ICDAR 2019

15th International Conference on Document Analysis and Recognition
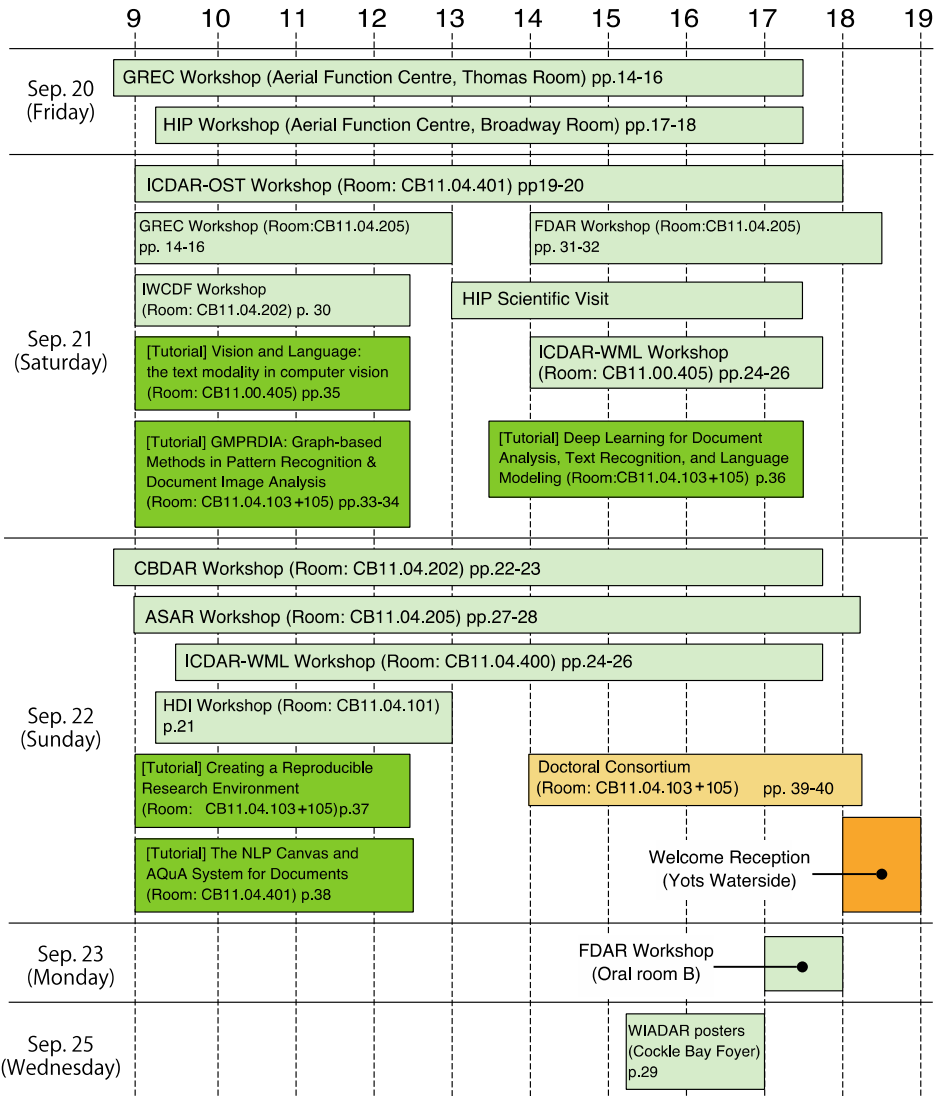
September 20 – 25, 2019
Sydney, New South Wales, Australia

Program Booklet

IAPR

ICDAR 2019

Timetable (Pre-events)

Time axis: 9 10 11 12 13 14 15 16 17 18 19

Sep. 20 (Friday)
- GREC Workshop (Aerial Function Centre, Thomas Room) pp.14-16
- HIP Workshop (Aerial Function Centre, Broadway Room) pp.17-18

Sep. 21 (Saturday)
- ICDAR-OST Workshop (Room: CB11.04.401) pp19-20
- GREC Workshop (Room:CB11.04.205) pp. 14-16
- FDAR Workshop (Room:CB11.04.205) pp. 31-32
- IWCDF Workshop (Room: CB11.04.202) p. 30
- HIP Scientific Visit
- [Tutorial] Vision and Language: the text modality in computer vision (Room: CB11.00.405) pp.35
- ICDAR-WML Workshop (Room: CB11.00.405) pp.24-26
- [Tutorial] GMPRDIA: Graph-based Methods in Pattern Recognition & Document Image Analysis (Room: CB11.04.103+105) pp.33-34
- [Tutorial] Deep Learning for Document Analysis, Text Recognition, and Language Modeling (Room:CB11.04.103+105) p.36

Sep. 22 (Sunday)
- CBDAR Workshop (Room: CB11.04.202) pp.22-23
- ASAR Workshop (Room: CB11.04.205) pp.27-28
- ICDAR-WML Workshop (Room: CB11.04.400) pp.24-26
- HDI Workshop (Room: CB11.04.101) p.21
- [Tutorial] Creating a Reproducible Research Environment (Room: CB11.04.103+105)p.37
- Doctoral Consortium (Room: CB11.04.103+105) pp. 39-40
- [Tutorial] The NLP Canvas and AQuA System for Documents (Room: CB11.04.401) p.38
- Welcome Reception (Yots Waterside)

Sep. 23 (Monday)
- FDAR Workshop (Oral room B)

Sep. 25 (Wednesday)
- WIADAR posters (Cockle Bay Foyer) p.29

* Pre-events except WIADAR workshop are held in UTS CB11 (UTS Faculty of Engineering and IT Building) and Aerial Function Centre.

* Posters at WIADAR workshop are presented in Poster Session 3 at main conference.

Timetable
(Main Conference)

Sunday, 22 September		
18:00-19:00	Welcome Reception (Yots Waterside – Australian Maritime Museum) (p.74)	

Oral Room A	Oral Room B	Cockle Bay Foyer

Monday, 23 September (pp.48-54)		
9:00-9:20	Opening Ceremony	
9:20-10:20	ICDAR Award Speech: Prof. Andreas Dengel (pp.42-43)	
10:20-10:50	Coffee Break	
10:50-12:30	Oral Session 1: Handwritten Text Recognition	Oral Session 2: Document Image Processing
12:30-14:00	Lunch Break	
14:00-16:00	Oral Session 3: Document Understanding	Oral Session 4: Table Analysis
16:00-18:00	Competition Session (16:20-17:40)	Future DAR Workshop (17:00-18:00)	Poster Session 1 / Coffee Break

Tuesday, 24 September (pp.55-62)		
9:00-10:00	Keynote Speech 1: Dr. Qiang Huo (pp.44-45)	
10:00-10:30	Coffee Break	
10:30-12:30	Journal Session 1	Journal Session 2
12:30-14:00	Lunch Break	
14:00-15:40	Oral Session 5: Document Understanding	Oral Session 6: Table Analysis
15:40-17:40	Poster Session 2 and Competirion Outcome Reports	Coffee Break
17:40-18:20	TC10/TC11 Joint Meeting	
19:00-22:00	Conference Dinner (Luna Park – Grand Ballroom) (p.74)	

Wednesday, 25 September (pp.63-69)		
9:00-10:00	Keynote Speech 2: Prof. Enrique Vidal (pp.46-47)	
10:00-10:30	Coffee Break	
10:30-12:30	Oral Session 7: Layout Analysis	Oral Session 8: Application of Document Analysis
12:30-14:00	Lunch Break	
14:00-15:20	Oral Session 9: Script Identification and Authentication	Oral Session 10: Signature Verification
15:20-17:00	Poster Session 3 and WIADAR Workshop Posters	Coffee Break
17:00-18:00	Industrial Panel	
18:00-18:10	Closing	

Registration desk opens every day at 8:30am.

Message from Honorary Chair

Welcome to the International Conference on Document Analysis and Recognition ICDAR-2019. This exciting conference has been organized to celebrate the 28th Anniversary of ICDAR which started in 1991 at St. Malo in France by me and Prof. Guy Lorette. Indeed, ICDAR has become one of the most important international conferences in the community of pattern recognition and artificial intelligence. It covers the main themes of document analysis and recognition, handwriting analysis and verification, text detection and processing, and other related topics. In addition to the main conference, numerous satellite workshops have been organized to bring participants up-to-date on graphics, forensics, image processing of historical documents, remote text analysis, machine learning, and others.

For all the above activities, we would like to thank the tremendous efforts of General Chairs Michael Blumenstein and Umapada Pal, the Australian team of ICDAR-2019, and other international committee members of the conference, making it an attractive and valuable conference for the DAR communities around the globe.

Finally, I hope you will find this conference a rewarding and memorable experience. We wish you a very enjoyable stay in beautiful Sydney and other parts of Australia, relaxing on the golden beaches, snorkeling at the Great Barrier Reef, enjoying the harbour lights and operas, and encountering the lovely koalas and kangaroos.

Ching Y. Suen

Honorary Chair of ICDAR 2019, and
Director of CENPARMI - Centre for PR & MI,
Concordia University, Montreal, Canada

August 2019

Welcome Message from General Chairs

Our heartiest welcome to ICDAR-2019, the 15th IAPR International Conference on Document Analysis and Recognition being held in Sydney, Australia. It is truly an honor to host our premier conference in the business capital of Australia, which is the most populous city in the country and is located in the premier State – New South Wales; this is the first time that the ICDAR conference is organized in this part of the world. Sydney is truly an international city, hosting world-famous icons such as the Sydney Harbour Bridge and the Sydney Opera House. There are also many more natural wonders and cultural sites in our beautiful state of New South Wales, including the Blue Mountains and Hunter Valley (famous for its wines). We did our best to prepare every aspect of this conference and hope you will enjoy your stay in Sydney.

ICDAR is a very successful and flagship conference series, which is the biggest and premier international gathering for researchers, scientists and practitioners in the document analysis community. The conference is endorsed by IAPR-TC 10/11 and it was established nearly three decades ago. ICDAR 2019 is the fifteenth biennial meeting of our international research community which began in St. Malo, France in 1991. Since that time, we have met in Tsukuba, Japan ('93), Montreal, Canada ('95), Ulm, Germany ('97), Bangalore, India ('99), Seattle, Washington ('01), Edinburgh, UK ('03), Seoul, Korea ('05), Curitiba, Brazil ('07), Barcelona, Spain ('09), Beijing, China ('11), Washington DC, USA ('13), Nancy, France ('15) and in 2017 in Kyoto, Japan. ICDAR 2019 continues a long tradition of providing state-of-the-art snapshots of the research advances in our field and we hope that you will benefit from all that the conference has to offer. This conference will be highlighted by three keynote talks. The first keynote will be by IAPR/ICDAR Outstanding Achievements Award winner Andreas Dengel, a Professor from the German Research Center for Artificial Intelligence (DFKI), our Second keynote will be delivered by Dr. Qiang Huo, a Partner Research Manager of the Speech Group at Microsoft Research Asia (MSRA), Beijing, China, and he will talk about OneOCR For Digital Transformation. The third keynote of ICDAR will be delivered by Enrique Vidal, Professor of Computer Science, Universidad Politécnica de Valencia, Spain, and he will discuss text search and information retrieval in large historical collections of un-transcribed manuscripts as part of his keynote.

Like past ICDARs, ICDAR 2019 also received high-quality paper submissions. This year we have received 403 papers and based on the reviews our Program Chairs accepted 52 papers oral presentations and 176 papers poster presentations. In addition to the regular papers, reports of 18 competitions in different areas of document analysis and recognition will be presented in oral and poster sessions at this ICDAR. Also 9 workshops will be organized during September 20-22, 2019 as part of this conference, hosted at the University of Technology Sydney. One novel initiative in ICDAR 2019 is the special session for the presentation of the papers of an IJDAR/ICDAR Special Issue, a set of high-quality journal standard papers. Also 5 tutorial talks will be delivered as part of this conference. We hope that this conference along with its associated

4

events will provide a forum for generating new insights within the field of document analysis.

A large event like ICDAR depends almost exclusively on the team of volunteers who work hard on the program, infrastructure, and facilities. We would first like to thank the program co-chairs, Cheng-Lin Liu, Andreas Dengel and Rafael Dueire Lins who have worked hard towards creating a rigorous and interesting technical program. We would also like to thank the chairs of the workshops, tutorials, competitions and those supporting the publicity of ICDAR for their help and support. We gratefully acknowledge the financial support of our sponsors which has helped to reduce the costs and provided various awards including student best paper awards. We would like to thank the sponsorship chairs and Arinex, our Professional Conference Organizer for helping us towards sponsorships and organization. We would also like to thanks our publication chairs, Wataru Ohyama and Giuseppe Pirlo; Finance Chair, Wenjing Jia, and Web Chair Parikshit Acharya for their active support. Our special thanks to Organizing Chairs Nabin Sharma and Sean He for their endless support to make this event successful. Finally, we would like to express our deep appreciation and valuable guidance from our honorary chair, Prof. Ching Y. Suen.

Our sincere thanks to all the researchers who have showed interest in this ICDAR by sending contributed papers, tutorial proposals and by registering in competition tracks. Thanks also to the Program committee members, reviewers and local organizing committee members including Arinex, our event management team for their strong support and active participation. Last but not the least, our special thanks are due again to our valued sponsors of the conference.

We hope you will find your stay fruitful and rewarding. We wish you all the best for a productive exchange of technical and scientific ideas during ICDAR-2019, as well as having the opportunity to explore the sights, sounds and flavours of our beautiful host city – Sydney.

Let your visit for ICDAR-2019 be a memorable one!

Michael Blumenstein, University of Technology Sydney, Australia
Umapada Pal, Indian Statistical Institute, Kolkata, India
ICDAR2019 General Chairs

Welcome Message from Program Chairs

We are delighted to welcome you all to the 15th International Conference on Document Analysis and Recognition (ICDAR 2019) in Sydney, Australia. We do hope that the conference will be informative, rewarding and enjoyable for all participants.

ICDAR 2019 attracted 403 high-quality paper submissions, about the same number as the previous editions in 2015 and 2017. During the review process, each paper was assigned to an Area Chair and three or more expert reviewers. Based on the reviews, the twenty Area Chairs prepared a meta-review and gave acceptance recommendations for each paper to the Program Chairs. The final program consists of 52 oral presentations and 176 poster presentations. The papers that will be orally presented were grouped by subject in 10 sessions: Handwritten Text Recognition, Document Image Processing, Document Understanding, Table Analysis, Text Detection and Recognition, Mathematical Expression and Text Recognition, Layout Analysis, Applications of Document Analysis, Script and Identification and Authentication, and Signature Verification. In addition to the regular papers, there are the reports of 18 competitions in in different areas of document analysis and recognition be presented in oral and poster sessions.

