

15th International Conference on Frontiers in Handwriting Recognition (ICFHR 2016)

Shenzhen, China
October 23-26, 2016

Program Guide

Sponsored by

TC11 (Reading Systems) of International Association for Pattern Recognition (IAPR)

Organized by

Institute of Automation of Chinese Academy of Sciences
Graduate School at Shenzhen, Tsinghua University

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Program at a Glance

Oct 23 (Sunday)	
8:00-18:00	Registration
9:00-17:30	Tutorials
18:00-20:00	Welcome reception
Oct 24 (Monday)	
8:00-9:00	Registration
9:00-9:20	Opening
9:20-10:20	Keynote 1: How deep is deep and what's next in computational intelligence?
10:20-10:50	Break
10:50-12:30	Oral Session 1: Document Segmentation and Understanding
12:30-13:40	Lunch
13:40-14:50	Poster session 1
14:50-16:10	Oral Session 2: Deep Learning for Handwriting Recognition
16:10-16:30	Break
16:30-18:20	Oral Session 3: Online Handwriting Recognition
Oct 25 (Tuesday)	
9:00-10:00	Keynote 2: Handwriting and Speech Recognition: From Bayes Decision Rule to Deep Neural Networks
10:00-10:30	Break
10:30-12:30	Oral Session 4: Document Retrieval
12:30-13:40	Lunch
13:40-14:40	Poster session 2
14:40-15:00	Break
15:00-16:20	Oral Session 5: Handwritten Character Recognition
16:20-17:00	TC11 session
17:00-20:30	Social event
20:30-22:30	Banquet
Oct 26 (Wednesday)	
9:00-10:00	Keynote 3: Online handwriting recognition: past, present and future
10:00-10:30	Break
10:30-12:30	Oral Session 6: Handwritten Text Recognition
12:30-13:40	Lunch
13:40-15:00	Oral Session 7: Writer Identification
15:00-16:00	Panel discussion: New Frontiers in Handwriting Recognition
16:00-16:20	Break
16:20-17:40	Competitions
17:40-17:50	Award presentation, Closing

Welcome from the Chairs

Welcome to the 15th International Conference on Frontiers in Handwriting Recognition (ICFHR 2016), being held in Shenzhen, China. The series of the ICFHR conferences is a continuation of initially ten IWFHRs (Montreal 1990, Chateau de Bonas 1991, Buffalo 1993, Taipei 1994, Colchester 1996, Taejon 1998, Amsterdam 2000, Niagara on the Lake 2002, Tokyo 2004, La Baule 2006). Since 2008, in Montreal, the event moved from a workshop to a conference and has been successfully held in Kolkata (2010), Bari (2012) and Crete Island (2014).

The ICFHR 2016 will be highlighted by three keynote talks. Prof. Lambert Schomaker of University of Groningen, Netherlands, will give a talk “How Deep is Deep and What's Next in Computational Intelligence”. Prof. Hermann Ney of RWTH Aachen University, Germany, will give a talk “Handwriting and Speech Recognition: From Bayes Decision Rule to Deep Neural Networks”. Prof. Masaki Nakagawa of Tokyo University of Agriculture and Technology, Japan, will give a talk “Online Handwriting Recognition: Past, Present and Future”. The keynote talks cover important topics including the emerging deep learning as well as the historical review of handwriting recognition techniques and applications. A panel session is also organized to discuss the frontier research issues of handwriting recognition in the deep learning era.

The program includes seven oral sessions, two poster sessions and a competition session. The 33 oral papers and 66 poster papers were selected from 135 full submissions after strict review. The topics cover handwritten document segmentation and understanding, deep learning for handwriting recognition, online handwriting recognition, handwritten character and text recognition, handwritten document retrieval, writer identification, and other related issues of document image analysis and applications. The eight competition papers report the results of benchmarking on different techniques in handwriting recognition.

The conference also hosts tutorials. The tutorial “Forensic Document Examination: State of the Art and Open Issues” is presented by Michael Blumenstein, Donato Impedovo, Marcus Liwicki, Imran Malik, and Angelo Marcelli. The tutorial “Deep Representation Learning for Handwriting Recognition” is presented by Tonghua Su and Guoqiang Zhong.

