ICDAR2017

The 14th IAPR International Conference on Document Analysis and Recognition

Kyoto, Japan
November 9-15, 2017

Conference Booklet

http://www.iapr.org/ICDAR2017/

IAPR

Timetable
(Pre-events)

	8	9	10	11	12	13	14	15	16	17	18	19

Nov. 9 (Thursday)

GREC Workshop (AV Study Room , 2nd Floor), pp.12-15

Nov. 10 (Friday)

GREC Workshop (AV Study Room , 2nd Floor) , pp.12-15

MANPU Workshop (Seminar Room #2, 2nd Floor), pp.16-17

MANPU Workshop (Kyoto International Manga Museum), pp.16-17

HIP Workshop (Medium Conference Room, 2nd Floor), pp.18-19

ICDAR-OST Workshop (Seminar Room #3, 2nd Floor), pp.20-21

Nov. 11 (Saturday)

HIP Workshop (Ritsumeikan University Art Research Center), pp.18-19

ICDAR-WML Workshop (Medium Conference Room, 2nd Floor), pp.22-23

ICDAR-OST Workshop (Seminar Room #3, 2nd Floor), pp.20-21

CBDAR Workshop (AV Study Room, 2nd Floor), p.24

MOCR Workshop (Seminar Room #2, 2nd Floor), p.25

Nov. 12 (Sunday)

HDI Workshop (Medium Conference Room, 2nd Floor), p.26

IWCDF Workshop (AV Study Room, 2nd Floor), p.27

Doctoral Consortium (Large Conference Room, 3rd Floor), pp.28-29

[Tutorial] GMPRDIA: Graph-based Methods in Pattern Recognition and Document Image Analysis (Seminar Room #2-3, 2nd Floor), p.30

[Tutorial] RTRS: Building a Robust Text Reading System for Unconstrained Scene Images (AV Study Room, 2nd Floor), p.31

[Tutorial] Word Spotting - From Bag-of-Features to Deep Learning (Medium Conference Room, 2nd Floor), p.32

Special Workshop: Future DAR (Large Conference Room, 3rd Floor), pp.33-34

Free of charge

Registration desk opens every day at 8:30 at AV Study Room on Nov. 9, and at Seminar Room #1 on Nov.10 - 12.

Timetable
(Main Conference)

	Terrsa Hall (West building)	Large Conference Room (East building, 3rd Floor)	Seminar Room, Medium Conference Room, AV Study Room (East building, 2nd Floor)	
Sunday, November 12				
19:00-20:30	Reception (p.60)			
Monday, November 13				
9:30- 9:40	Opening Ceremony (p.37)			
9:40-10:40	Keynote 1 Prof. Rangachar Kasturi (p.36)			
10:40-11:10	Coffee Break			
11:10-12:30	Oral Session 1 Character Recognition I (p.37)	Oral Session 2 Graphics Recognition (p.37)		
12:30-14:20	Lunch			
14:20-15:40	Oral Session 3 Offline Handwriting Recognition I (p.38)	Oral Session 4 Document Image Processing (p.38)		
15:40-17:40		[15:45 - 16:15] Competition Reports 1 (p.39 & pp.58-59)	Poster session 1 (pp.39-42)	Coffee Break
17:40-18:40	TC10/TC11 Joint Meeting (p.42)			
Tuesday, November 14				
9:00-10:00	Keynote 2 Prof. Andreas Dengel (pp.43-44)			
10:00-10:30	Coffee Break			
10:30-12:10	Oral Session 5 Character Recognition II (p.45)	Oral Session 6 Spotting and Information retrieval (p.45)		
12:10-14:00	Lunch			
14:00-15:20	Oral Session 7 Offline Handwriting Recognition II (p.46)	Oral Session 8 Segmentation and Layout Analysis (p.46)		
15:20-17:20		[15:25 - 15:55] Competition Reports 2 (pp.46 & pp.58-59)	Poster session 2 (pp.47-50)	Coffee Break
19:00-21:00	Banquet (Rihga Royal Hotel Kyoto) (p.60)			
Wednesday, November 15				
9:00-10:00	Keynote 3 Prof. Xiang Bai (p.51)			
10:00-10:30	Coffee Break			
10:30-12:10	Oral Session 9 Online Handwriting Recognition (p.52)	Oral Session 10 Scene Text Understanding (p.52)		
12:10-14:00	Lunch			
14:00-15:20	Oral Session 11 Historical Document Image Analysis (p.53)	Oral Session 12 Font, Writer, and Style Classification (p.53)		
15:20-17:20			Poster session 3 (pp.53-57)	Coffee Break
17:20-18:20	Future Workshop Report & Panel (p.57)			
18:20-18:30	Closing (p.57)			

Registration desk opens every day at 8:30 at the entrance of Terrsa Hall.

Welcome Message from
General and Executive Chairs
ICDAR2017

Welcome to the 2017 IAPR International Conference on Document Analysis and Recognition in Kyoto, Japan. It is truly an honor to host our premier conference in an ancient capital of Japan, which is now recognized as one of the most important and attractive cities in Japan because of its cultural properties. You are now in Kyoto at the best season with full of autumn red leaves. We hope you will enjoy the mixture of modern and historical sites and tastes, as well as natural scenes in Kyoto.