One novel initiative in ICDAR 2019 is the special session for the presentation of the papers of a IJDAR/ICDAR Special Issue, a set of high-quality journal standard papers.

We are honored to have two distinguished invited keynote speakers: Qiang Huo (Microsoft Research Asia) and Enrique Vidal (Universitat Politècnica de València). As a tradition of ICDAR, there will also be a technical speech given by the winner of the 2019 IAPR/ICDAR Outstanding Achievements Award.

As program chairs, we take primary responsibility for deciding the program, but its content and quality are derived from the vision and hard work of a large number of people. ICDAR 2019 is deeply indebted to the sponsors for their invaluable financial support, as well as the teamwork of 20 Area Chairs, 199 PC members and 272 reviewers.

The Program Chairs, on behalf of the whole ICDAR 2019 community, would like to express their immense gratitude to Prof. Michael Blumenstein and Prof. Umapada Pal and their team in the Organizing Committee for their efforts and support in making ICDAR 2019 such a great success.

Please enjoy ICDAR 2019 in Sydney, Australia.

Cheng-Lin Liu, Chinese Academy of Sciences, China
Andreas Dengel, DFKI, Germany
Rafael Dueire Lins, Federal University de Pernambuco, Brasil
ICDAR2019 Program Chairs

Organizers

Honorary Chair
Prof. Ching Y. Suen
Concordia University, Canada

General Chairs
Michael Blumenstein
University of Technology Sydney,
Australia
Umapada Pal
Indian Statistical Institute, Kolkata,
India

Program Chairs
Cheng-Lin Liu
Chinese Academy of Sciences, China
Andreas Dengel
DFKI, Germany
Rafael Dueire Lins
Federal University de Pernambuco,
Brasil

Workshop Chairs
Jean-Marc Ogier
University of La Rochelle, France
Seiichi Uchida
Kyushu University, Japan

Competition Chairs
Marcus Liwicki
Luleå University of Technology,
Sweden
Luiz Oliveira
Federal University of Parana, Brazil

Tutorial Chairs
Josep Llados
Computer Vision Center, Spain
Daniel Lopresti
Lehigh University, USA

Publication Chairs
Giuseppe Pirlo
University of Bari, Italy
Wataru Ohyama
Saitama Institute of Technology, Japan

Publicity Chairs
David Doermann
DARPA, USA
Simone Marinai
University of Florence, Italy

Sponsorship Chairs
Apostolos Antonacopoulos
University of Salford, UK
Koichi Kise
Osaka Prefecture University, Japan

Finance Chair
Wenjing Jia
University of Technology Sydney,
Australia

Doctoral Consortium Chairs
Véronique Eglin
INSA, France
Jean-Christophe Burie
La Rochelle University, France

Posters and Demo Chair
   Adel Alimi
   University of Sfax, Tunisia

Web Chair
   Parikshit Acharya
   University of Technology Sydney,
   Australia

Organizing Chairs
   Sean He
   University of Technology Sydney,
   Australia
   Nabin Sharma
   University of Technology Sydney,
   Australia

Organizing Committee
   Miguel Angel Ferrer
   University of Las Palmas de Gran
   Canaria, Spain
   Mukesh Prasad
   University of Technology Sydney,
   Australia
   Abhijit Das
   University of Technology Sydney,
   Australia

Conference Manager
   Arinex Pty Ltd
   Sydney, Australia

Program Committee Members

Area Chairs

Apostolos Antonacopoulos
University of Salford, UK
Xiang Bai
Huazhong University of Science and
Technology, China
Elisa H. Barney Smith
Boise State University, USA
David Doermann
DARPA, USA
Gernot Fink
TU Dortmund University, Germany
C.V. Jawahar
IIIT Hyderabad, India
Lianwen Jin
South China University of Technology,
China
Dimothenis Karatzas
Computer Vision Center, Spain
Koichi Kise
Osaka Prefecture University, Japan

Bart Lamiroy
LORIA, France
Marcus Liwicki
Luleå University of Technology, Sweden
Daniel Lopresti
Lehigh University, USA
Shijian Lu
Nanyang Technological University,
Singapore
Angelo Marcelli
University of Salerno, Italy
Evangelos Milios
Dalhousie University, Canada
Jean-Marc Ogier
University of La Rochelle, France
Luiz E. S. Oliveira
Federal University of Parana, Brazil
Shivakumara Palaiahnakote
University of Malaya, Malaysia

Steven Simske
Colorado State University, USA
Jun Sun
Fujitsu R&D Center, China

Faisal Shafait
National University of Sciences and
Technology, Pakistan

Technical Program Committee Members

Muhammad Zeshan Afzal	Bertrand Coüasnon	Emilio Granell
Irfan Ahmad	Mickaël Coustaty	Richard Guest
Sheraz Ahmed	Kenny Davila	Zhenhua Guo
Younes Akbari	Claudio De Stefano	Ankush Gupta
Alireza Alaei	Sounak Dey	Mehdi Hamdani
Eric Anquetil	Moises Diaz	Gaurav Harit
Djamila Aouada	Chawki Djeddi	Ehtesham Hassan
Srikar Appalaraju	Antoine Doucet	Sheng He
Sabine Barrat	Fadoua Drira	Jianhua He
Abdel Belaid	Jun Du	Jean Hennebert
Mohamed Faouzi	Véronique Eglin	Pierre Héroux
Benzeghiba	Stefan Eickeler	Laurent Heutte
Anurag Bhardwaj	Jihad El-Sana	Tin Kam Ho
Ujjwal Bhattacharya	Mounin Elyacoubi	Kaizhu Huang
Théodore Bluche	Najoua Essoukri Ben	Qiang Huo
Thomas Breuel	Amara	Donato Impedovo
Alceu Britto	Sungmin Eum	Rajiv Jain
Tien Bui	Jonathan Fabrizio	Karim Kalti
Syed Saqib Bukhari	Nadir Farah	Slim Kanoun
Jean-Christophe Burie	Rafael Ferreira	Thotreingam Kasar
Xiaochun Cao	Miguel Ferrer	Klara Kedem
Elodie Carel	Andreas Fischer	Christopher Kermorvant
Chee Kheng Ch'Ng	Francesco Fontanella	Khurram Khurshid
Sukalpa Chanda	Alicia Fornés	Soo-Hyung Kim
Bidyut B. Chaudhuri	Akio Fujiyoshi	Pramod Kompalli
Jin Chen	Liangcai Gao	Alessandro Lameiras
Mohamed Cheriet	C. Lee Giles	Koerich
Youcef Chibani	Romain Giot	Frank Lebourgeois
Nam Ik Cho	Lluis Gomez	Gurpreet Lehal
Hojin Cho	Petra Gomez-Krämer	Aurélie Lemaitre
Florence Cloppet	Venu Govindaraju	Haifeng Li
Donatello Conte	Anuj Goyal	Zhouhui Lian

Minghui Liao

Laurence Likforman-Sulem

Lu Liu

Wenyin Liu

Josep Llados

Georgios Louloudis

Yue Lu

Tong Lu

Xiaoqing Lu

Muhammad Muzzamil Luqman

Pengyuan Lyu

Sriganesh Madhvanath

Muhammad Imran Malik

R. Manmatha

Volker Märgner

Simone Marinai

Daniel Martín-Albo

Carlos David Martinez Hinarejos

Carlos Mello

Anand Mishra

Momina Moetesum

Harold Mouchère

Bastien Moysset

Masaki Nakagawa

Satoshi Naoi

Nibal Nayef

Atul Negi

Journet Nicholas

Shinichiro Omachi

Thierry Paquet

Swapan Kr. Parui

Antonio Parziale

Liangrui Peng

Antonio Pertusa

Giuseppe Pirlo

Réjean Plamondon

Stefan Pletschacher

Utkarsh Porwal

Vincent Poulain D'Andecy

Ioannis Pratikakis

Joan Puigcerver

Jean-Yves Ramel

Romain Raveaux

Ana Rebelo

Kaspar Riesen

Marcelo Riss

Partha Pratim Roy

Marçal Rusiñol

Robert Sablatnig

Javad Sadri

Rajkumar Saini

Joan Andreu Sanchez

Adolfo Santoro

K.C. Santosh

Marc-Peter Schambach

Lambert Schomaker

Rosa Senatore

Amina Serir

Srirangaraj Setlur

Baoguang Shi

Imran Siddiqi

Nicolas Sidère

Foteini Simistira Liwicki

Fouad Slimane

Volker Sorge

Nikolaos Stamatopoulos

Bela Stantic

H. Siegfried Stiehl

Bolan Su

Tonghua Su

Yipeng Sun

Suresh Sundaram

Badarinath T

Salvatore Tabbone

Kazem Taghva

Zhi Tang

Christopher Tensmeyer

Kengo Terasawa

Shangxuan Tian

Alejandro Toselli

Cao De Tran

Shinji Tsuruoka

Szilard Vajda

Marie Vans

Eduardo Vellasques

Christian Viard-Gaudin

Enrique Vidal

Mauricio Villegas

Nicole Vincent

Da-Han Wang

Wei Wang

Qiu-Feng Wang

Yongtao Wang

Liang Wu

Baihua Xiao

Yongchao Xu

Mingkun Yang

Berrin Yanikoglu

Xu-Cheng Yin

Fei Yin

Richard Zanibbi

Xu-Yao Zhang

Heng Zhang

Guoqiang Zhong

Majid Ziaratban

Pre-Events (Sep.20-22)

Venue:
University of Technology Sydney (UTS)

Aerial Function Centre (Sep.20)
https://goo.gl/maps/LXTrfdwmprNnCyTF6

CB11: Faculty of Engineering and IT Building (Sep.21-22)
https://goo.gl/maps/rHWCWE5TmBpNPSeYA

UTS UNIVERSITY
OF TECHNOLOGY
SYDNEY

GREC Workshop (September 20 - 21)

GREC: The 13th IAPR International Workshop on Graphics Recognition

Organizer: Jean-Christophe BURIE

Location: 1st day: Aerial Function Centre, Thomas Room
                        @ University of Technology Sydney (UTS)
                2nd day: CB11.04.205 @ University of Technology Sydney (UTS)

Website: https://grec2019.univ-lr.fr

Friday, September 20 (Room: Aerial Function Centre, Thomas Room)

8:45-9:00   **Introduction / Welcome**

9:00-10:30   <u>**Session 1 : Graphic Element Extraction and Recognition**</u>

1.   **Text Recognition and Classification in Floor plan Images** - Jason Ravagli, Zahra Ziran and Simone Marinai.

2.   **Arrow R-CNN for Flowchart Recognition** - Bernhard Schäfer and Heiner Stuckenschmidt.

3.   **Line recognition for generating accessible line plots** - Francesco Lombardi, Cagatay Goncu and Simone Marinai.

4.   **An automated technique to recognize and extract images from scanned archaeological documents** - Cindy Roullet, David Fredrick, John Gauch and Rhodora Vennarucci.

5.   **Table Localization and Field Value Extraction in Piping and Instrumentation Diagram Images** - Arka Sinha, Johannes Bayer and Syed Saqib Bukhari

10:30-11:00   **Coffee break**

11:00-13:00   <u>**Session 2 : Comics Analysis and Understanding**</u>

6.   **Understanding multilingual four-scene comics with deep learning methods** - Jiali Chen, Ryo Iwasaki, Naoki Mori, Makoto Okada and Miki Ueno.

7.   **Confidence criterion for speech balloon segmentation** - Christophe Rigaud, Nhu Van Nguyen and Jean-Christophe Burie.

8.   **CNN based Extraction of Panels/Characters from Bengali Comic Book Page Images** - Arpita Dutta and Samit Biswas.

9.   **Multi-class semantic segmentation of comics: A U-Net based approach** - Jochen Laubrock and David Dubray.

10.   **What do we expect from comic panel extraction?** - Nhu Van Nguyen, Christophe Rigaud and Jean-Christophe Burie.

11.   **Analysis based on Distributed Representations of Various Parts Images in Four-scene Comics Story Dataset** - Akira Terauchi, Naoki Mori and Miki Ueno.

13:00-14:00 **Lunch**

14:00-15:30 **Round-table discussion on the future of Graphic Recognition**

15:30-16:00 **Coffee break**

16:00-17:30 **Session 3 : Mathematical Expressions and Music Scores**
12. **Tree-Based Structure Recognition Evaluation for Math Expressions: Techniques and Case Study** - Mahshad Mahdavi and Richard Zanibbi
13. **Learning Fine-Grained Image Representations for Mathematical Expression Recognition** - Sidney Bender, Monica Haurilet, Alina Roitberg and Rainer Stiefelhagen
14. **Graph matching over Hypothesis Graphs for the Analysis of Handwritten Arithmetic Operations** - Arnaud Lods, Eric Anquetil and Sébastien Macé
15. **Recognition, encoding, and transcription of early mensural handwritten music** - Jose M. Iñesta, David Rizo and Jorge Calvo-Zaragoza

Saturday, September 21 (Room: CB11.04.205)

9:00-10:30 **Session 4 : Detection and Classification : symbols, sketches**
16. **Graph Neural Network for Symbol Detection on Document Images** - Guillaume Renton, Benoit Gaüzère, Pierre Héroux and Sébastien Adam
17. **GSD-Net: Compact Network for Pixel-level Graphical Symbol Detection** - Swarnendu Ghosh, Prasenjit Shaw, K.C. Santosh and Nibaran Das
18. **DocFigure: A Dataset for Scientific Document Figure Classification** - Jobin K V, Ajoy Mondal and C V Jawahar
19. **Shoot less and Sketch more: An Efficient Sketch Classification Via Joining Graph Neural Networks and Few-shot Learning** - Asma Bensalah, Pau Riba, Alicia Fornés and Josep Lladós.