We thank all the program committee members and reviewers, who dedicated precious time in the review process to guarantee the quality of selected papers. We also thank the tutorial chairs, Michael Blumenstein and Marcus Liwicki, who bring two tutorials of important topics. The competition chairs, Apostolos Antonacopoulos and Volker Märgner, made great efforts in guiding the organization of competitions and reviewing the competition papers. We also thank the publicity chairs, Seichi

Uchida, Venu Govindaraju and Jean-Marc Ogier, the organizing chair, Zhenhua Guo, and the publication chair, Xu-Yao Zhang, for their contributions to the conference.

We specially thank the researchers who have submitted original research work for presentation, prepared a tutorial, organized or participated in a competition, attended a session of the conference. Without them, the conference would not have been a success.

We welcome you to take part in this important academic event and hope you find ICFHR 2016 an enjoyable and fruitful conference.

Honorary Chair: Ching Y. Suen

General Chairs: Cheng-Lin Liu, Youbin Chen

Program Chairs: Umapada Pal, Simone Marinai, Mohamed Cheriet

Conference Committees

Honorary Chair

Ching Y. Suen (Canada)

General Chairs

Cheng-Lin Liu (China)

Youbin Chen (China)

Program Chairs

Umapada Pal (India)

Mohamed Cheriet (Canada)

Simone Marinai (Italy)

Tutorial&Workshop Chairs

Michael Blumenstein (Australia)

Marcus Liwicki (Germany)

Competition Chairs

Apostolos Antonacopoulos (UK)

Volker M ärgner (Germany)

Publicity Chairs

Seiichi Uchida (Japan)

Venu Govindaraju (USA)

Jean-Marc Ogier (France)

Publication Chair

Xu-Yao Zhang (China)

Organizing Chair

Zhenhua Guo (China)

Local Arrangements Team

Peipei Yang

Ming Li

Anli Gong

Program Committee Members

- A. Alaei (Australia)
A. Alimi (Tunisia)
S. Al-Maadeed (Qatar)
E. Anquetil (France)
A. Antonacopoulos (UK)
A. Belaid (France)
U. Bhattacharya (India)
M. Blumenstein (Australia)
T. Bui (Canada)
H. Cao (USA)
B. Chaudhuri (Indian)
J. Chen (USA)
Y. Chherawala (USA)
A. Dengel (Germany)
C. Djeddi (Algeria)
V. Eglin (France)
H. El Abed (Saudi Arabic)
J. El-Sana (Israel)
R. Farrahi Moghaddam (Canada)
M. Ferrer Ballester (Spain)
G. Fink (Germany)
A. Fischer (Switzerland)
A. Fornes (Spain)
V. Frinken (Japan)
B. Gatos (Greece)
V. Govindaraju (USA)
E. Granger (Canada)
L. Heutte (France)
Q. Huo (China)
M. Iwamura (Japan)
L. Jin (China)
S. Kanoun (Tunisia)
D. Karatzas (Spain)
E. Kavallieratou (Greece)
C. Kermorvant (France)
Y. Kessentini (France)
K. Kise (Japan)
A. Koerich (Brazil)
B. Lamiroy (France)
F. Lebourgeois (France)
L. Likforman-Sulem (France)
R. Lins (Brazil)
M. Liwicki (Germany)
J. Lladós (Spain)
D. Lopresti (USA)
G. Louloudis (Greece)
S. Lu (Singapore)
Y. Lu (China)
D. Mammass (Morocco)
R. Manmatha (USA)
A. Marcelli (Italy)
V. Märgner (Germany)
M. Nakagawa (Japan)
J.-M. Ogier (France)
W. Ohyama (Japan)
L. Oliveira (Brazil)
S. Omachi (Japan)
J. Ortega-Garcia (Spain)
T. Paquet (France)
G. Pirlo (Italy)
R. Plamondon (Canada)
L. Pratikakis (Greece)
J.-Y. Ramel (France)
P. Roy (Indian)
R. Sabourin (Canada)
J. Sanchez (Spain)
S. Setlur (USA)
P. Shivakumara (Malaysia)
S. Srihari (USA)
N. Stamatopoulos (Greece)
J. Sun (China)
S. Uchida (Japan)
C. Viard-Gaudin (France)
E. Vidal (France)
N. Vincent (France)
B. Xiao (China)
F. Yin (China)
R. Zanibbi (USA)
G. Zhong (China)
X.-D. Zhou (China)

