriting character font creation that reflects individualities. The proposed method introduces extraction of individuality, which is described in chapter 3, to select an optimal font from a variety of standard character fonts. Then, scale information and geometrical displacement information are defined as the individualities, which should be appended to the standard character font. The correspondence estimation, which is described in chapter 2, is used to extract the geometrical displacement information. The writing habit including character font generating system was developed to verify the validity of the proposed method, and a font generation experiment toward a great many subjects and the evaluation was done.</p> <p>Chapter 5 is the conclusion of the dissertation. The experiments of the all method, which are proposed in each chapter, and its results bring together, then results of this study are summarized.</p>		