10:30-11:00 **Coffee break**

11:00-12:30 **Session 5 : Other Graphic Recognition Approaches**
20. **Creating destruction animations by transferring hand-drawn styles -** Takumi Kato and Susumu Nakata.
21. **Identifying the Presence of Graphical Texts in Scene Images using CNN** - Mridul Ghosh, Himadri Mukherjee, Md Obaiduallh Sk, K.C. Santosh, Nibaran Das and Kaushik Roy
22. **Dynamic Deep Multi-task Learning for Caricature-Visual Face Recognition -** Zuheng Ming, Jean-Christophe Burie and Muhammad Muzzamil Luqman

23. **Optimal Compression of a Polyline while Aligning to Preferred Directions** - Alexander Gribov

12:30-13:00 **Conclusions and Closing**

13:00-14:00 **Lunch**

HIP Workshop (September 20 - 21)

HIP: The 5th International Workshop on Historical Document Imaging and Processing

Organisers: Stefan Pletschacher, Apostolos Antonacopoulos, Clemens Neudecker, Christian
Clausner

Location: 1st day: Aerial Function Centre, Broadway Room
@ University of Technology Sydney (UTS)
2nd day: External scientific visit

Website: https://www.primaresearch.org/hip2019/

Proceedings: Published by ACM ICPS, ISBN 978-1-4503-7668-6

Friday, September 20

9:15-9:30   **Welcome**

9:30-10:30   **Session 1: Datasets**

1.   **Dataset of Pages from Early Printed Books with Multiple Font Groups**
Mathias Seuret, Saskia Limbach, Nikolaus Weichselbaumer, Andreas Maier and Vincent
Christlein

2.   **HORAE: an annotated dataset of books of hours**
Mélodie Boillet, Marie-Laurence Bonhomme, Dominique Stutzmann and Christopher
Kermorvant

3.   **BADAM: A Public Dataset for Baseline Detection in Arabic-script Manuscripts**
Benjamin Kiessling, Daniel Stökl Ben Ezra and Matthew Thomas Miller

10:30-11:00   **Coffee Break**

11:00-12:20   **Session 2: Training**

4.   **Generating Cuneiform Signs with Cycle-Consistent Adversarial Networks**
Eugen Rusakov, Kai Brandenbusch, Denis Fisseler, Turna Somel, Gernot A. Fink, Frank
Weichert and Gerfrid Müller

5.   **okralact - a multi-engine Open Source OCR training system**
Konstantin Baierer, Rui Dong and Clemens Neudecker

6.   **Using Balanced Training to Minimize Biased Classification**
Redy Andriyansah, Syed Saqib Bukhari, Martin Jenckel and Andreas Dengel

7.   **Recognition of Japanese historical text lines by an attention-based encoder-decoder
and text line generation**
Anh Le Duc, Daichi Mochihashi, Katsuya Masuda, Hideki Mima and Ly Tuan Nam

12:20-13:00   **Discussion**

13:00-14:10   **Lunch Break**

14:10-15:30 <u>**Session 3 - Forms, Tables, Pattern Spotting**</u>

8.   Crowdsourcing Historical Tabular Data – 1961 Census of England and Wales
      Christian Clausner, Justin Hayes and Apostolos Antonacopoulos
9.   Keeping Informed: Automatic Processing of Residual Functional Capacity Form Images
      Julia Porcino and Chunxiao Zhou
10. Signature detection as a way to recognise historical parish register structure
      Solène Tarride, Aurélie Lemaitre, Bertrand Coüasnon and Sophie Tardivel
11. Pattern Spotting in Historical Documents Using Convolutional Models
      Ignacio Ubeda, José M. Saavedra, Stéphane Nicolas, Caroline Petitjean and Laurent Heutte

15:30-16:00 **Coffee Break**

16:00-17:20 <u>**Session 4 - HTR, Matching, Layout Analysis**</u>

12. **Information Extraction in Handwritten Marriage Licenses Books**
      Verónica Romero, Emilio Granell, Alicia Fornés, Enrique Vidal and Joan Andreu Sánchez
13. **Recognition of Japanese Historical Handwritten Characters Based on Object Detection**
      Yiping Tang, Kohei Hatano and Eiji Takimoto
14. **Papy-S-Net : A Siamese Network to match papyrus fragments**
      Antoine Pirrone, Marie Beurton-Aimar and Nicholas Journet
15. **Layout Analysis and Text Column Segmentation for Historical Vietnamese Steles**
      Anna Scius-Bertrand, Lars Voegtlin, Michele Alberti, Andreas Fischer and Marc Bui

17:20-17:30 **Wrap-Up**

Saturday, September 21

Afternoon   **Scientific visit**

ICDAR-OST Workshop (September 21)

ICDAR-OST: The 2nd International Workshop on Open Services and Tools for Document Analysis
Organizers: Fouad Slimane, Lars Vögtlin
Location: CB11.04.401 @ University of Technology Sydney (UTS)
Website: https://sites.google.com/view/icdar-ost2019

Saturday, September 21

9:00-9:15   **Welcome notes**

9:15-10:30   **Keynote**
   Dr. Christian Clausner,
      (PRImA Research Lab University of Salford, Manchester)

10:30-11:00   **Tea/Coffee break and informal discussion**

11:00-13:00   **First interactive pitch & demo session**
1. **FUNSD: A Dataset for Form Understanding in Noisy Scanned Documents** - Guillaume Jaume, Hazim Ekenel and Jean-Philippe Thiran
2. **Fast and Reliable Acquisition of Truth Data for Document Analysis using Cyclic Suggest Algorithms** - Marc-Peter Schambach, Stephan von der Nüll and Martin Schall
3. **Strategy and Tools for Collecting and Annotating Handwritten Descriptive Answers for Developing Automatic and Semi-Automatic Marking - an Initial Effort to Math** - Quang Huy Ung, Minh Khanh Phan and Masaki Nakagawa
4. **eScriptorium: an open source platform for historical document analysis** - Benjamin Kiessling, Robin Tissot, Peter Stokes and Daniel Stökl Ben Ezra

    Questions and interaction with authors

13:00-14:00   **Lunch**

14:00-15:30   **Second interactive pitch & demo session**
5. **PHTI-WS: A Printed and Handwritten Text Identification Web Service Based on FCN and CRF Post-Processing** - Nicolas Dutly, Fouad Slimane and Rolf Ingold
6. **Interactive User Interface for Recognizing Online Handwritten Mathematical Expressions and Correcting Misrecognition** - Khuong Vu, Khanh Phan and Masaki Nakagawa
7. **HInDoLA: A Cloud-based System for Large-Scale Annotation and Analysis of Indic Palm Leaf Manuscripts** - Abhishek Trivedi and Ravi Kiran Sarvadevabhatla

Questions and interaction with authors

15:30-16:00   **Tea/Coffee break and informal discussion**

16:00-17:00   **Third interactive pitch & demo session**

8.   **Procedural Information Extraction from Scientific Literature: Towards Recipes using A Holistic Machine Learning Approach** - Huichen Yang, William Hsu, Carlos Aguirre, Maria Fernanda De La Torre Romo, Derek Christensen, Luis Bobadilla, Emily Davich, Jordan Roth, Lei Luo, Yihong Theis, Alice Lam, Yong-Jin Han and David Buttler

9.   **StreetOCRCorrect: An Interactive Framework for OCR Corrections in Chaotic Indian Street Videos**   - Rohit Saluja, Pankaj Singh, Bhavya Patwa, Ganesh Ramakrishnan and Parag Chaudhuri

    Questions and interaction with authors

17:00-   **Panel discussion and closing**

HDI Workshop (September 22)

HDI: The 2nd International Workshop on Human-Document Interaction

Organizers: Mickaël Coustaty, Andreas Dengel, Dimosthenis Karatzas,
                    Koichi Kise, Fernando Vilariño

Location: CB11.04.101 @ University of Technology Sydney (UTS)

Website: http://www.cvc.uab.es/hdi2019/

Sunday, September 22

9:15-9:30   **Welcome**

9:30-10:30   **Oral session 1**
1. **User interface for text and non-text classification**
   Thanh Lam Thi Xuan, Anh Le Duc and Masaki Nakagawa
2. **Eye-Movements during information extraction from administrative documents**
   Helena Muñoz Escudero, Fernando Vilarino and Dimosthenis Karatzas
3. **Concurrent Speech Synthesis to Improve Document First Glance for the Blind**
   Fabrice Maurel, Gaël Dias, Stéphane Ferrari, Judith Jeyafreeda Andrew and Emmanuel Giguet
4. **Self-confidence Estimation on Vocabulary Tests with Stroke-level Handwriting Logs**
   Takanori Maruichi, Shoya Ishimaru and Koichi Kise

10:30-11:00   **Coffee Break**

11:00-11:50   **Invited Talk**
The Past, Present, and Future of Reading: Building Systems to Support Reading Activities
Dr Tilman Dingler, University of Melbourne, Australia

11:50-12:30   **Oral session 2**
5. **Making DIA Accessible to Non-experts: Designing a Visual Programming Language for Document Image Analysis**
   Vinodh Rajan and H. Siegfried Stiehl
6. **An Interactive Recommendation System for 2nd Language Vocabulary Learning - Vocabulometer 2.0**
   Francisco Cruz, Michaël Coustaty, Olivier Augereau, Koichi Kise and Nicholas Journet

12:30-13:00   **Closing Remarks**

CBDAR: The 8th International Workshop on Camera-Based Document Analysis and
             Recognition
Organizers: Lluís Gómez i Bigordà, LUQMAN Muhammad Muzzamil
Location: CB11.04.202 @ University of Technology Sydney (UTS)
Website: https://cbdar2019.univ-lr.fr

Sunday, September 22

8:50-9:00   Opening
9:00-10:00   <u>**Keynote 1**</u>
         Irregular Text Detection and Recognition
         Professor Xiang Bai
         (Huazhong University of Science and Technology, China)

10:00-10:30   Oral session 1
1.   **A fast page outline detection and dewarping method based on iterative cut and adaptive coordinate transform**
     Fengjun Guo, Yadong Li and Pengwei Liu
2.   **Document Image Retrieval Based on Visual Saliency Maps**
     Fahimeh Alaei, Alireza Alaei, Umapada Pal and Michael Blumenstein

10:30-11:00   **Coffee break**

11:00-13:00   <u>**Oral session 2**</u>
3.   **Summarizing Lecture Videos by Key Handwritten Content Regions**
     Bhargava Urala Kota, Kenny Davila, Saleem Ahmed, Alexander Stone, Srirangaraj Setlur and Venu Govindaraju
4.   **Document detection in videos captured by smartphones using a saliency-based method**
     Minh On Vu Ngoc, Jonathan Fabrizio and Thierry Geraud
5.   **Character Keypoint-based Homography Estimation in Scanned Documents for Efficient Information Extraction**
     Kushagra Mahajan, Monika Sharma and Lovekesh Vig
6.   **Performance Comparison of Scanner and Camera-Acquired Data for Bangla Offline Handwriting Recognition**
     Nishatul Majid and Elisa H. Barney Smith
7.   **OctShuffleMLT: A Compact Octave Based Neural Network for End-to-End Multilingual Text Detection and Recognition**
     Antonio Lundgren, Dayvid Castro, Estanislau Lima and Byron Bezerra

8. **Text-based Image Style Transfer and Synthesis**
    Yifan Wu, Jian Li and Anna Zhu

13:00-14:00   **Lunch break**

14:00-14:30   <u>**Oral session 3**</u>
9. **FaSTExt: Fast and Small Text Extractor**
    Alexander Filonenko, Konstantin Gudkov, Aleksei Lebedev, Nikita Orlov and Ivan
    Zagaynov
10. **Face Detection in Camera Captured Images of Identity Documents under
    Challenging Conditions**
    Souhail Bakkali, Zuheng Ming, Muhammad Muzzamil Luqman and Jean-Christophe
    Burie

14:30-15:30   <u>**Keynote 2**</u>
    **Beyond Text Detection and Recognition: Emerging Opportunities in Scene
    Understanding**
    Prof. C. V. Jawahar
    (International Institute of Information Technology, India)

15:30-16:00   **Coffee break**

16:00-17:30   <u>**Special session on ICDAR2019 Robust Reading Challenges (RRC)**</u>
1. RRC on Reading Chinese Text on Signboard
2. RRC on Scanned Receipts OCR and Information Extraction
3. RRC on Arbitrary-Shaped Text
4. RRC on Large-scale Street View Text with Partial Labeling
5. RRC on Multi-lingual scene text detection and recognition
6. RRC on Scene Text Visual Question Answering

17:30-17:45   **Best paper award & Closing**

ICDAR-WML: The Second International Workshop on Machine Learning

Organizers: Umapada Pal, Xiao-jun Wu

Location: CB11.00.405 @ University of Technology Sydney (UTS)

Website: https://www.isical.ac.in/~cvpr/ICDARWML/

- Long presentation: 20 minutes
- Short presentation: 10 minutes

Saturday, September 21

14:00-14:10   **Opening**

14:10-15:10   **Session 1 (Long): Image and Document Analysis, (Session Chair:** Lianwen Jin)
1. **Robust Keypoint Regression**
    Christopher Tensmeyer and Tony Martinez
2. **Synthesizing Scene Text Images for Recognition with Style Transfer**
    Haoran Liu and Anna Zhu
3. **Intelligent Identification of Ornamental Devanagari Characters Inspired by Visual Fixations**
    Chetan Ralekar, Shubham Choudhary, Tapan Gandhi and Santanu Chaudhury

15:10-15:30 **Session 2 (Short): Document Image Processing I** , (**Session Chair**: Lianwen Jin)
4. **A Fast Content-Based Image Retrieval Method Using Deep Visual Features**
    Hiroki Tanioka
5. **Trilingual 3D Script Identification and Recognition using Leap Motion Sensor**
    Rajkumar Saini, Pradeep Kumar, Shweta Patidar, Partha Roy and Marcus Liwicki

15:30-16:00 **Break**

16:00-17:00 **Session 3 (Long): Handwriting Recognition, Session Chair: (**Marcus Liwicki **)**
6. **End-to-End Handwritten Text Detection and Transcription in Full Pages**
    Manuel Carbonell, Joan Mas, Mauricio Villegas, Alicia Fornés and Josep Llados
7. **A Computationally Efficient Pipeline Approach to Full Page Offline Handwriting Text Recognition**
    Jonathan Chung and Thomas Delteil
8. **Associating field components in heterogeneous handwritten form images using Graph Autoencoder**
    Divya Srivastava and Gaurav Harit

17:00-17:40 <u>**Session 4 (Short): Document Image Processing II,**</u> **(Session Chair:** Marcus Liwicki**)**

9. **Cluster-based Sample Selection for Document Image Binarization**
    Amandus Krantz and Florian Westphal

10. **A Light weight and Hybrid Deep Learning Model based Online Signature Verification**
    Chandra Sekhar, Anoushka Doctor, Prerana Mukherjee and Viswanath Pulabaigari

11. **Cursive Script Textline Image Transformation for Improving OCR Accuracy**
    Eman Eman, Syed Saqib Bukhari, Martin Jenckel and Andreas Dengel