Additional Reviewers

Riaz Ahmad
Manuel Bouillon
Stephane Bres
Meng Cai
Yajuan Cai
Sukalpa Chanda
Guangyi Chen
Kai Chen
Kai Chen
Tao Chen
Cheng Cheng
Kenny Davila
Jean Duong
Wei Fan
Yanhai Gan
Angelika Garz
Nathalie Girard
Rene Grzeszick
Frank Dennis Julca-Aguilar
Majeed Kassis
Kyung Won Lee
Yann Leydier
Shujing Lu
Muhammad Muzzamil Luqman
Ranju Mandal
Nagashri Namagundlu Lakshminarayana
Neeti Narayan
Nibal Nayef
Vu Nguyen
Angelos Nicolaou
Srikanta Pal
Swapn Kr. Parui
Antonio Parziale
Xujun Peng
Axel Plinge
Sophea Prum
Rathin Radhakrishnan Nair
George Retsinas
Pau Riba
Leonard Rothacker
Adolfo Santoro
Rosa Senatore
Mathias Seuret
Giorgos Sfikas
Hong Shang
Xiaohu Shao
Yunxue Shao
Nabin Sharma
Nabin Sharma
Cunzhao Shi
Fotini Simistira
Damien Simonnet
Bolan Su
Tonghua Su
Sebastian Sudholt
Lei Sun
Shangxuan Tian
Juan Ignacio Toledo
Bhargava Urala Kota
Jean-Paul van Oosten
Nikos Vasilopoulos
Liuang Wang
Qingqing Wang
Song Wang
Yanna Wang
Yichao Wu
Marcel W irtsch
Zecheng Xie
Liang Xu
Weixin Yang
Yan Zheng
Yuchen Zheng
Anna Zhu

Presentation Instructions

Oral Presentation

The organizing committee will provide a computer and video projector for display in the meeting room. The presenting author is recommended to arrive at the room 10min before the start of session, and copy the presentation material (PPT or PDF) into the computer provided by the organizing committee. Each oral paper has 20min, including 15min for presentation and 5min for questions and discussions.

Note that the competition papers have different time lengths (10min) for presentation. The presentation of each competition paper includes technical report and presenting certificates to competition winners.

Poster Presentation

The poster boards will be attached sequential numbers #1, #2, #3 (paper index in the reviewing process). The presenting author should have the poster attached on the board of assigned number before the start of the poster session. If the authors would like to show demonstrations, they should use their own laptop with battery. The organizer will not provide desks and electricity for poster presentations.

The poster board will be 250cm high and 100cm wide. The author is recommended to prepare a poster of A0 size (120cm high and 84cm wide) or smaller in portrait orientation.

Technical Program

October 23 (Sunday)

8:00-18:00 **Registration**

Location: First Floor

9:00-17:30 **Tutorials**

Tutorial 1: Forensic Document Examination: state of the art and open issues

Location: Second Floor

Tutorial 2: Deep Representation Learning for Handwriting Recognition

Location: Third Floor

18:00-20:00 **Welcome reception**

Location: 25th Floor

October 24 (Monday)

8:00-9:00 Registration

Location: First Floor

9:00-9:20 Opening

Location: Third Floor

9:20-10:20 Keynote 1

Location: Third Floor

Chair: Umapada Pal

Lambert Schomaker. *How deep is deep and what's next in computational intelligence?*

10:50-12:30 Oral Session 1: Document Segmentation and Understanding

Location: Third Floor

Chair: Angelo Marcelli

10:50-11:10 Bastien Moysset, Jerome Louradour, Christopher Kermorvant and Christian Wolf. *Learning text-line localization with shared and local regression neural networks*

11:10-11:30 Sheng He, Petros Samara, Jan Burgers and Lambert Schomaker. *Discovering Visual Element Evolutions for Historical Document Dating*

11:30-11:50 Majeed Kassis and Jihad El-Sana. *Scribble Based Interactive Page Layout Segmentation Using Gabor Filter*

11:50-12:10 Umair Muneer Butt, Muhammad Imran Malik, Faisal Shafait and Sheraz Ahmad. *Automatic Signature Segmentation Using Hyper-spectral Imaging*

12:10-12:30 K. S. Raghunandan, Palaiahnakote Shivakumara, B. J. Navya, G. Pooja, Navya Prakash, G. Hemantha Kumar, Umapada Pal and Tong Lu. *Fourier Coefficients for Fraud Handwritten Document Classification Through Age Analysis*

13:40-14:50 Poster session 1

Location: Third Floor

Chair: Tong-Hua Su

#3 Majeed Kassis and Jihad El-Sana. *Word Spotting using Radial Descriptor Graph*

#5 Sangheeta Roy, Palaiahnakote Shivakumara, Umapada Pal, Tong Lu and Chew Lim Tan. *New Tampered Features for Scene and Caption Text Classification in Video Frame*

#8 Moises Diaz, Sukalpa Chanda, Miguel Ferrer, Chayan Kr. Banerjee, Anirban Majumdar, Cristina Carmona-Duarte, Parikshit Acharya and Umapada Pal.

