Static Signature Verification Based on Texture Analysis Using Support Vector Machine

Subhash Chandra, Indian Institute of Technology, Department of Computer Science and Engineering, Indian Institute of Technology, Dhanbad, India

Sushila Maheshkar, Indian Institute of Technology, Department of Computer Science and Engineering, Indian Institute of Technology, Dhanbad, India

ABSTRACT

Off-line hand written signature verification performs at the global level of image. It processes the gray level information in the image using statistical texture features. The textures and co-occurrence matrix are analyzed for features extraction. A first order histogram is also processed to reduce different writing ink pens used by signers. Samples of signature are trained with SVM model where random and skilled forgeries have been used for testing. Experimental results are performed on two databases: MCYT-75 and GPDS Synthetic Signature Corpus.

KEYWORDS

INTRODUCTION

Biometric automatic identification or authentication of particular person is essentially a concerning debate in today's society. Biometric based on proof of identity plays a vital role in field of security. It authenticates the individual through pattern recognition based system. Biometrics is classified as behavioural or physical. Behavioural biometrics includes voice, signature pattern, keystroke etc. whereas physical characteristic includes iris, retina, palm geometry. Signature recognition is major issue in the research field of biometric (Jabin & Zareen, 2015). Signatures are treated as image having certain patterns of pixels that belongs to a particular person. In verification problem, we concerned about a signature belongs to a particular person or not i.e. whether it is genuine or forged. Signature is generally classified in two categories of verification based system: online and offline signature. Offline signature verification only static feature of signatures is considered. Acquisition of signature images in offline methods are done through scanner or camera. In case of online signature verification dynamic features are measured i.e. direction, time, speed, minimum or maximum pressure etc. which uses digitizing tablet to collect signature information. Based on the knowledge of the forger about the signature and signer, forgery can be broadly classified into three types such as: random, simple

and skilled (Diaz-Cabrera, Morales, & Ferrer, 2014); Rico-Juan & Iñesta, 2012). The forgeries are posing a major threat for certification and validation of a person through signature. Out of these three forgeries random forgery is simple to identify, the forger is unaware about the name and pattern of the signature of a person. In case of simple forgery, the forger is aware about the name but not the signature pattern. In skilled forgery, forger has knowledge of both name and pattern of signature and well-practiced. Therefore, it is difficult to verify the signature either genuine or forgery. In offline, different features are extracted from the post-processing of input signature which is subsequently applied for verification. The performance of the proposed approach is demonstrated on two standard international databases. Experimental results on both databases indicate that the efficiency of the proposed method, which provides better results in discriminating random and skilled forgeries signatures (Al-Omari, Abdullah, & Omar, 2011). This paper is systematized as follows. Section II presents the databases that we used in our experimental results. Section III presents our proposed method and deals with the brief explanation of feature extraction process (First order histogram and Co-occurrence matrix approach). Section IV presents classification model. Section V provides the evaluation protocol having subsection as performance measure and experimental results and conclusion is provided in section VI.
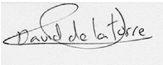
Database

We have used GPDS and MCYT databases for testing the projected texture and gray level based features. Database has been scanned at 600 dpi having sufficient gray texture demonstration. The major modifications between these databases are use of pens. In MCYT all the signers, genuine and forger are signed with the same pen while in GPDS all the signers signed with their own pens. So, our experimental results will point to evaluate ink independence of the proposed features on both databases (Malik et al., 2013).

MCYT Corpus

Database used in experiment is collected from MCYT-75 offline signature (Frias-Martinez, Sanchez, & Velez, 2006; Vargas, Ferrer, Travieso, & Alonso, 2011). Each signature is signed using a WAMCOM Intuous inking pen. Database contains 75 users in which every user has 15 genuine and 15 forgery signature samples. The forgery signature is the mixture of random, simple and skilled forgeries. Some samples of MCYT database is shown in Table 1.

Table 1. Samples of MCYT database

9 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/static-signature-verification-based-on-texture-analysis-using-support-vector-machine/178931

Related Content

A Web-Based Multimedia Retrieval System with MCA-Based Filtering and Subspace-Based Learning Algorithms
Chao Chen, Tao Mengand Lin Lin (2013). *International Journal of Multimedia Data Engineering and Management (pp. 13-45).*
www.irma-international.org/article/a-web-based-multimedia-retrieval-system-with-mca-based-filtering-and-subspace-based-learning-algorithms/84023

Improving Emotion Analysis for Speech-Induced EEGs Through EEMD-HHT-Based Feature Extraction and Electrode Selection
Jing Chen, Haifeng Li, Lin Maand Hongjian Bo (2021). *International Journal of Multimedia Data Engineering and Management (pp. 1-18).*
www.irma-international.org/article/improving-emotion-analysis-for-speech-induced-eegs-through-eemd-hht-based-feature-extraction-and-electrode-selection/276397

Multiresolution Wavelet Transform Based Anisotropic Diffusion for Removing Speckle Noise in a Real-Time Vision-Based Database
Rohini Mahajanand Devanand Padha (2020). *International Journal of Multimedia Data Engineering and Management (pp. 1-14).*
www.irma-international.org/article/multiresolution-wavelet-transform-based-anisotropic-diffusion-for-removing-speckle-noise-in-a-real-time-vision-based-database/247124

FaceTimeMap: Multi-Level Bitmap Index for Temporal Querying of Faces in Videos
Buddha Shrestha, Haeyong Chungand Ramazan S. Aygün (2019). *International Journal of Multimedia Data Engineering and Management (pp. 37-59).*
www.irma-international.org/article/facetimemap/233863

Elementary School Students, Information Retrieval, and the Web
Valerie Nesset (2009). *Encyclopedia of Multimedia Technology and Networking, Second Edition (pp. 469-476).*
www.irma-international.org/chapter/elementary-school-students-information-retrieval/17437