12. **Have convolutions already made recurrence obsolete for unconstrained handwritten text recognition ?**
    Denis Coquenet, Yann Soullard, Clément Chatelain and Thierry Paquet

Sunday, September 22

9:30-10:30 <u>**Keynote,**</u>

   Deep learning with noisy supervision
   Prof. Ivor Tsang, (**Session Chair:** Umapada Pal)

10:30-11:00 **Break**

11:00-12:20 <u>**Session 5 (Long): Scene Text Recognition,**</u> **(Session Chair:** Michael Blumenstein**)**

13. **ReELFA: A Scene Text Recognizer with Encoded Location and Focused Attention**
    Qingqing Wang, Wenjing Jia, Sean He, Yue Lu, Michael Blumenstein, Ye Huang and Shujing Lyu

14. **CNN-based Hindi Numeral String Recognition for Indian Postal Automation**
    Hongjian Zhan, Shujing Lyu, Umapada Pal and Yue Lu

15. **A Novel Joint Character Categorization and Localization Approach for Character-Level Scene Text Recognition**
    Xianbiao Qi, Yihao Chen, Rong Xiao, Chun-Guang Li, Qin Zou and Shuguang Cui

16. **Reading Chinese Scene Text with Arbitrary Arrangement based on Character Spotting**
    Qi Song, Rui Zhang, Yongsheng Zhou, Qianyi Jiang, Xi Liu, Haozong Wang and Dong Wang

12:20-13:00 <u>**Session 6 (Short): Semantic Document Analysis,**</u> (**Session Chair**: Seiichi Uchida)

17. **Semantic Text Recognition via Visual Question Answering**
    Viviana Beltrán, Nicholas Journet, Mickaël Coustaty and Antoine Doucet

18. **Balanced Word Clusters for Interpretable Document Representation**
    Marco Wrzalik and Dirk Krechel

19. **Word embeddings in Low Resource Gujarati Language**

Ishani Joshi, Purvi Koringa and Suman Mitra

20. **Feedback Learning: Automating the Process of Correcting and Completing the Extracted Information**
    Khurram Azeem Hashmi, Rakshith Bymana Ponnappa, Saqib Bukhari, Martin Jenckel and Andreas Dengel

13:00-14:00 Lunch

14:00-15:40 <u>**Session 7 (Long): Optical Character Recognition**</u> , (**Session Chair:** Abdel Belaid)

21. **Joint Spatial and Radical Analysis Network For Distorted Chinese Character Recognition**
    Changjie Wu, Zi-Rui Wang, Jun Du, Jianshu Zhang and Jiaming Wang

22. **Semi-supervised learning through adversary networks for baseline detection**
    Romain Karpinski and Abdel Belaid

23. **Optical Character Recognition with Chinese and Korean Character Decomposition**
    Chun-Chieh Chang, Ashish Arora, Leibny Paola Garcia Perera, David Etter, Daniel Povey and Sanjeev Khudanpur

24. **A Deep Neural Network to Detect Keyboard Regions and Recognize Isolated Characters**
    Zongyi Liu, Bruce Ferry, Simon Lacasse

25. **Historical Document Synthesis with Generative Adversarial Networks**
    Vinay Pondenkandath, Michele Alberti, Michael Diatta, Rolf Ingold and Marcus Liwicki

15:40-16:10 **Break**

16:10-16:50 <u>**Session 8 (Short): Document Structure Analysis**</u> (**Session Chair:** Marcal Rossinyol)

26. **Table Localization and Segmentation using GAN and CNN**
    Mohammad Mohsin Reza, Syed Saqib Bukhari and Andreas Dengel

27. **Table understanding in structured documents**
    Martin Holeček, Antonin Hoskovec, Petr Baudis and Pavel Klinger

28. **Recognition of Handwritten Chemical Organic Ring Structure Symbols Using Convolutional Neural Networks**
    Lina Zheng, Ting Zhang and Xinguo Yu

29. **Inferring structure and meaning of semi-structured documents by using a Gibbs saampling based approach**
    Vinodh Kumar Ravindranath, Devashish Deshpande, K Venkata Vijay Girish, Darshan Patel, Neel Jambhekar and Vikash Singh

16:50-17:50 **Final discussion and closing**

ASAR Workshop (September 22)

ASAR: The 3rd International Workshop on Arabic and derived Script Analysis and Recognition

Organizers: Adel M. Alimi, Abdel Belaid, Tarek M. Hamdani

Location: CB11.04.205 @ University of Technology Sydney (UTS)

Website: http://asar.ieee.tn

Sunday, September 22

9:00 **Opening**

9:30-10:30 **Keynote**
  Urdu OCR: A journey from hand-crafting to deep learning
  Prof. Dr. Faisal Shafait

10:30-11:00 **Tea/Coffee Break**

11:00-13:00 **Session 1**
1. **Detecting Spam Images with Embedded Arabic Text in Twitter**
  Niddal Imam and Vassilios Vassilakis
2. **A Smart Arabic Signboard Image Reader for Mobile Devices**
  Maddouri Snoussi Samia, Bushra Al-Anesi, Zainah Boukhari, Roaa Alqurashi and Amani T. Jamal
3. **VML-MOC: Segmenting a multiply oriented and curved handwritten text lines dataset**
  Berat Kurar, Rafi Cohen, Irina Rabaev and Jihad El-Sana

13:00-14:00 **Lunch**

14:00-15:30 **Session 2**
4. **Arabic Handwritten Documents Segmentation into Text-lines and Words using Deep Learning**
  Chemseddine Neche, Abdel Belaid and Afef Kacem-Echi
5. **Visual Representation of Online Handwriting Time Series for Deep Learning Parkinson′s Disease Detection**
  Catherine Taleb, Laurence Likforman-Sulem, Chafic Mokbel and Maha Khachab
6. **Adversarial Autoencoders for denoising digitized historical documents: the use case of incunabula**
  Hala Neji, Javier Nogueras Iso, Javier Lacasta, Mohamed Ben Halima and Adel M. Alimi

15:30-16:00 **Tea/Coffee Break**

16:00-17:00 **Session 3**

7. **Deep Bidirectional Long Short-Term Memory for Online Arabic Writer Identification based on Beta-Elliptic Model**
   Thameur Dhieb, Houcine Boubaker, Wael Ouarda, Mounir Ben Ayed and Adel M. Alimi

8. **Convolutional Neural Networks for Online Arabic Characters Recognition with Beta-Elliptic Knowledge Domain**
   Hanen Akouaydi, Sourour Njah, Anis Samet, Mourad Zaied and Adel M. Alimi

17:00-18:00 **Round table**

18:00   **Closing**

WIADAR Workshop (September 25)

WIADAR: Workshop on Industrial Applications of Document Analysis and Recognition
Organizers: Elisa H Barney Smith, Vincent Poulaind Andecy
Location: Cockle Bay Foyer, ICC Sydney
Website: http://ece.boisestate.edu/WIADAR/

Wednesday, September 25 15:20-17:00

1.   **Automatic generation of a custom corpora for invoice analysis and recognition**
    Jérôme Blanchard, Yolande Belaid and Abdel Belaid.

2.   **Digitisation of Assets from the Oil & Gas Industry: Challenges and Opportunities**
    Carlos Francisco Moreno-García and Eyad Elyan.

3.   **Fast Glare Detection in Document Images**
    Dmitry Rodin and Nikita Orlov.

4.   **Fast Korean Syllable Recognition with Letter-based Convolutional Neural Networks**
    Michael Zatsepin, Yury Vatlin, Iurii Chulinin and Aleksei Zhuravlev

5.   **TedEval: A Fair Evaluation Metric for Scene Text Detectors**
    Chae Young Lee, Youngmin Baek and Hwalsuk Lee.

6.   **X-BROT: Prototyping of Compatibility Testing Tool for Web Application based on Document Analysis Technology**
    Hiroshi Tanaka.

IWCDF: The 2nd International Workshop on Computational Document Forensics

Organizers: Nicolas Sidère, Imran Siddiqi, Jean-Marc OGIER, Chawki Djeddi,

Location: CB11.04.202 @ University of Technology Sydney (UTS)

Website: https://iwcdf2019.sciencesconf.org

Saturday, September 21

9:00-9:45   **Keynote**
                TBA

9:45-10:30   **Oral Session 1 (15 min/presentation)**
1.   **A Blind Document image watermarking approach based on Discrete Wavelet Transform and QR code embedding** - Quoc Bao Dang, Louisa Kessi, Mickaël Coustaty, Muhammad Muzzamil Luqman and Jean-Marc Ogier
2.   **Document Forgery Detection using Printer Source Identification-A Text-independent Approach** - Maryam Bibi, Anmol Hamid, Momina Moetesum and Imran Siddiqi

       Round Table, Questions

10:30-11:00   **Coffee Break**

11:00-12:00   **Oral Session 2 (15 min/presentation)**
3.   **Comparison of Ink Classification Capabilities Of Classic Hyperspectral Similarity Features** - Binu Melit Devassy, Sony George and Jon Y. Hardeberg
4.   **Document typist identification by classification metrics applying keystroke dynamics under unidealised conditions** - Enrique P. Calot, Jorge S. Ierache and Waldo Hasperué
5.   **Online and Offline Data Collection of Japanese Handwriting** - Yoko Seki

       Round Table, Questions

12:00-12:30   **Panel Discussion**

FDAR Workshop (September 21, 23, and 24)

FDAR: 2nd Workshop on the Future of Document Analysis and Recognition
Organizers: Dimosthenis Karatzas, C. V. Jawahar, Koichi Kise

Workshop format

This workshop is the second edition of a series of workshops that aim to provide a space for reflecting on the past and envisioning the future of our community. The first workshop of this type (http://u-pat.org/ICDAR2017/program_special.php) took place in ICDAR 2017 in Kyoto, Japan - you can find the program and topics we discussed two years ago here. In this second edition, we expect to go deeper in our discussions, and hopefully come up with a list of suggestions for continuously improving DAR.

Program

(1) Workshop (September 21)
Location: CB11.04.205 @ University of Technology Sydney (UTS)

14:00-14:10 Welcome

14:10-14:30 Break the ice activity

14:30-15:30 Discussion about how to improve DAR in the next 5 years.

- How to improve participation,

- How to improve quality of the conference,

- How to improve decision making in our community,

- anything else you might want to raise.

15:30-16:00 Coffee Break

16:00-18:00 Discussion in groups

18:00-18:30 Conclusions and closing

(2) Open discussion (September 23)
Location: Room B @ ICC Sydney

17:00-17:10 Introduction

17:10-17:30 Summary from the moderators

17:30-18:00 Open discussion

(3) <u>Report at the TC10/11 Meeting</u>

Location: Room A @ ICC Sydney

September 24, at TC10 / 11 Meeting

10 minutes synthesis

Graph-based Methods in Pattern Recognition and Document Image Analysis (GMPRDIA)

Presenters: Muzzamil Luqman, Anjan Dutta, Pau Riba
Date and time: September 21, 2019, 9:00-12:30
Location: CB11.04.103+105 @ University of Technology Sydney (UTS)
Website: http://gmprdia.univ-lr.fr

Brief description:

Many tasks in Pattern Recognition and Document Image Analysis are formulated as graph matching problems. Despite the NP-hard nature of the problem, fast and accurate approximations have led to significant progress in a wide range of applications in pattern recognition. Therefore, learning graph-based representations and related techniques is a real interest of the community. In this tutorial, we will present many methodologies for obtaining stable graph representation for different applications. Afterwards, we will explain different graph-based algorithms, methods and techniques for performing recognition, classification, detection, and many other tasks in graph domain. We will present the recent trends including the graph convolutional networks and message passing in graphs highlighting the applications to various pattern recognition problem such as chemical molecule classification and community detection in graph representation of social networks. Moreover, in addition to different applications of these algorithms in the field of Document Image Analysis & Recognition in particular and Pattern Recognition in general, a hands-on experience for working with graphs will also be provided.

Keywords:

Structural Pattern Recognition, Graph-based representations, Graph matching, Graph embedding, Graph kernel, Graph serialization, Graph indexing, Graph hashing, Subgraph spotting and Graph Neural Network.

Program:
- Opening
- Graph-based Structural Pattern Recognition
  - Introduction
  - Graph Representation
  - Graph Matching
  - Graph Edit Distance
  - Graph Embedding
  - Subgraph spotting
  - Graph Indexing
  - Graph Diffusion

- Graph Serialisation
- Neural Networks on graphs and modern trends in graph-based Pattren Recognition
  - Node classification
  - Graph classification
  - Distance prediction
  - Applications
- Hands-on / Programming
  - Case studies using graph-based Pattern Recognition methods
- Discussion and closing

Vision and Language: the text modality in computer vision

Presenters: Dimosthenis Karatzas, Marçal Rusiñol, Lluís Gómez, Raúl Gómez, Jaume Gibert, Yash Patel

Date and time: September 21, 2019, 9:00-12:30

Location: CB11.00.405 @ University of Technology Sydney (UTS)

Website: https://sites.google.com/view/icdar2019-vl

Overview:

The ability to properly exploit textual information in the image, or about the image to be analysed, is a capacity still missing from many computer vision systems. Document image analysis has long strived to create intelligent reading systems, focusing exclusively on understanding textual and graphical information that is presented in image form.Computer vision at large on the other hand, shows an increasing trend towards exploiting multimodal information in various ways. Translating from one modality to the other or deriving a joint embedding between modalities are the two key paradigms. Text is frequently one of the modalities of interest, although rarely this refers to text in image form.

In this tutorial we draw from recent advances in document analysis and computer vision, to showcase how text as a modality is currently dealt with in state-of-the-art research. We will review various methods and applications, focusing on deep learning techniques used for multimodal embedding and cross-modal translation, which provide very powerful frameworks for modeling correlations between textual and visual information.

Program:

9:00-9:30   Introduction to Multimodal learning

9:30-10:30   Joint image-text embeddings for word spotting

10:00-10:30 Semantic embeddings (I)

10:30-11:00 Coffee Break

11:00-12:00 Semantic embeddings (II)

12:00-12:30 Multi-modal image representations

12:30-13:00 Future directions: Text in Computer Vision

Tutorial (September 21, PM)

Deep Learning for Document Analysis, Text Recognition, and Language Modeling

Presenter: Thomas Breuel
Date and time: September 21, 2019, 13:30-17:30
Location: CB11.04.103+105 @ University of Technology Sydney (UTS)
Website: https://sites.google.com/view/icdar2019dl

Abstract:
   The tutorial will cover applications of deep learning to problems in document analysis:

- convolutional, one-dimensional, and multidimensional layers
- the relationship between filters and deep learning models
- different types of sequence models: LSTM, seq2seq, attention, CTC
- DL models for noise removal, upscaling, skew correction (image to image)
- DL models for layout analysis and semantic segmentation
- DL models for OCR, handwriting recognition, text recognition
- DL models for language modeling and OCR post-correction
- large scale processing pipelines using map-reduce, Docker, and Kubernetes

   The course will present numerous examples and workbooks based on PyTorch. Basic familiarity with deep learning and Python is recommended.