Multiple Generation of Bengali Static Signatures

- #10 Martin Bresler, Daniel Prusa and Vaclav Hlavac. *Recognizing Off-line Flowcharts by Reconstructing Strokes and Using On-line Recognition Techniques*
- #12 Yunxue Shao, Guanglai Gao and Chunheng Wang. *A Connection Reduced Network for Similar Handwritten Chinese Character Discrimination*
- #14 Ji Liu, Long-Long Ma and Jian Wu. *Online Handwritten Mongolian Word Recognition Using MWRCNN and Position Maps*
- #15 Mauricio Villegas, Alejandro H. Toselli, Verónica Romero and Enrique Vidal. *Exploiting Existing Modern Transcripts for Historical Handwritten Text Recognition*
- #20 Fan Daoerji and Gao Guanglai. *DNN-HMM for Large Vocabulary Mongolian Offline Handwriting Recognition*
- #22 Sheng He and Lambert Schomaker. *Co-occurrence features for writer identification*
- #27 Song Wang, Li Chen, Liang Xu, Wei Fan, Jun Sun and Satoshi Naoi. *Deep Knowledge Training and Heterogeneous CNN for Handwritten Chinese Text Recognition*
- #28 Kai Chen, Mathias Seuret, Marcus Liwicki, Jean Hennebert, Cheng-Lin Liu and Rolf Ingold. *Page Segmentation for Historical Handwritten Document Images Using Conditional Random Fields*
- #30 Nicholas Howe, Andreas Fischer and Baptiste Wicht. *Inkball Models as Features for Handwriting Recognition*
- #33 Hemmaphan Suwanwiwat, Michael Blumenstein and Umapada Pal. *An Investigation of Novel Combined Features on Automatic Off-line Short Answer Assessment System*
- #36 Dona Valy, Michel Verleysen and Kimheng Sok. *Line Segmentation Approach for Ancient Palm Leaf Manuscripts using Competitive Learning Algorithm*
- #39 Xi Shen and Ronaldo Messina. *A method of synthesizing handwritten Chinese images for data augmentation*
- #41 Fatma Chabchoub, Yousri Kessentini, Slim Kanoun and V éronique Eglin, Frank Lebourgeois. *SmartATID: A mobile captured Arabic Text Images Dataset for multi-purpose recognition tasks*
- #43 Suliman Alsubhany and Mohammad Tanvir Parvez. *Secure Arabic Handwritten CAPTCHA Generation Using OCR Operations*
- #46 Rui Wu, Shuli Yang, Dawei Leng, Zhenbo Luo and Yunhong Wang. *Random Projected Convolutional Feature for Scene Text Recognition*
- #49 Kha Cong Nguyen and Masaki Nakagawa. *Enhanced Character Segmentation for Format-Free Japanese Text Recognition*
- #50 Hung Tuan Nguyen, Cuong Tuan Nguyen, Pham The Bao and Masaki Nakagawa. *Preparation of an Unconstrained Vietnamese Online*

