

2nd International Workshop on Automated Forensic Handwriting Analysis (AFHA) 2013

22-23 August 2013, Washington DC, USA



AFHA 2013

PREFACE

Handwriting is considered as a representative of human behavior and characteristics for centuries. With the evolution of modern computing technologies, researchers have moved towards the automated analysis of handwriting. This shift has been reinforced by the interest various industries have in this field. One of the most important applications of automated handwriting analysis systems is in forensic environments. Until now, most of the forensic cases of handwriting analysis are solved without actual application of automated systems. This is because there is an ever increasing gap between the demands of Forensic Handwriting Experts (FHEs) and the computer science community. Actually the underlying issue is the incapability of most of the state of the art handwriting examination systems to be directly applicable to the forensic cases. This is because the computer science community in general has moved by considering the cases which are either trivial w.r.t. forensic situations or not considered the needs of FHEs. Thus there is a great demand to bring the forensic experts and the computer science experts under one roof. The 2nd International Workshop and Tutorial on Automated Forensic Handwriting Analysis (AFHA) 2013, like its predecessor AFHA 2011, serves this purpose.

The AFHA 2013 takes place on 22-23 August 2013, in Washington DC, USA, and is organized as a two-day combined workshop and tutorial covering a diverse range of topics influencing handwriting analysis in the forensic science and in pattern recognition.

On the first day, an introductory tutorial on forensic handwriting examination is given. This includes a description of the forensics point of view and examples of real casework as well as a summary of important approaches in the area of automated handwriting examination. The major topics include: how forensic experts make comparisons (similarities versus differences, subjectivity, and bias), natural variation, line quality, quality versus quantity; what forensic experts need from the document analysis community; what the document analysis community needs to understand about FHEs work; existing systems and system problems; application of the Bayesian approach to forensic evidence evaluation (i.e. using the Likelihood Ratios a measure of the strength of evidence), and reporting by means of a verbal conclusion scale. The state-of-the-art of automatic handwriting/signature analysis systems is also focused where the emphasis is on the internal working of these systems along with the future directions in this regard. The purpose is to familiarize the forensic experts about working of automatic systems.

On the second day, the workshop is organized where researchers from handwriting examination and pattern recognition communities will present their novel researches. Thirteen submissions were received and after a single-blind-peer review process, ten papers were accepted for this volume.

The first paper, '*Some Observations on Handwriting from a Motor Learning Perspective*' discusses the dynamics of signatures in the light of recent findings in motor learning, according to which a signature is a highly automated motor task and, as such, it is stored in the brain as both a trajectory plan and a motor plan. It conjectures that such a stored representation does not necessarily include the entire signature, but can be limited to only parts of it, those that have been learned better and therefore are executed more automatically than others.

The second paper, '*Offline Handwriting Acquisition under Controlled and Uncontrolled Conditions*' discusses the offline handwriting acquisition under controlled and uncontrolled conditions for research purposes. The paper emphasizes that for forensic purposes, it is preferred to start building databases with forensically relevant data. This is because handwriting samples that make

up the current publicly available databases have all been collected under controlled conditions.

The third paper '*Oriented Local Binary Patterns for Writer Identification*' presents an oriented texture feature set, based on local binary patterns (LBP), and apply it to the problem of offline writer identification using the ICDAR 2011 and ICHFR 2012 writer identification contest datasets.

The fourth paper '*Chinese Handwritten Writer Identification based on Structure Features and Extreme Learning Machine*' proposes an approach for writer identification of Chinese handwriting using Chinese character structure features (CSF) and extreme learning machine (ELM). To extract the features embedded in Chinese handwriting characters, special structures have been explored according to the trait of Chinese language.

The fifth paper '*Dissimilarity Representation for Handwritten Signature Verification*' discusses the dissimilarity representation (DR) approach where proximity among patterns constitute the classification space. The paper provide various scenarios where similar concept has been applied by forensic Questioned Document Examination (QDE) experts, when proximity between questioned signatures and a set of templates lead to the authentication decision.

The sixth paper '*Multi-script Off-line Signature Verification: A Two Stage Approach*' presents a technique for off-line English, Hindi (Devnagari), and Bangla (Bengali) signature verification by initially identifying the script type and then applying verification. This paper highlights that better results could be achieved when the script is identified in advance.

The seventh paper '*Off-Line Signature Verification based on Ordered Grid Features: An Evaluation*' presents and evaluates an offline signature modeling which attempts to advance a grid based feature extraction method uniting it with the use of an ordered power set. More specifically, this work represents the pixel distribution of the signature trace by modeling specific predetermined paths having Chebyshev distance of the two, as being members of alphabet subsets-events.

The eighth paper '*Towards Automated Hyper-spectral Document Image Analysis*' provides an overview of the applications of hyper-spectral imaging with focus on solving pattern recognition problems, especially handwriting analysis and signature verification.

The ninth paper '*Fusing Modalities in Forensic Identification with Score Discretization*' proposes a method of score fusion based on discretization. It is evaluated considering the signatures and fingerprints.

The tenth paper '*Joint Glossary of Forensic Document Examination and Pattern Recognition*' introduces an open scientific glossary, based on the MediaWiki engine, to the forensic examination and pattern recognition communities. The purpose is to enable the development of a shared conceptualization among the two communities.

We would like to thank the authors for their paper submission, our program committee members for their reviews and active participation in various activities concerning tutorial and workshop, and the AFHA 2013 workshop chairs for their advice and guidance throughout the endeavor.

The AFHA 2013 PC-chairs,
August 2013.

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