Creating a Reproducible Research Environment

Presenters: Lars Vögtlin, Fouad Slimane, Marcel Würsch
Date and time: September 22, 2019, 9:00-12:30
Location: CB11.04.103+105 @ University of Technology Sydney (UTS)
Website: https://sites.google.com/view/crre-tutorial

Abstract:

A topic that is constantly being discussed within Document Image Analysis (DIA) but also Machine Learning in general is the difficulties in reproducibility of scientific results. Many papers get published today where it is near impossible for the reader to independently reproduce and verify the reported numbers, due to various reasons.

In this tutorial we will introduce the topic of reproducibility and present general approaches to ensure reproducibility of research. In a practical session, we will discuss docker containers and how to set them up for one's own code. Finally, we will offer a hands-on session where we show how to create a research environment that is targeted towards reproducibility and can be easily shared with others.

In this tutorial we will provide and introduction and several hands-on sessions on existing solutions to reproduce DIA results.

About the program:

The tutorial will be a half-day event. It comprises interactive pitch and demo sessions as well as hands-on experience.

Tutorial (September 22, AM)

The NLP Canvas and AQuA System for Documents

Presenters: Abhishek Parikh, Dhara Kotecha
Date and time: September 22, 2019, 9:00-12:30
Location: CB11.04.401 @ University of Technology Sydney (UTS)
Website: http://infocusp.in/nlp_canvas.html

Abstract:

Have you ever wondered how machines understand Natural Language? How "Google Translate" works? How "Siri", a robotic voice, responds to your voice commands? Or how a piece of software understands a text document and does automatic summarization or extract relevant sentences? The answer to all these questions lie in this workshop where we explore the astounding domain of Natural Language Processing (NLP). We will unveil the very concepts of NLP with the help of your notion of how you understand the natural human language. With tons of text data being produced every day and with immense amount of efforts carried out to build a voice-controlled world, the domain of Natural Language Processing is gaining an exponential attention with simultaneous advances in Machine Learning and Deep Learning. In this workshop, we will present you the nitty-gritties and the pipeline process of NLP with a real world example of applying NLP techniques to build an Automatic Question Answering (AQuA) system which reads a given document and can relevantly answer the related questions. AQuA can be trained and applied across range of domains and with diverse applications and can save immense amount of time of reading a large-content document.

Doctoral Consortium (September 22)

ICDAR2019 Doctoral Consortium

Chairs: Véronique Eglin and Jean-Christophe Burie

Location: CB11.04.103+105 @ University of Technology Sydney (UTS)

Program: <u>Sunday, September 22</u>

14:00-14:15: Opening/ Introduction of DC

14:15-15:30: Brief presentation of the projects from tutees and mentors

15:30-16:00: Coffee Break and Setting-up of Posters

16:00-16:30: Talk on: "How to succeed in your Ph.D. degree"

16:30-18:00: Poster session

18:00-18:15: Concluding remarks and Best Poster Award

List of accepted PhD Students and title of the work:

Allan Marvin Ssemambo	A model to automate uganda sign recognition and translation to English	Uganda
Nishatul Majid	Developing an offline Bangla handwriting recognition system	USA
Raul Gomez	Exploiting the Interplay between Visual and Textual Image Content for Scene Interpretation	Spain
Showmik Bhowmik	An Integrated Document Layout Analysis System	India
Florian Westphal	Training Data and Time Efficient Algorithms for Historical Document Analysis	Sweden
Chandra Sekhar	Interpretable Online Signature Verification through Generative Adversarial Networks (GANs).	India
Julien Maitre	Detection and analysis of weak signals. Development of a digital investigation framework for a hidden alert launcher service	France
Lady Viviana Beltrán Beltrán	Multimodal Machine Learning: Representation, Fusion and Applications	France
Shreya Goyal	Semantic Understanding of Floor Plan Images through Machine Learning Techniques	India
Xenofon Karagiannis	Layout Analysis and Recognition in historical documents using machine learning methods	Greece
Camille Guerry	Historical big-data: modelization of strategies to analyze collections of documents	France

Bhargava Urala Kota	Automated Lecture Video Summarization via Extraction and Feature Representation of Text Content	USA
Thi Tuyet Hai Nguyen	Multilingual OCR correction for ancient books: Looking at multiple documents to fix multiple words	France
Brian Davis	Template-Free Information Extraction From Arbitrary Form Images	USA
Olfa Mechi	Transcription and indexing of text in archival documents using deep architectures	Tunisia
Clément Sage	Table Information Extraction from Business Documents	France
Antoine Pirrone	Multimodal analysis and reconstruction of ancient papyrus fragments using image processing and deep learning	France
Qingqing Wang	Detect and recognize text from images	Australia
Rohit Saluja	Interactive Systems for Reading Texts in Indian Streets and Documents	Australia

List of Mentors:

Elisa H. Barney Smith, Boise State University, USA

Bertrand Couasnon, Irisa, Rennes, France

Mickaël Coustaty, Laboratoire L3i, Université de La Rochelle, France

Najoua Essoukri Ben Amara, Ecole Nationale d'Ingénieurs de Sousse, Sousse, Tunisia

Andreas Fischer, University of Fribourg, Switzerland

Alicia Fornés, Computer Vision Center, Universitat Autònoma de Barcelona, Spain

C.V. Jawahar, International Institute of Information Technology, Hyderbad, India

Rafael Lins, Federal University of Pernambuco, Brazil

Josep Llados, Computer Vision Center, Universitat Autònoma de Barcelona, Spain

Angelo Marcelli, DIEM - Universita' di Salerno, Italy

Shivakumara Palaiahnakote, University of Malaya, Malaysia

Thierry Paquet, Laboratoire LITIS, Université de Rouen, France

Ioannis Pratikakis, Democritus University of Thrace, Greece

Oriol Ramos Terrades, Computer Vision Center, Universitat Autònoma de Barcelona, Spain

Faisal Shafait, National University of Sciences and Technology, Pakistan

Nicolas Sidère, Laboratoire L3i, Université de La Rochelle, France

Seiichi Uchida, Human Interface Laboratory, Kyushu University, Japan

Richard Zanibbi, Dept. Computer Science, Rochester Institute of Technology, USA

Main Conference

Venue:

International Convention Center
(ICC) Sydney

ICDAR Outstanding Achievement Award Speech

/ September 23

Prof. Andreas Dengel

German Research Center for

Artificial Intelligence (DFKI)

Time: 9:20-10:20
Location: Room A
Chair: Rangachar Kasturi (University of South Florida)

Title: From Hindsights to Insights – 30 Years in Document Analysis and Recognition

Abstract: We are using text and graphic editors or other technical means, such as cameras, recorders, as well as messaging channels, all of which allow us to produce a document, i.e. a resource for furnishing information evidence or proving the information authenticity. As a result, we obtain an artifact. that may become a subject of study and interpretation. This could be a printed photograph or a sheet of paper with printed text, graphics, or writings, all of which in their specific and individual combination bear the original or legal form of something. When we take this attempt of a definition, then a document is associated with surfaces, which capture the information, the more we think about this very traditional view to a document, the more we are faced with raising challenges that are caused by the way we communicate these days that confronts us with the question: What is a document and what would document evolution mean for the field of document analysis and recognition? This formulation was a guiding motivation throughout my scientific endeavors, which began in the mid-1980s. During this time, I have gone through all phases of a scientific career, starting as a young scientist who asked curious questions, his own team of students, successfully launched research projects and started to establish and develop DFKI, which today is the largest AI research center in the world. In my talk, I will give insights into these more than 30 years with a special focus on my findings, initiatives, and

contributions to the field of document analysis and recognition.

Bio: Andreas Dengel is the Site Head at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern and the Scientific Director of the Smart Data & Knowledge Services Research Department at DFKI. In 1993, he became a Professor at the Computer Science Department of the University of Kaiserslautern. Since 2009, he further holds a Professorship (kyakuin) at the Dept. of Computer Science and Intelligent Systems, Graduate School of Engineering of the Osaka Prefecture University. Andreas was program/technical chair of many international conferences, acts as an editorial board member of international journals and book series. He has written or edited 13 books and is author of more than 350 peer-reviewed scientific publications, several of which received a Best-Paper Award. He supervised more than 250 PhD, master and bachelor theses. Moreover, he is founder, initiator and mentor of many successful start-up companies, two of which received a "Pioneer Spirit Award" as well as the "Cebit Innovation Award". For his contributions, he was honored by the prize "Founding Promoter of the Year". Furthermore, Andreas is a Fellow of the International Association for Pattern Recognition (IAPR) and the Chairman of the Flexible Factory Partner Alliance (FFPA). He serves as an advisor for academic institutions, research programs as well as ministries, national and international. For his scientific findings, beside others, Andreas received one of the most prestigious personal scientific award in Germany, the Alcatel/SEL Award on Technical Communication and was appointed as "Distinguished Honorary Professor" (tokubetu eiyo kyoju) at the Osaka Prefecture University, an honor only five researchers received within 135 years. His main research interests are in the areas machine learning, pattern recognition, immersive quantified learning, data mining, and semantic technologies.

Keynote Speech 1 / September 24

Dr. Qiang Huo

Microsoft Research Asia

Time: 9:00-10:00
Location: Room A
Chair: Cheng-Lin Liu (Chinese Academy of Sciences)

Title: OneOCR For Digital Transformation

Abstract: Optical Character Recognition (OCR) or more broadly Document Analysis and Recognition (DAR) is an important enabling technology that empowers people and organizations to do more and achieve more. In a mobile-first world, we have cameras everywhere, which makes "OCR in the wild" very common in our everyday life. In Microsoft, we have been developing a new generation OCR engine (aka OneOCR), which can detect both printed and handwritten text in an image captured by a camera or mobile phone, and recognize the detected text for follow-up actions. Our unified OneOCR engine can recognize mixed printed and handwritten English text lines with arbitrary orientations (even flipped), outperforming significantly other leading industrial OCR engines on a wide range of application scenarios such as document, invoice, receipt, business card, slide, menu, book cover, poster, GIF/MEME, street view, product label, handwritten note and whiteboard. Empowered by OneOCR engine, Computer Vision Read capability and Cognitive Search capability of Azure Search are generally available, and a Form Recognizer with Receipt Understanding capability is available for preview, all in Azure Cognitive Services, to democratize OCR technologies. In this keynote talk, I will demonstrate the capabilities of Microsoft's latest OneOCR engine, highlight its core component technologies, and explain the roadmap ahead. I will argue that now is the best time for ICDAR community to make a big impact by developing better technologies and solutions for page object (especially table) detection, table structure recognition, extraction of entities and key-value pairs in forms and receipts, which can power enterprise workflows and Robotic Process Automation (RPA) to spur digital transformation.

Bio: Dr. Qiang Huo is a Partner Research Manager of Speech Group in Microsoft Research Asia (MSRA), Beijing, China. Prior to joining MSRA in August 2007, he had been a faculty member at the Department of Computer Science, The University of Hong Kong for about ten years. Many of his students have become leaders in both academia and industry. From 1995 to 1997, Dr. Huo worked on speech recognition for the world's first spoken language translation system at Advanced Telecommunications Research Institute (ATR) in Kyoto, Japan. In the past 30 years, he has been doing research and making fundamental contributions in the areas of speech recognition, handwriting recognition, OCR, gesture recognition, biometric-based user authentication, hardware design for speech and image processing. Many core technologies developed by his teams have been deployed widely in industry, including Microsoft's products and services such as Windows, Office, Azure Cognitive Services, and Bing.

Keynote Speech 2 / September 25

Prof. Enrique Vidal

Universidad Politecnica de Valencia

Time: 9:00-10:00
Location: Room A
Chair: Andreas Dengel (DFKI)

Title: Text Search and Information Retrieval in Large Historical Collections of Untranscribed Manuscripts

Abstract: Despite recent great advances in handwritten text recognition technology, accurate transcription of large historical manuscript collections remains elusive. In most cases, however, transcripts are only or mainly needed to enable textual search in the documents considered. In this talk we show how plain-text search and many other usual tasks of Information Retrieval and big-data Text Analytics can be accomplished without any previous explicit transcription of the manuscript images.

To this end, some years ago we drew from Lexicon-Free, Word-Segmentation-Free, Query by String, Keyword Spotting concepts and ideas to develop a Probabilistic Indexing approach aimed to support arbitrary textual queries on unconstrained text images. In this approach, a layout-agnostic, pixel-level "heat map" (called posteriorgram) is produced for each text image and each character string which proves sufficiently likely to constitute a real word written in the image. Posteriorgrams are huge, but they are simplified and pruned into manageable lists of promising hypotheses of character strings, along with their corresponding image locations (bounding boxes) and probabilities. Finally, these lists are indexed to allow extremely efficient confidence-threshold-controlled text search and retrieval at query time.

Using this approach, several very large collections of historical manuscripts have been recently indexed and made available for real, effective textual search: Chancery (82,000 page images of Latin/French manuscripts, 14th-15th c.); TSO - Spanish Golden Age Theatre (41,000 page images of Spanish comedies, 16th-18th c.); Bentham Papers (90,000 page images, of mostly English text, 18th-19th c.); Finnish Court Records (102,000 images of about 140,000

pages of Swedish text, 18th-19th c.); Carabela and CaraabelaFull - manuscripts of interest to underwater archaeology (31,000 images, of Spanish documents, most written in abstruse scripts, 15th-16th c.).

Probabilistic Indexing allows us to go beyond basic word spotting. Specifically, we will explain how they can be used for more complex tasks such as searching for hyphenated words, and for words described by wildcards or approximate spelling. Moreover, these indexes enable probabilistic versions of typical Natural Language Processing and Text Analytics tasks, such as estimating the evolution of word usage, estimating the vocabulary or the number of running words of a manuscript or a collection, computing estimated Zipf curves, etc. Finally, we will explain how Probabilistic Indexes also allow for more content-oriented, "semantic" Information Retrieval concepts and tasks such as Boolean (AND/OR/NOT) and Sequence (phrase) queries, layout-agnostic, SQL-like "database queries" in handwritten table images, content-based image classification, or even searching for melodic patterns in images of handwritten music notation.