Handwriting Database and Recognition Experiments by Recurrent Neural Networks

- #52 Kapil K. Upreti and Soumen Bag. *Segmentation of Unconstrained Handwritten Hindi Words Using Polygonal Approximation*
- #56 Youbao Tang and Xiangqian Wu. *Scene Text Detection via Edge Clue and Multi-Features*
- #58 Li Chen, Song Wang, Wei Fan, Jun Sun and Satoshi Naoi. *Cascading Training for Relaxation CNN on Handwritten Character Recognition*
- #61 Made Windu Antara Kesiman, Jean-Christophe Burie, Jean-Marc Ogier, Gusti Ngurah Made Agus Wibawantara and I Made Gede Sunarya. *AMADI_LontarSet: The First Handwritten Balinese Palm Leaf Manuscripts Dataset*
- #65 Daniel Mart ın-Albo, Luis A. Leiva and R ęean Plamondon. *On the Design of Personal Digital Bodyguards: Impact of Hardware Resolution on Handwriting Analysis*
- #67 Lei Hu and Richard Zanibbi. *Line of Sight Stroke Graphs for Handwritten Math Formula Representation and Symbol Segmentation*
- #68 Ting Zhang, Harold Mouch ęre and Christian Viard-Gaudin. *Online Handwritten Mathematical Expressions Recognition by Merging Multiple 1D Interpretations*
- #78 Dewi Suryani, Patrick Doetsch and Hermann Ney. *On the Benefits of Convolutional Neural Network Combinations in Offline Handwriting Recognition*
- #79 Leonard Rothacker and Gernot A. Fink. *Robust Output Modeling in Bag-of-Features HMMs for Handwriting Recognition*
- #80 Fredrik Wahlberg, Tomas Wilkinson and Anders Brun. *Historical Manuscript Production Date Estimation using Deep Convolutional Networks*
- #82 Yann Leydier, Jean Duong, Stephane Bres, V ęronique Eglin, Frank Le Bourgeois and Martial Tola. *libcrn, an Open-Source Document Image Processing Library*
- #120 Jianjuan Liang, Bilan Zhu and Masaki Nakagawa. *A candidate lattice refinement method for online handwritten Japanese text recognition*
- #134 Adolfo Santoro, Antonio Parziale and Angelo Marcelli. *A human in the loop approach to historical handwritten document transcription*

14:50-16:10 Oral Session 2: Deep Learning for Handwriting Recognition

Location: Third Floor

Chair: Thierry Paquet

- 14:50-15:10 Paul Voigtlaender, Patrick Doetsch and Hermann Ney. *Handwriting Recognition with Large Multidimensional Long Short-Term Memory Recurrent Neural Networks*

- 15:10-15:30 Bruno Stuner, Clément Chatelain and Thierry Paquet. *A Lexicon Verification Strategy in a BLSTM Cascade Framework*
- 15:30-15:50 Zenghui Sun, Lianwen Jin, Zecheng Xie, Ziyong Feng and Shuye Zhang. *Convolutional Multi-directional Recurrent Network for Offline Handwritten Text Recognition*
- 15:50-16:10 Cuong Tuan Nguyen and Masaki Nakagawa. *Finite State Machine Based Decoding of Handwritten Text Using Recurrent Neural Networks*

16:30-18:20 Oral Session 3: Online Handwriting Recognition

Location: Third Floor

Chair: Richard Zanibbi

- 16:30-17:00 Invited: R  jean Plamondon. *Personal Digital Bodyguards for e-Security, e-Health and e-Learning: an International Journey*
- 17:00-17:20 Chengcheng Wang, Harold Mouch  re, Christian Viard-Gaudin and Lianwen Jin. *Combined Segmentation and Recognition of Online Handwritten Diagrams with High Order Markov Random Field*
- 17:20-17:40 Minh Khanh Phan, Anh Le Duc and Masaki Nakagawa. *Semi-Incremental Recognition of Online Handwritten Mathematical Expressions*
- 17:40-18:00 Brian Iwana, Seiichi Uchida and Volkmar Frinken. *A Robust Dissimilarity-based Neural Network for Temporal Pattern Recognition*
- 18:00-18:20 Tonghua Su and Li Sun. *Deep LSTM Networks for Online Chinese Handwriting Recognition*

October 25 (Tuesday)

9:00-10:00 **Keynote 2**

Location: Third Floor

Chair: Youbin Chen

Hermann Ney. *Handwriting and Speech Recognition: From Bayes Decision Rule to Deep Neural Networks*

10:30-12:30 **Oral Session 4: Document Retrieval**

Location: Third Floor

Chair: Shivakumara Palaiahnakote

10:30-10:50 Sebastian Sudholt and Gernot Fink. *PHOCNet: A Deep Convolutional Neural Network for Word Spotting in Handwritten Documents*

10:50-11:10 Giorgos Sfikas, George Retsinas and Basilis Gatos. *Zoning Aggregated Hypercolumns for Keyword Spotting*

11:10-11:30 Praveen Krishnan, Kartik Dutta and C V Jawahar. *Deep Feature Embedding for Accurate Recognition and Retrieval of Handwritten Text*

11:30-11:50 Zhong Zhuoyao, Weishen Pan, Lianwen Jin, Harold Mouchère and Christian Viard-Gaudin. *SpottingNet: Learning the Similarity of Word Images with Convolutional Neural Network for Word Spotting in Handwritten Historical Documents*

11:50-12:10 Bartosz Bogacz, Nicholas Howe and Hubert Mara. *Segmentation free spotting of Cuneiform using part structured models*

12:10-12:30 Tomas Wilkinson and Anders Brun. *Semantic and Verbatim Word Spotting using Deep Neural Networks*

13:40-14:40 **Poster session 2**

Location: Third Floor

Chair: Fei Yin

#16 Vicente Bosch Campos, Jorge Calvo-Zaragoza, Alejandro Héctor Toselli and Enrique Vidal. *Sheet Music Statistical Layout Analysis*

#24 Jorge Calvo-Zaragoza, Alejandro Héctor Toselli and Enrique Vidal. *Early Handwritten Music Recognition with Hidden Markov Models*

#62 Made Windu Antara Kesiman, Jean-Christophe Burie and Jean-Marc Ogier. *A New Scheme for Text Line and Character Segmentation from Gray Scale Images of Palm Leaf Manuscript*

#66 Verónica Romero, Alicia Fornés, Enrique Vidal and Joan Andreu Sánchez. *Using the MGGI Methodology for Category-based Language Modeling in Handwritten Marriage Licenses Books*

- #70 Lei Hu and Richard Zanibbi. *MST-Based Parsing of Online Handwritten Mathematical Expressions*
- #76 Liang Xu, Wei Fan, Jun Sun and Satoshi Naoi. *An HMM-based Over-segmentation Method for Touching Chinese Handwriting Recognition*
- #77 Alejandro Toselli, Joan Puigcerver and Enrique Vidal. *Two Methods for Improving Confidence Scores for Lexicon-free Word Spotting in Handwritten Text*
- #83 Salil Kanetkar, Ayush Pathania, Vivek Venugopal and Suresh Sundaram. *Offline Writer Identification using Local Derivative Pattern*
- #85 Patrick Doetsch, Albert Zeyer and Hermann Ney. *Bidirectional decoder networks for attention-based end-to-end offline handwriting recognition*
- #87 Sovann En, Caroline Petitjean, Stephane Nicolas, Frederic Jurie and Laurent Heutte. *Region Proposal for Pattern Spotting in Historical Document Images*
- #93 Soumik Bhattacharya, Durjoy Sen Maitra, Ujjwal Bhattacharya and Swapn Kr. Parui. *An End-to-End System for Bangla Online Handwriting Recognition*
- #95 Zhaoxin Chen, Eric Anquetil, Harold Mouchère and Christian Viard-Gaudin. *A dataset for evaluating simultaneous composition of structured documents in a multi-user and multi-touch environment*
- #97 Fan Yang, Lianwen Jin, Weixin Yang, Ziyong Feng and Shuye Zhang. *Handwritten/Printed Receipt Classification using Attention-Based Convolutional Neural Network*
- #98 Anh Le Duc and Masaki Nakagawa. *Comparison of parsing algorithms for recognizing online handwritten mathematical expressions*
- #100 Ali Mirza, Momina Moetesum, Chawki Djeddi and Imran Siddiqi. *Gender Classification from Offline Handwriting Images using Textural Features*
- #101 Hanen Khelif, Sophea Prum, Yousri Kessentini, Slim Kanoun and Jean-Marc Ogier. *Fusion of explicit segmentation based system and segmentation-free based system for on-line Arabic handwritten word recognition*
- #108 Seiichi Uchida, Shota Ide, Brian Iwana and Anna Zhu. *A Further Step to Perfect Accuracy by Training CNN with Larger Data*
- #110 Fuxi Jia, Cunzhao Shi, Kun He, Chunheng Wang and Baihua Xiao. *Document Image Binarization using Structural Symmetry of Strokes*
- #112 Bilan Zhu, Arti Shivram, Masaki Nakagawa and Venu Govindaraju. *Online handwritten cursive word recognition by combining segmentation-free and segmentation-based methods*
- #113 Anshuman Majumdar, Praveen Krishnan and C V Jawahar. *Visual Aesthetic Analysis for Handwritten Document Images*
- #115 Chandranath Adak, Bidyut B. Chaudhuri and Michael Blumenstein. *Offline Cursive Bengali Word Recognition using CNNs with a Recurrent Model*
- #116 Rajib Ghosh and Partha Pratim Roy. *Comparison of Zone-Features for Online Bengali and Devanagari Word Recognition using HMM*