On-line, live demonstrators of these capabilities can be found in http://transcriptorium.eu/demots/KWSdemos .

Bio: Enrique Vidal is a professor emeritus of the Universitat Politcnica de Valncia (Spain) and former co-leader of PRHLT research center in this University. He has published more than two hundred and fifty research papers in the fields of Pattern Recognition, Multimodal Interaction and applications to Language, Speech and Image Processing and has led many important projects in these fields. Dr. Vidal is a member of the IEEE and a fellow of the International Association for Pattern Recognition (IAPR).

9:00-9:20 Opening Ceremony
>   Location: Room A

9:20-10:20 ICDAR Outstanding Award Speech
>   Location: Room A
>   Chair: Rangachar Kasturi (University of South Florida)
>   **From Hindsights to Insights – 30 Years in Document Analysis and Recognition**
>   Prof. Andreas Dengel (DFKI)

10:20-10:50 Coffee Break

10:50-12:30 Oral Session 1: <u>Handwritten Text Recognition</u>
>   Location: Room A
>   Chair: Gernot Fink (TU Dortmund University)

OS1-1   **Training Full-Page Handwritten Text Recognition Models without Annotated Line Breaks**
Chris Tensmeyer, Curtis Wigington

OS1-2   **Deep Network with Pixel-level Rectification and Robust Training for Handwriting Recognition**
Shanyu Xiao, Liangrui Peng, Ruijie Yan, Shengjin Wang

OS1-3   **A Scalable Handwritten Text Recognition System**
R. Reeve Ingle, Yasuhisa Fujii, Thomas Deselaers, Jonathan Baccash, Ashok C. Popat

OS1-4   **A Fast and Accurate Fully Convolutional Network for End-to-end Handwritten Chinese Text Segmentation and Recognition**
Dezhi Peng, Lianwen Jin, Yaqiang Wu, Zhepeng Wang, Mingxiang Cai

OS1-5   **Dissecting Multi-Line Handwriting for Multi-Dimensional Connectionist Classification**
Martin Schall, Marc-Peter Schambach, Matthias O. Franz

10:50-12:30 Oral Session 2: <u>Document Image Processing</u>
>   Location: Room B
>   Chair: Rafael Dueire Lins (Federal University de Pernambuco)

OS2-1   **MTRNet: A Generic Scene Text Eraser**
Osman Tursun, Rui Zeng, Simon Denman, Sabesan Sivapalan, Sridha Sridharan, Clinton Fookes

OS2-2   **Document Binarization via Multi-Resolutional Attention Model with DRD Loss**
Xujun Peng, Chao Wang, Huaigu Cao

OS2-3 Graphical Object Detection in Document Images
Ranajit Saha, Ajoy Mondal, C. V. Jawahar

OS2-4 An End-to-End trainable framework for joint optimization of document enhancement and recognition
Manoj Sharma, Anupama Ray, Avinash Upadhyay, Megh Makwana, Ajay Pratap Singh, Akkshita Trivedi, Anil Saini, Santanu Chaudhury

OS2-5 Learning 2D Morphological Network for Old Document Image Binarization
Ranjan Mondal, Deepayan Chakraborty, Bhabatosh Chanda

12:30-14:00 Lunch Break

14:00-16:00 Oral Session 3: Document Understanding
Location: Room A
Chair: Lianwen Jin (South China University of Technology)

OS3-1 Multimodal Document Image Classification
Rajiv Jain, Curtis Wigington

OS3-2 Decipherment of Historical Manuscript Images
Xusen Yin, Nada Aldarrab, Beáta Megyesi, Kevin Knight

OS3-3 Training Convolutional Autoencoders with Metric Learning
Yosuke Onitsuka, Wataru Ohyama, Seiichi Uchida

OS3-4 A meaningful information extraction system for interactive analysis of documents
Julien Maitre, Michel Ménard, Guillaume Chiron, Alain Bouju, Nicolas Sidère

OS3-5 Table-of-Contents generation on contemporary documents
Najah-Imane Bentabet, Rémi Juge, Sira Ferradans

OS3-6 Making Two Vast Historical Manuscript Collections Searchable and Extracting Meaningful Textual Features Through Large-Scale Probabilistic Indexing
Alejandro H. Toselli, Verónica Romero, Enrique Vidal, Joan Andreu Sánchez

14:00-16:00 Oral Session 4: Table Analysis
Location: Room B
Chair: David Doermann (DARPA)

OS4-1 Deep Splitting and Merging for Table Structure Decomposition
Christopher Tensmeyer, Vlad Morariu, Brian Price, Scott Cohen, Tony Martinez

OS4-2 Table Detection in Invoice Documents by Graph Neural Networks
Pau Riba, Anjan Dutta, Lutz Goldmann, Alicia Fornés, Oriol Ramos, Josep Lladós

OS4-3 TableNet: Deep Learning model for end-to-end Table detection and Tabular data extraction from Scanned Document Images
Shubham Paliwal, Vishwanath D, Rohit Rahul, Monika Sharma, Lovekesh Vig

OS4-4 Deep Visual Template-Free Form Parsing
Brian Davis, Bryan Morse, Scott Cohen, Brian Price, Chris Tensmeyer

OS4-5 **Rethinking Table Recognition using Graph Neural Networks**
Shah Rukh Qasim, Hassan Mahmood, Faisal Shafait

OS4-6 **Breaking the Code on Broken Tablets: The Learning Challenge for Annotated Cuneiform Script in Normalized 2D and 3D Datasets**
Hubert Mara, Bartosz Bogacz

16:00-18:00 Poster Session 1 & Coffee Break
Location: Cockle Bay Foyer
Chair: Jean-Christophe Burie (La Rochelle University)

PS1-01 **OCR On-the-Go: Robust End-to-end Systems for Reading License Plates and Street Signs**
Rohit Saluja, Ayush Maheshwari, Ganesh Ramakrishnan, Parag Chaudhuri, Mark Carman

PS1-02 **Sub-word Embeddings for OCR Corrections in highly Fusional Indic Languages**
Rohit Saluja, Mayur Punjabi, Mark Carman, Ganesh Ramakrishnan, Parag Chaudhuri

PS1-03 **DeepHSV: User-independent Offline Signature Verification Using Two-Channel CNN**
Feng Lin, Chuang Li, Zhiyong Wang, Gang Yu, Liou Yuan, Haiqiang Wang

PS1-04 **Generating Realistic Binarization Data with Generative Adversarial Networks**
Chris Tensmeyer, Mike Brodie, Daniel Saunders, Tony Martinez

PS1-05 **TH-GAN: Generative Adversarial Network based Transfer Learning for Historical Chinese Character Recognition**
Junyang Cai, Liangrui Peng, Yejun Tang, Changsong Liu, Pengchao Li

PS1-06 **Data Augmentation via Adversarial Networks for Optical Character Recognition**
Victor Storchan, Jocelyn Beauchesne

PS1-07 **BAGS: An automatic homework grading system using the pictures taken by smart phones**
Xiaoshuo Li, Tiezhu Yue, Xuanping Huang, Zhe Yang, Gang Xu

PS1-08 **Detecting Named Entities in Unstructured Bengali Manuscript Images**
Chandranath Adak, Bidyut B. Chaudhuri, Chin-Teng Lin, Michael Blumenstein

PS1-09 **Target-Directed MixUp for Labeling Tangut Characters**
Guangwei Zhang, Yinliang Zhao

PS1-10 **DeepText: Detecting Text from the Wild with Multi-ASPP-Assembled DeepLab**
Qingqing Wang, Yue Lu, Xiangjian He, Wenjing Jia, Michael Blumenstein, Ye Huang, Shujing Lyu

PS1-11 **Transductive Learning for Reading Handwritten Tibetan Manuscripts**
Sivan Keret, Lior Wolf, Nachum Dershowitz, Eric Werner, Orna Almogi, Dorji Wangchuk

PS1-12 **Learning Free Line Detection in Manuscripts using Distance Transform Graph**
Majeed Kassis, Jihad El-Sana

PS1-61 **Hybrid DBLSTM-SVM based Beta-elliptic-CNN Models for Online Arabic Characters Recognition**

Yahia Hamdi, Houcine Boubaker, Thameur Dhieb, Abdelkarim Elbaati, Adel M Alimi

PS1-62 **Towards Document Image Quality Assessment: A Text Line Based Framework and A Synthetic Text Line Image Dataset**

Hongyu Li, Fan Zhu, Junhua Qiu

PS1-63 **Curved Text Detection in Natural Scene Images with Semi- and Weakly-Supervised Learning**

Xugong Qin, Yu Zhou, Dongbao Yang, Weiping Wang

PS1-64 **Hybrid Training Data for Historical Text OCR**

Jiří Martínek, Ladislav Lenc, Pavel Král, Anguelos Nicolaou, Vincent Christlein

PS1-65 **Training Binary-Valued Gates LSTM**

Zhe Li, Jian Cheng

PS1-66 **An End-to-end Trainable System for Offline Handwritten Chemical Formulae Recognition**

Xiaoxue Liu, Ting Zhang, Xinguo Yu

PS1-67 **Exploring Confidence Measures for Word Spotting in Heterogeneous Datasets**

Fabian Wolf, Philipp Oberdiek, Gernot Fink

PS1-68 **Cross-modal Prototype Learning for Zero-shot Handwriting Recognition**

Xiang Ao, Xu-Yao Zhang, Hong-Ming Yang, Fei Yin, Cheng-Lin Liu

PS1-69 **Multiple Comparative Attention Networks for Offline Handwritten Chinese Character Recognition**

Qingquan Xu, Xiang Bai, Wenyu Liu

16:20-17:40 Competition Session

> Location: Room A
> Chair: Marcus Liwicki (Luleå University of Technology),
>   Luiz Oliveira (Federal University of Parana)

17:00-18:00 Future of DAR Workshop

> Location: Room B
> Chair: Koichi Kise (Osaka Prefecture University)

9:00-10:00 Keynote Speech 1

  Location: Room A

  Chair: Cheng-Lin Liu (Chinese Academy of Sciences)

  OneOCR For Digital Transformation

   Dr. Qiang Huo (Microsoft Research Asia)

10:00-10:30 Coffee Break

10:30-12:30 Journal Session 1

  Location: Room A

  Chair: Simone Marinai (University of Florence)

JS1-1 **An Anchor-Free Region Proposal Network for Faster R-CNN based Text Detection Approaches**

Zhuoyao Zhong, Lei Sun, Qiang Huo

JS1-2 **A Two-Stage Method for Text Line Detection in Historical Documents**

Tobias Grüning, Gundram Leifert, Tobias Strauß, Johannes Michael, Roger Labahn

JS1-3 **Coarse-to-fine Document Localization in Natural Scene Image with Regional Attention and Recursive Corner Refinement**

Anna Zhu, Chen Zhang, Zhi Li, Shengwu Xiong

JS1-4 **Comic MTL: multi-task model for comic book image analysis**

Nhu-Van Nguyen, Christophe Rigaud, Jean-Christophe Burie

JS1-5 **Generalized Framework for Summarization of Fixed-Camera Lecture Videos by Detecting and Binarizing Handwritten Content**

Bhargava Urala Kota, Kenny Davila, Alexander Stone, Srirangaraj Setlur, Venu Govindaraju

JS1-6 **A comparison of local features for camera-based document image retrieval and spotting**

Quoc Bao Dang, Mickal Coustaty, Muhammad Muzzamil Luqman, Jean-Marc Ogier

10:30-12:10 Journal Session 2

  Location: Room B

  Chair: Daniel Lopresti (Lehigh University)

JS2-1 **Boosting Scene Character Recognition by Learning Canonical Forms of Glyphs**

Yizhi Wang, Zhouhui Lian,   Yingmin Tang, Jianguo Xiao

JS2-2 **Are 2D-LSTM really dead for offline text recognition?**

Bastien Moysset, Ronaldo Messina

JS2-3 **Handwritten Arabic Text Recognition Using Multi-Stage Sub-Core Shape HMMs**

Irfan Ahmad, Gernot Fink

JS2-4 **Dynamic Temporal Residual Network for Sequence Modeling**
Ruijie Yan, Liangrui Peng, Shanyu Xiao, Michael T. Johnson, Shengjin Wang

JS2-5 **On optimal stopping strategies for text recognition in a video stream as an application of a monotone sequential decision model**
Konstantin Bulatov, Nikita Razumnyi, Vladimir V. Arlazarov

12:30-14:00 Lunch Break

14:00-15:40 Oral Session 5: Text Detection and Recognition
Location: Room A
Chair: Xiang Bai (Huazhong University of Science and Technology)

OS5-1 **An End-to-end Video Text Detector with Online Tracking**
Hongyun Yu, Chengquan Zhang, Xuan Li, Junyu Han, Errui Ding, Liang Wang

OS5-2 **KuroNet: Pre-Modern Japanese Kuzushiji Character Recognition with Deep Learning**
Tarin Clanuwat, Alex Lamb, Asanobu Kitamoto

OS5-3 **A New Approach for Integrated Recognition and Correction of Texts from Images**
Jian Wei, Kai Chen, Jianhua He, Zheng Huang, Yunrui Lian, Yi Zhou

OS5-4 **On the Improvement of Recognizing Single-line Strings of Japanese Historical Cursive**
Ayumu Nagai

OS5-5 **An attention-based end-to-end model for multiple text lines recognition in Japanese Historical Documents**
Nam Tuan Ly, Cuong Tuan Nguyen, Masaki Nakagawa

14:00-15:40 Oral Session 6: Mathematical Expression and Text Recognition
Location: Room B
Chair: Richard Zanibbi (Rochester Institute of Technology)

OS6-1 **Residual BiRNN based Seq2Seq Model with Transition Probability Matrix for Online Handwritten Mathematical Expression Recognition**
Zelin Hong, Ning You, Jun Tan, Ning Bi

OS6-2 **Fuzzy Visibility Graph for Structural Analysis of Online Handwritten Mathematical Expressions**
Arnaud Lods, Éric Anquetil, Sébastien Macé

OS6-3 **LPGA: Line-Of-Sight Parsing with Graph-based Attention for Math Formula Recognition**
Mahshad Mahdavi, Michael Condon, Kenny Davila Castellanos, Richard Zanibbi

OS6-4 **A Cost Efficient Approach to Correct OCR Errors in Large Document Collections**
Deepayan Das, Jerin Philip, Minesh Mathew, C.V. Jawahar