- #124 Louisa Kessi, Frank Lebourgeois and Garcia Christophe. *An Efficient New PDE-based Characters Reconstruction After Graphics Removal*
- #138 Antonio Parziale, Adolfo Santoro and Angelo Marcelli. *Writer verification in forensic handwriting examination: a pilot study*
- #141 Riaz Ahmad, Muhammad Zeshan Afzal, Sheikh Faisal Rashid, Marcus Liwicki, Thomas Breuel and Andreas Dengel. *KPTI: Katib's Pashto Text Imagebase and Deep Learning Benchmark*
- #142 Mathias Seuret, Rolf Ingold and Marcus Liwicki. *N-light-N: A Highly-Adaptable Java Library for Document Analysis with Convolutional Auto-Encoders and Related Architectures*
- #143 Arnau Baró, Pau Riba and Alicia Fornés. *Towards the recognition of compound music notes in handwritten music scores*
- #144 Fotini Simistira, Mathias Seuret, Nicole Eichenberger, Angelika Garz, Marcus Liwicki and Rolf Ingold. *DIVA-HisDB: A Precisely Annotated Large Dataset of Challenging Medieval Manuscripts*
- #146 Mahmoud Ltaief, Hala Bezine and Adel M.Alimi. *A spiking motor-model for online handwriting movements generation*
- #147 Cristinel Codrescu. *FIRMLP for Handwritten Digit Recognition*
- #149 Keigo Matsuda, Wataru Ohyama, Tetsushi Wakabayashi and Fumitaka Kimura. *Effective Random-impostor Training for Combined Segmentation Signature Verification*
- #153 Arie Shaus, Barak Sober, Eli Turkel and Eli Piasezky. *Beyond the Ground Truth: Alternative Quality Measures of Document Binarizations*
- #159 Nabil Aouadi, Afef Kacem and Abdel Belaid. *Localization Of Touching Letters In Arabic Handwritten Documents*

15:00-16:20 Oral Session 5: Handwritten Character Recognition

Location: Third Floor

Chair: Abdel Belaid

- 15:00-15:20 Cheng Cheng, Xu-Yao Zhang, Xiao-Hu Shao and Xiang-Dong Zhou. *Handwritten Chinese Character Recognition by Joint Classification and Similarity Ranking*
- 15:20-15:40 Hong-Ming Yang, Xu-Yao Zhang, Fei Yin, Zhenbo Luo and Cheng-Lin Liu. *Unsupervised Adaptation of Neural Networks for Chinese Handwriting Recognition*
- 15:40-16:00 Yuanping Zhu, Xingle An and Kuang Zhang. *A Handwritten Chinese Character Recognition Method Combining Sub-Structure Recognition*
- 16:00-16:20 Bogdan-Ionut Cirstea and Laurence Likforman-Sulem. *Tied Spatial Transformer Networks for Digit Recognition*

16:20-17:00 TC11 session

17:00-20:30 Social event

20:30-22:30 Banquet

Instructions for social event and banquet:

The social event will take place at the Chinese Folk Culture Village (深圳锦绣中华民俗文化村) from 18:30-20:00. Since it is outdoor, if it rains in this time, the event maybe canceled and then the participants move to the location of banquet directly.

The banquet will be held at 10F Banquet Hall of Seaview O'City Hotel Shenzhen (深圳海景奥斯廷酒店, 深圳市南山区光侨街 3-5 号), which is in walking distance from the Chinese Folk Culture Village.

All the participants (including the conference registrants and people who hold extra banquet tickets) should gather in front of the Convention Centre to take bus at 17:10. The buses will depart for the Chinese Folk Culture Village at 17:20. When boarding bus, you will need to show your name badge or banquet ticket.

October 26 (Wednesday)

9:00-10:00 Keynote 3

Location: Third Floor

Chair: Cheng-Lin Liu

Masaki Nakagawa. *Online handwriting recognition: past, present and future*

10:30-12:30 Oral Session 6: Handwritten Text Recognition

Location: Third Floor

Chair: Lianwen Jin

10:30-10:50 Th odore Bluche and Ronaldo Messina. *Faster Segmentation-Free Handwritten Chinese Text Recognition with Character Decompositions*

10:50-11:10 Wassim Swaileh, Julien Lerouge and Thierry Paquet. *A Unified French/English syllabic model for handwriting recognition*

11:10-11:30 Joan Andreu S anchez and Umapada Pal. *Handwritten Text Recognition for Bangla*

11:30-11:50 Zi-Rui Wang and Jun Du. *Writer Code Based Adaptation of Deep Neural Network for Offline Handwritten Chinese Text Recognition*