OS6-5 Using ASR methods for OCR

Ashish Arora, Chun Chieh Chang, Babak Rekabdar, Bagher BabaAli, Daniel Povey, David Etter, Desh Raj, Hossein Hadian, Jan Trmal, Paola Garcia, Shinji Watanabe, Vimal Manohar, Yiwen Shao, Sanjeev Khudanpur

15:40-17:40 Poster Session 2 & Coffee Break

Location: Cockle Bay Foyer

Chair: Faisal Shafait (National University of Sciences and Technology)

PS2-01 **A Multi-oriented Chinese Keyword Spotter Guided by Text Line Detection**

Pei Xu, Shan Huang, Hongzhen Wang, Hao Song, Shen Huang, Qi Ju

PS2-02 **Cascading Modular U-Nets for Document Image Binarization**

Seokjun Kang, Brian Kenji Iwana, Seiichi Uchida

PS2-03 **OBC306: A Large-Scale Oracle Bone Character Recognition Dataset**

Shuangping Huang, Haobin Wang, Yongge Liu, Xiaosong Shi, Lianwen Jin

PS2-04 **GARN: A Novel Generative Adversarial Recognition Network for End-to-End Scene Character Recognition**

Hao Kong, Dongqi Tang, Xi Meng, Tong Lu

PS2-05 **A Text-context-aware CNN Network for Multi-oriented and Multi-language Scene Text Detection**

Yao Xiao, Minglong Xue, Tong Lu, Yirui Wu, Shivakumara Palaiahnakote

PS2-0 **Handwritten words and digits recognition using Deep Learning based Bag of Features Framework**

Najoua Rahal, Maroua Tounsi, Tarek M. Hamdani, Adel M. Alimi

PS2-07 **A Relation Network Based Approach to Curved Text Detection**

Chixiang Ma, Zhuoyao Zhong, Lei Sun, Qiang Huo

PS2-08 **An efficient off-line handwritten Japanese address recognition system**

Xiaojie Xia, Xiaoyi Yu, Wei Liu, Chunyan Zhang, Jun Sun, Satoshi Naoi

PS2-09 **A Comprehensive Study of ImageNet Pre-Training for Historical Document Image Analysis**

Linda Studer, Michele Alberti, Vinaychandran Pondenkandath, Pinar Goktepe, Thomas Kolonko, Andreas Fischer, Marcus Liwicki, Rolf Ingold

PS2-10 **GRK-Papyri: A Dataset of Greek Handwriting on Papyri for the Task of Writer Identification**

Hussein Mohammed, Isabelle Marthot-Santaniello, Volker Märgner

PS2-11 **The Pinkas Dataset**

Berat Kurar Barakat, Jihad El-Sana, Irina Rabaev

PS2-12 **Layout Analysis on Challenging Historical Arabic Manuscripts using Siamese Network**

Reem Alaasam, Berat Kurar Barakat, Jihad El-Sana

PS2-28 **Universal Barcode Detector via Semantic Segmentation**
Andrey Zharkov, Ivan Zagaynov

PS2-29 **HoughNet: neural network architecture for vanishing points detection**
Alexander Sheshkus, Anastasia Ingacheva, Vladimir Arlazarov, Dmitry Nikolaev

PS2-30 **Fast method of ID documents location and type identification for mobile and server application**
Natalya Skoryukina, Vladimir V. Arlazarov, Dmitry P. Nikolaev

PS2-31 **Combination of deep learning and syntactical approaches for the interpretation of interactions between text-lines and tabular structures in handwritten documents**
Camille Guerry, Bertrand Co_asnon, Aur_lie Lemaitre

PS2-32 **A Synthetic Recipe for OCR**
David Etter, Stephen Rawls, Cameron Carpenter, Gregory Sell

PS2-33 **Synthesis of handwriting dynamics using sinusoidal model**
Himakshi Choudhury, S. R. Mahadeva Prasanna

PS2-34 **Post-OCR Error Detection by Generating Plausible Candidates**
Thi-Tuyet-Hai Nguyen, Adam Jatowt, Mickael Coustaty, Nhu-Van Nguyen, Antoine Doucet

PS2-35 **Music Symbol Sequence Indexing in Medieval Plainchant Manuscripts**
Jorge Calvo-Zaragoza, Alejandro H. Toselli, Enrique Vidal, Joan Andreu S_nchez

PS2-36 **Bi-level Masked Multi-scale CNN-RNN Networks for Short Text Representation**
Qian Li, Qiang Wu, Chengzhang Zhu, Jian Zhang

PS2-37 **Challenges in end-to-end neural scientific document OCR**
Yuntian Deng, David Rosenberg, Gideon Mann

PS2-38 **Deep Neural Networks for Text Detection and Recognition in Historical Maps**
Jerod Weinman, Ziwen Chen, Ben Gafford, Nathan Gifford, Abyaya Lamsal, Liam Niehus-Staab

PS2-39 **Woodblock-printing Mongolian Words Recognition by Bi-LSTM with Attention Mechanism**
Yanke Kang, Hongxi Wei, Hui Zhang, Guanglai Gao

PS2-40 **A Comparative Study of Attention-based Encoder-Decoder Approaches to Natural Scene Text Recognition**
Fuze Cong, Wenping Hu, Qiang Huo, Li Guo

PS2-41 **Generating Synthetic Handwritten Mathematical Expressions from a LaTeX Sequence or a MathML Script**
Minh Khanh Phan, Vu Tran Minh Khuong, Huy Quang Ung, Masaki Nakagawa

PS2-42 **RankSVM for Offline Signature Verification**
Yan Zheng, Yuchen Zheng, Wataru Ohyama, Daiki Suehiro, Seiichi Uchida

17:40-18:20 TC10/TC11 Joint Meeting
    Location: Room A

19:00-22:00 Conference Dinner
    Location: Luna Park – Grand Ballroom

9:00-10:00 Keynote Speech 2

> Location: Room A
> Chair: Andreas Dengel (DFKI)

Text Search and Information Retrieval in Large Historical Collections of Untranscribed Manuscripts

> Prof. Enrique Vidal (Universidad Politecnica de Valencia)

10:00-10:30 Coffee Break

10:30-12:30 Oral Session 7: Layout Analysis

> Location: Room A
> Chair: Jean-Marc Ogier (University of La Rochelle)

OS7-1 **Contextual Stroke Classification in Online Handwritten Documents with Graph Attention Networks**

> Jun-Yu Ye, Yan-Ming Zhang, Qing Yang, Cheng-Lin Liu

OS7-2 **Indiscapes: Instance Segmentation Networks for Layout Parsing of Historical Indic Manuscripts**

> Abhishek Prusty, Sowmya Aitha, Abhishek Trivedi, Ravi Kiran Sarvadevabhatla

OS7-3 **Article Segmentation in Digitised Newspapers with a 2D Markov Model**

> Andrew Naoum, Joel Nothman, James Curran

OS7-4 **PubLayNet: largest dataset ever for document layout analysis**

> Xu Zhong, Jianbin Tang, Antonio Jimeno Yepes

OS7-5 **Page Segmentation using a Convolutional Neural Network with Trainable Co-occurrence Features**

> Joonho Lee, Hideaki Hayashi, Wataru Ohyama, Seiichi Uchida

OS7-6 **DoT-Net: Document Layout Classification Using Texture-based CNN**

> Sai Chandra Kosaraju, Mohammed Masum, Nelson Zange Tsaku, Pritesh Patel, Tanju Bayramoglu, Girish Modgil, Mingon Kang

10:30-12:30 Oral Session 8: Applications of Document Analysis

> Location: Room B
> Chair: Apostolos Antonacopoulos (University of Salford)

OS8-1 **CNN-BLSTM-CRF Network for Semantic Labeling of Students' Online Handwritten Assignments**

> Amirali Darvishzadeh, Thomas F. Stahovich, Amir Feghahati, Negin Entezari, Shaghayegh Gharghabi, Reed Kanemaru, Christian Shelton

OS8-2 **Serif or Sans: Visual Font Analytics on Book Covers and Online Advertisements**

> Yuto Shinahara, Takuro Karamatsu, Daisuke Harada, Kota Yamaguchi, Seiichi Uchida

OS8-3 **Content Extraction from Lecture Video via Speaker Action Classification based on Pose Information**

Fei Xu, Kenny Davila, Srirangaraj Setlur, Venu Govindaraju

OS8-4 **Developing Horizon Scanning Methods for the Discovery of Scientific Trends**

Maja Karasalo, Johan Schubert

OS8-5 **Identifying the Central Figure of a Scientific Paper**

Sean T. Yang, Po-Shen Li, Lia Kazakova, Abhishek Joshi, Bum Mook Oh, Jevin D. West, Bill Howe

OS8-6 **BRIDGE: Building plan Repository for Image Description Generation, and Evaluation**

Shreya Goyal, Vishesh Mistry, Chiranjoy Chattopadhyay, Gaurav Bhatnagar

12:30-14:00 Lunch Break

14:00-15:20 Oral Session 9: <u>Script Identification and Authentication</u>

Location: Room A

Chair: Seiichi Uchida (Kyushu University)

OS9-1 **Patch Aggregator for Scene Text Script Identification**

Changxu Cheng, Qiuhui Huang, Xiang Bai, Bin Feng, Wenyu Liu

OS9-2 **Script Identification using Across- and Within-Image Distribution Estimation**

Gregory Sell, David Etter, Daniel Garcia-Romero, Alan McCree

OS9-3 **Deep Generalized Max Pooling**

Vincent Christlein, Lukas Spranger, Mathias Seuret, Anguelos Nicolaou, Pavel Král, Andreas Maier

OS9-4 **A Spatio-Spectral Hybrid Convolutional Architecture for Hyperspectral Document Authentication**

Muhammad Jaleed Khan, Khurram Khurshid, Faisal Shafait

14:00-15:20 Oral Session 10: <u>Signature Verification</u>

Location: Room B

Chair: Venu Govindaraju (SUNY)

OS10-1 **Deep Dynamic Time Warping: End-to-End Local Representation Learning for Online Signature Verification**

Xiaomeng Wu, Akisato Kimura, Brian Kenji Iwana, Seiichi Uchida, Kunio Kashino

OS10-2 **Capturing Micro Deformations from Pooling Layers for Offline Signature Verification**

Yuchen Zheng, Wataru Ohyama, Brian Kenji Iwana, Seiichi Uchida

OS10-3 **Offline Signature Verification using Structural Dynamic Time Warping**

Michael Stauffer, Paul Maergner, Andreas Fischer, Rolf Ingold, Kaspar Riesen

OS10-4 **Online Signature Verification by Few-shot Separable Convolution Based Deep Learning**

Chandra Sekhar Vorugunti, Rama Krishna Sai Gorthi, Viswanath Pulabaigari

15:20-17:00 Poster Session 3 & Coffee Break

Location: Cockle Bay Foyer

Chair: Shivakumara Palaiahnakote (University of Malaya)

PS3-01 **Age Estimation using Disconnectedness Features in Handwriting**

V. Basavaraja, Shivakumara Palaiahnakote, D. S. Guru, Umapada Pal, Tong Lu, Michael Blumenstein

PS3-02 **Offline Writer Identification Based on the Path Signature Approach**

Songxuan Lai, Lianwen Jin

PS3-03 **Do You Need More Data? The DeepSignDB On-Line Handwritten Signature Biometric Database**

Ruben Tolosana, Ruben Vera-Rodriguez, Julian Fierrez, Aythami Morales, Javier Ortega-Garcia

PS3-04 **CRNN based Jersey-Bib Number/Text Recognition in Sports and Marathon Images**

Sauradip Nag, Raghavendra Ramachandra, Palaiahnakote Shivakumara, Umapada Pal, Tong Lu, Mohan Kankanhalli

PS3-05 **KeyWord Spotting using Siamese Triplet Deep Neural Networks**

Yasmine Serdouk, Véronique Eglin, Stéphane Bres, Mylène Pardoen

PS3-06 **Learning Character Recognition with Graph-based Privileged Information**

Florian Westphal, Niklas Lavesson, Håkan Grahn

PS3-07 **Simultaneous Optimisation of Image Quality Improvement and Text Content Extraction from Scanned Documents**

Shashank Mujumdar, Nitin Gupta, Abhinav Jain, Douglas Burdick

PS3-08 **Improving text recognition using optical and language model writer adaptation**

Yann Soullard, Wassim Swaileh, Pierrick Tranouez, Thierry Paquet, Clément Chatelain

PS3-09 **Multi-modal Attention Network for Handwritten Mathematical Expression Recognition**

Jiaming Wang, Jun Du, Jianshu Zhang, Zi-Rui Wang

PS3-10 **Semantic and interaction: when Document Image Analysis meets Computer Vision and Machine Learning**

Jean-Yves Ramel, Nicole Vincent

PS3-11 **Improving Text Image Resolution using a Deep Generative Adversarial Network for Optical Character Recognition**

Xiangdong Su, Huali Xu, Ying Kang, Xiang Hao, Guanglai Gao, Yue Zhang

PS3-42 **A Robust Hybrid Approach for Textual Document Classification**
Muhammad Nabeel Asim, Muhammad Usman Ghani Khan, Muhammad Imran Malik, Andreas Dengel, Sheraz Ahmed

PS3-43 **Rethinking Semantic Segmentation for Table Structure Recognition in Documents**
Shoaib Ahmed Siddiqui, Pervaiz Iqbal Khan, Andreas Dengel, Sheraz Ahmed

PS3-44 **DeepTabStR: Deep Learning based Table Structure Recognition**
Shoaib Ahmed Siddiqui, Imran Ali Fateh, Syed Tahseen Raza Rizvi, Andreas Dengel, Sheraz Ahmed

PS3-45 **Two Stream Deep Network for Document Image Classification**
Muhammad Nabeel Asim, Muhammad Usman Ghani Khan, Muhammad Imran Malik, Khizar Razzaque, Andreas Dengel, Sheraz Ahmed

PS3-46 **Speeding-up the Handwritten Signature Segmentation Process through an Optimized Fully Convolutional Neural Network**
Paloma G. S. Silva, Celso Lopes Junior, Estanislau Lima, Byron L. D. Bezerra, Cleber Zanchettin

PS3-47 **Document Domain Adaptation with Generative Adversarial Networks**
Diede Rusticus, Lutz Goldmann, Matthias Reisser, Mauricio Villegas

PS3-48 **End-To-End Measure for Text Recognition**
Gundram Leifert, Roger Labahn, Tobias Grüning, Svenja Leifert

PS3-49 **A Neural Approach for Text Extraction from Scholarly Figures**
David Morris, Peichen Tang, Ralph Ewerth

PS3-50 **A Quality and Time Assessment of Binarization Algorithms**
Rodrigo Bernardino, Rafael Lins, Darlisson Marinho Jesus

PS3-51 **A Study of Script Language Effects in Deep Neural Network Based Scene Text Detection**
Jiaxin Cheng, Achin Gupta, Yue Wu, Premkumar Natarajan

PS3-52 **Fast Text/non-text Image Classification with Knowledge Distillation**
Miao Zhao, Rui-Qi Wang, Fei Yin, Xu-Yao Zhang, Lin-Lin Huang, Jean-Marc Ogier

PS3-53 **A Handwritten Chinese Text Recognizer Applying Multi-level Multimodal Fusion Network**
Yuhuan Xiu, Qingqing Wang, Hongjian Zhan, Man Lan, Yue Lu

PS3-54 **OSVNet: Convolutional Siamese Network for Writer Independent Online Signature Verification**
Chandra Sekhar V, D.S. Guru, Prerana Mukherjee, Viswanath Pulabaigari

PS3-55 **Blind Source Separation based Framework for Multispectral Document Image Binarization**
Abderrahmane Rahiche, Athmane Bakhta, Cheriet Mohamed

PS3-56 **Logo Design Analysis by Ranking**
Takuro Karamatsu, Daiki Suehiro, Seiichi Uchida

PS3-57 **Automatic generation of a custom corpora for invoice analysis and recognition (WIADAR poster 1)**

Jérôme Blanchard, Yolande Belaid and Abdel Belaid

PS3-58 **Digitisation of Assets from the Oil & Gas Industry: Challenges and Opportunities (WIADAR poster 2)**

Carlos Francisco Moreno-García and Eyad Elyan

PS3-59 **Fast Glare Detection in Document Images (WIADAR poster 3)**

Dmitry Rodin and Nikita Orlov

PS3-60 **Fast Korean Syllable Recognition with Letter-based Convolutional Neural Networks (WIADAR poster 4)**

Michael Zatsepin, Yury Vatlin, Iurii Chulinin and Aleksei Zhuravlev

PS3-61 **TedEval: A Fair Evaluation Metric for Scene Text Detectors (WIADAR poster 5)**

Chae Young Lee, Youngmin Baek and Hwalsuk Lee

PS3-62 **X-BROT: Prototyping of Compatibility Testing Tool for Web Application based on Document Analysis Technology (WIADAR poster 6)**

Hiroshi Tanaka

17:00-18:00 Industrial Panel

Location: Room A

Chair: Michael Blumenstein (University of Technology Sydney)

"The future of document analysis in the industry sector"

18:00-18:10 Closing

Location: Room A

Competitions

C1   **ICDAR 2019 Competition on Historical Book Analysis**
Maroua Mehri, Pierre H_roux, R_my Mullot, Jean-Philippe Moreux, Bertrand Co_asnon, and Bill Barrett

C4   **ICDAR2019 Competition on BAseline Detection (cBAD)**
Markus Diem, Florian Kleber, and Basilis Gatos

C6   **ICDAR 2019 Historical Document Reading Challenge on Large Structured Family Records**
Rajkumar Saini, Derek Dobson, Jon Morrey, Marcus Liwicki, and Foteini Simistira Liwicki

C7   **ICDAR 2019 Competition on Image Retrieval for Historical Handwritten Documents**
Vincent Christlein, Anguelos Nicolaou, Mathias Seuret, Dominique Stutzmann, and Andreas Maier

C8   **ICDAR 2019 Competition on Table Detection and Recognition in Archival Documents**
Liangcai Gao, Yilun Huang, Herv_ D_jean, Jean-Luc Meunier, Qinqin Yan, Yu Fang, Florian Kleber and Eva Lang

C10   **ICDAR 2019 Scanned Receipts OCR and Information Extraction**
heng Huang, Kai Chen, Jianhua He, Xiang Bai, Dimosthenis Karatzas, Shjian Lu, and C.V. Jawahar

C12   **ICDAR 2019 Competition on Recognition of Documents with Complex Layouts**
C. Clausner, A. Antonacopoulos, and S. Pletschacher

C13   **ICDAR 2019 Competition on Recognition of Early Indian Printed Documents**
C. Clausner, A. Antonacopoulos, T. Derrick and S. Pletschacher

C14   **ICDAR 2019 Competition on Recognition of Handwritten Mathematical Expressions and Typeset Formula Detection**
Mahshad Mahdavi, Richard Zanibbi, Harold Mouch_re, Utpal Garain

C15   **ICDAR 2019 Time-Quality Binarization Competition**
Rafael Dueire Lins, Ergina Kavallieratou, Elisa Barney Smith, Rodrigo Barros Bernardino, Darlisson Marinho de Jesus

C16   **ICDAR 2019 Competition on Document Image Binarization**
Ioannis Pratikakis, Konstantinos Zagoris, Xenofon Karagiannis, Lazaros Tsochatzidis and Tanmoy Mondal and Isabelle Marthot-Santaniello

C17   **ICDAR 2019 Competition on Robust Text Reading from Large-scale Street View Images with Partial Labels**
Yipeng Sun, Zihan Ni, Chee-Kheng Chng, Yuliang Liu, Canjie Luo, Chun Chet Ng, Junyu Han, Errui Ding, Jingtuo Liu, Dimosthenis Karatzas, Chee Seng Chan, Lianwen Jin

C18 **ICDAR 2019 RRC on Scene Text Visual Question Answering**

Ali Furkan Biten†, Rub_n Tito, Andres Mafla†, Lluis Gomez, Mar_al Rusi_ol, Minesh Mathew, C.V. Jawahar, Ernest Valveny, Dimosthenis Karatzas

C19 **ICDAR 2019 RRC on Arbitrary-shaped scene text detection and recognition**

Chee-Kheng Chng, Yuliang Liu, Yipeng Sun, Chun Chet Ng, Canjie Luo, Zihan Ni , ChuanMing Fang, Shuaitao Zhang, Junyu Han, Errui Ding, Jingtuo Liu, Dimosthenis Karatzas, Chee Seng Chan, Lianwen Jin

C20 **ICDAR 2019 Robust Reading Challenge on Reading Chinese Text on Signboard**

Xi Liu, Rui Zhang, Yongsheng Zhou, Qianyi Jiang, Qi Song, Nan Li, Kai Zhou, Lei Wang, Dong Wang, Minghui Liao, Mingkun Yang, Xiang Bai

C21 **ICDAR 2019 RRC on Multi-lingual scene text detection and recognition**

Nibal Nayef, Yash Patel, Michal Busta, Pinaki Nath Chowdhury, Dimosthenis Karatzas, Wafa Khlif, Jiri Matas, Umapada Pal, Jean-Christophe Burie, Cheng-Lin Liu and Jean-Marc Ogier

C22 **ICDAR 2019 Competition on Post-OCR Text Correction**

Christophe Rigaud, Antoine Doucet, Micka_l Coustaty and Jean-Philippe Moreux

C23 **ICDAR 2019 Competition on Harvesting Raw Tables from Infographics (CHART-Infographics)**

Kenny Davila, Bhargava Urala Kota, Srirangaraj Setlur, Venu Govindaraju, Christopher Tensmeyer, Sumit Shekhar, Ritwick Chaudhry

ICDAR 2019

Presentation Instructions

Instructions for Oral Presentations
- For oral presentations, all presenters should be in the conference room and must report to the session chair no later than 10 minutes before the start of the session.
- The length of oral presentations is 20 minutes, which must include time for Q&A. Hence, your presentation should last no longer than 17 minutes, to allow the audience at least 3 minutes for their questions. This is a hard deadline that will be enforced, so please practice and time your talk to meet this requirement.
- A public laptop (Windows 10 with the latest updates. MS PowerPoint 2016 is installed. Adobe Reader is also available) will be available in each conference room with MS PowerPoint installed. You can use either the public laptop (if so, bring your presentation on a memory stick), or your own laptop. There will be a 4-port display switcher to switch between laptops. To save time, presentations should be pre-loaded before the start of the session, hence the need for you to check in with your session chair in advance of the start of the session.
- The connector type of the projector is VGA (aka, DE-15 or D-sub 15). While HDMI-to-VGA converters are available, this does not completely guarantee the HDMI output of your laptop computer works.

Instructions for Poster Presentations
- The poster session will be held at the Cockle Bay Foyer. Delegates are requested to set up their posters and take them down as per the timings below as new posters are displayed every day. Velcro dots will be supplied when you register to attach your poster to the poster board. Pins securing posters are not effective as the poster boards are covered in a felt material. Please note that the Conference Managers or the venue will dispose of your poster if it is not removed by the specified time.
    - Poster Session 1: Monday 23 September,
      Posters to be displayed from 2 pm till 6 pm.
    - Poster Session 2: Tuesday 24 September,
      Posters to be displayed from 11 am till 6 pm.
    - Poster Session 3: Wednesday 25 September,
      Posters to be displayed from 11 am till 5.30 pm.
- Posters should be A0 Portrait size, printed in portrait mode (the poster board is 90 cm wide by 210 cm high, which translates to 35 inches wide by 83 inches high).
- One of the co-authors must be present at the poster to interact with attendees during the assigned session. So that poster presenters can have a chance to see the other posters presented in their same session, it is permissible to leave your poster for short periods of time, but for no more than a total of 20 minutes. It is not necessary to be at the poster at other times during the conference.

No-Show

All no-show papers will not be available on IEEE Xplore. No-show papers that were not withdrawn and were published in the Technical Program must be identified as "No-Show" in the conference website.

IAPR Ethical Requirements for Authors

The IAPR requires that all authors wishing to present a paper declare that the paper is substantially original; that is, the manuscript as a whole, or for the most part, is novel, has not been published in (or even submitted to) any journals and has not been presented at any other conferences. If previous versions of the manuscript were published or presented, appropriate references must be given and substantial justification for presentation of the current version must be presented.

The IAPR strictly prohibits any plagiarism; that is, the work of others must not be "borrowed" and presented as the authors' own work, regardless of the size of the borrowed portion.

The IAPR frowns upon "no-show behavior" at IAPR-related conferences and workshops, meaning that an author registers to make a presentation but does not show up for it. If such behavior is unavoidable due to urgent and unexpected personal matters, the author is strongly urged to notify the event organizer of the situation as soon as possible. If prior notification is impossible, the organizer should be advised after the fact of the reason for the author's absence.

The IAPR retains the rights to eliminate any papers in violation of these Requirements and to take appropriate action against individuals repeatedly violating these Requirements and assumes no responsibility for any resulting loss of reputation or opportunity of such individuals or for any inconvenience related to the future work of such individuals.

Social Program

Welcome Reception
Date: Sunday 22 September 2019
Time: 18:00 – 19:00 (subject to change)
Venue: Yots Waterside – Australian Maritime Museum
Dress Code: Cocktail
Tickets: Inclusive for Full Registration Conference Delegates
Additional tickets: A$140 per additional guest

Join delegates, sponsors and colleagues to celebrate the 15th International Conference on Document Analysis and Recognition. Enjoy an evening overlooking Sydney's Darling Harbour accompanied by canapés and beverages. The Welcome Reception will provide delegates with the opportunity to network and engage with colleagues and industry leaders alike.

Conference Dinner
Date: Tuesday 24 September 2019
Time: 19:00 – 22:00 (subject to change)
Venue: Luna Park – Grand Ballroom
Dress Code: Smart Casual
Tickets: Inclusive for Full Registration Conference Delegates
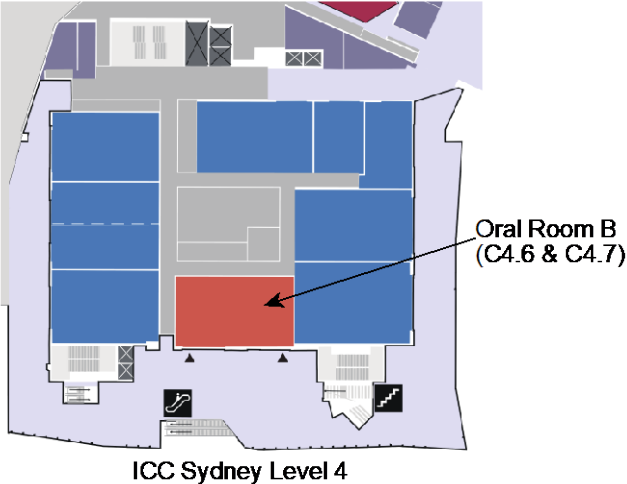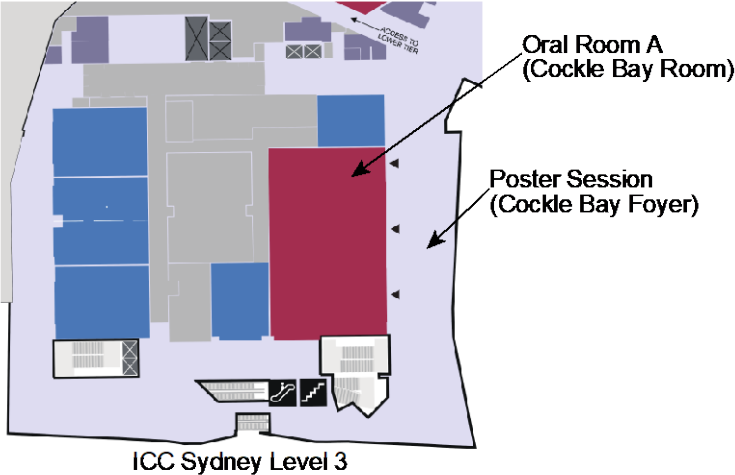Additional Tickets: A$220 per additional guest

Join us at Sydney's iconic Luna Park, after the second full Conference day, for a delightful 2-course dinner with fine Australian beverages. Luna Park's Grand Ballroom features floor to ceiling windows and a mezzanine that deliver an idyllic view of the stunning Sydney Harbour. Enjoy an evening of networking while watching the Harbour Bridge and Opera House come to life as the sun sets.

The International Convention Centre Sydney (ICC Sydney)

Oral Room A
(Cockle Bay Room)

Poster Session
(Cockle Bay Foyer)

ICC Sydney Level 3

Oral Room B
(C4.6 & C4.7)

ICC Sydney Level 4

Platinum Sponsors

Gold Sponsor

Silver Sponsor

Bronze Sponsors

Best Student Paper Award Sponsor

University Sponsor

Other Sponsors

Confirmed Sponsors

Official Airline Partner

Supporter

Proceedings Publisher