11:50-12:10 Irfan Ahmad and Gernot Fink. *Class-Based Contextual Modeling for Handwritten Arabic Text Recognition*

12:10-12:30 Akram Khemiri, Afef Kacem Echi, Abdel Belaid and Mourad Elloumi. *A System for off-line Arabic Handwritten Word Recognition based on the Bayesian Approach*

13:40-15:00 Oral Session 7: Writer Identification

Location: Third Floor

Chair: Seiichi Uchida

13:40-14:00 Youbao Tang and Xiangqian Wu. *Text-independent Writer Identification via CNN Features and Joint Bayesian*

14:00-14:20 Isht Dwivedi, Swapnil Gupta, Vivek Venugopal and Suresh Sundaram. *Online Writer Identification using Sparse Coding and Histogram based descriptors*

14:20-14:40 Jun Tan, Ning Bi, Ching Y Suen and Nicola Nobile. *Multi-Feature Selection of Handwriting for Gender Identification Using Mutual Information*

14:40-15:00 Linjie Xing and Yu Qiao. *DeepWriter: A Multi-Stream Deep CNN for Text-independent Writer Identification*

15:00-16:00 Panel discussion: New Frontiers in Handwriting Recognition

Location: Third Floor

Chair: Michael Blumenstein

Panlists: Youbin Chen, Gernot Fink, Qiang Huo, Christopher Kermorvant, Lambert Schomaker

16:20-17:40 Competitions

Location: Third Floor

Chair: Jean-Marc Ogier

- 16:20-16:30 Florence Cloppet, V éronique Eglin, Van Cuong Kieu, Dominique Stutzmann, Nicole Vincent. *ICFHR2016 Competition on the Classification of Medieval Handwritings in Latin Script*
- 16:30-16:40 Jean-Christophe Burie, Mickael Coustaty, Setiawan Hadi, Made Windu Antara Kesiman, Jean-Marc Ogier, Erick Paulus, Kimheng Sok, I Made Gede Sunarya, Dona Valy. *ICFHR2016 Competition on Analysis of Handwritten Text in Images of Balinese Palm Leaf Manuscripts*
- 16:40-16:50 Chawki Djeddi, Somaya Al-Maadeed, Abdeljalil Gattal, Imran Siddiqi, Abdellatif Ennaji, Haikal El Abed. *ICFHR2016 Competition on Multi-script Writer Demographics Classification Using "QUWI" Database*
- 16:50-17:00 Harold Mouch ère, Christian Viard-Gaudin, Richard Zanibbi, Utpal Garain. *ICFHR2016 Competition on Recognition of Handwritten Mathematical Expressions (CROHME2016)*
- 17:00-17:10 Ioannis Pratikakis, Konstantinos Zagoris, Georgios Barlas, Basilis Gatos. *ICFHR2016 Handwritten Keyword Spotting Competition (H-KWS 2016)*
- 17:10-17:20 Ioannis Pratikakis, Konstantinos Zagoris, Georgios Barlas, Basilis Gatos. *ICFHR2016 Handwritten Document Image Binarization Competition (H-DIBCO 2016)*
- 17:20-17:30 Michael Murdock, Jack Reese, Shawn Reid. *ICFHR2016 Competition on Local Attribute Detection for Improving Handwriting Recognition*
- 17:30-17:40 Joan Andreu Sánchez, Verónica Romero, Alejandro H. Toselli, Enrique Vidal. *ICFHR2016 Competition on Handwritten Text Recognition on the READ Dataset*

17:40-17:50 Awards Presentation and Closing

Location: Third Floor

Venue

The ICFHR2016 is to be held at the Ming Wah International Convention Centre, which is a four-star comprehensive deluxe hotel located in the heart of Shekou (a part of Shenzhen City), and is only 5-10min walk to the Shekou Ferry Terminal.

Shekou is one of the most beautiful places in Shenzhen and by far the largest living area for the foreigners in the Pearl River Delta Region. There are a lot of bars and restaurants in Shekou which is the main residential zone for Shenzhen's sizable Western expatriate community.

The nearest subway station to Ming Wah International Convention Centre is **Sea World**, which is one stop from the Shekou Ferry Terminal.

More detailed travel information can be found on the ICFHR2016 website:

<http://www.nlpr.ia.ac.cn/icfhr2016/travel.htm>



Sponsors

ICFHR 2016 is sponsored by the TC11 (Reading Systems) of the International Association of Pattern Recognition (IAPR) and the following organizations:



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