ICDAR 2017 is the fourteenth 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), and most recently in Nancy, France ('15). ICDAR 2017 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 Rangachar Kasturi, a professor at the University of South Florida, who will focus his talk on the history and recent advances of graphics recognition. In the second keynote, Andreas Dengel, a professor from German Research Center for Artificial Intelligence (DFKI), will enable us to consider the past, the current and the future of our ICDAR community, by his talk on mining our community publications. Finally, Xiang Bai, a professor at Huazhong University of Science and Technology, will provide his insights on deep neural networks applied to scene text analysis.

Through the technical program, you will have 52 oral presentations and 160 poster presentations over three days. The conference will host traditional and new workshops and tutorials on various topics aimed at the focused study of cutting-edge problems in our field, and researchers will have the opportunity to learn new algorithms as well as results of numerous competitions that are driving interest in

the community. This year's special attempt is to start an open workshop on the future of document analysis and recognition. In contrast to other workshops, which report what researchers have done, this workshop is only to discuss the future of our research field. We plan to have a short summary presentation at the banquet and more detailed presentation and discussion at the panel on the last day of the conference. We hope that this conference will provide a forum for generating new insights within the field of document analysis.

A large conference like ICDAR depends almost exclusively on the team of volunteers who work tirelessly on the program, infrastructure, and facilities. We would first like to thank the program co-chairs, Daniel Lopresti, C.V. Jawahar, Dimosthenis Karatzas who have worked to put together a first-class technical program. We would also like to thank the chairs of the workshops, tutorials, competitions, doctoral consortium, and publicity for their help and support. We gratefully acknowledge the financial support of our sponsors which helps to reduce costs and provide various awards including student travel awards. We would like to thank our team of organizers, in particular, Andreas Dengel and Hisashi Ikeda for their work as sponsorship chairs, Wataru Ohyama and Kengo Terasawa as publication chairs, Motoi Iwata and Olivier Augereau for local arrangement chairs, Tomo Miyazaki as the web master, and Aya Onishi and Yasuka Watanabe for their secretariat responsibilities. Finally, we would like to express our deep appreciation for valuable guidance from our honorary chairs, Prof. Kazuhiko Yamamoto and Prof. Masaki Nakagawa.

We hope that you enjoy the conference, the city and foods, as well as stimulating communication with your colleagues.

Koichi Kise, Shinichiro Omachi, Seiichi Uchida, and Masakazu Iwamura

General and Executive Chairs, ICDAR 2017

Welcome Message from Technical Program Chairs

We are very pleased to present the technical program for the 14th IAPR International Conference on Document Analysis and Recognition. In this edition of ICDAR, we received 409 full-paper submissions from 43 countries across 5 continents: Africa (3 countries / 23 papers), Americas (3 countries / 48 papers), Asia (20 countries / 192 papers), Australia (1 country / 5 papers), and Europe (16 countries / 141 papers).

This edition of the conference introduced some changes in the reviewing process with the goal of enhancing the overall technical quality. For the first time in the ICDAR series, we introduced double blind reviewing. Reviewers and Area Chairs did not have access to the author information while making their recommendations. We are happy to observe that the community responded well to this change aimed at reducing potential bias in the reviewing process.

The concept of Area Chairs was introduced in ICDAR 2015. In the 2017 edition, Area Chairs were not associated with a single thematic area. Rather, they had expertize overlapping in multiple subareas of ICDAR. We employed 23 Area Chairs covering the broad topics of interest to the ICDAR community. Each submission was managed by an Area Chair and reviewed by three reviewers. The program committee was composed of 23 Area Chairs and 226 PC members from 32 countries, while 123 more sub-reviewers were called upon during the review process. A total of 1,243 reviews were received. Authors had a chance to respond to factual errors in the reviews through a rebuttal process. The Area Chairs stimulated and mediated the discussion between reviewers during the rebuttal phase, before producing a meta-review for each of the papers assigned to them.

The assignment of submitted papers to reviewers took place in two stages. In the first stage, the three Program Chairs assigned papers to the Area Chairs based on their expertise as measured by the relevance of their own work. Relevance scores were computed based on a variant of the Toronto system by automatically analysing their recent publications. We thank Professor Bill Triggs for helping us with this. Papers co-authored by Area Chairs were handled by another, different Area Chair. In the next stage, Area Chairs recommended a ranked list of reviewers from the pool of Program Committee members. This was made easier by providing the relevance scores. Final assignment was done based on Area Chair recommendations, conflicts, relevance, and the review load per person. The

average load per area chair was 18 papers and the average review load per PC member was 5 papers.

To suite the new review process, the program committee was expanded to be more inclusive and diverse, reflecting the range of researchers who have been contributing to ICDAR over recent years. The program committee of ICDAR used to have a more executive role, with each PC member being responsible for generating reviews for a large number of papers. With the changes introduced in ICDAR 2017 we are moving towards a structure with a small number of area chairs coupled with an enlarged list of reviewers, each of which had to perform a limited number of reviews.

Taking into account the recommendations of the Area Chairs, we selected 52 papers for oral presentation and 160 papers for poster presentation, while 197 papers were rejected. This translates to an overall acceptance rate of 51.8% (an oral acceptance rate of 12.7%, and a poster acceptance rate of 39.1%).

The number of oral tracks of the conference has been reduced from three to two, focusing on a smaller number of high quality oral presentations. The program of the conference comprises 12 oral sessions of 4 or 5 papers per session, and 3 poster sessions.

Given the lower acceptance rate compared to previous editions of the conference, the main conference notification and workshop submission dates were coordinated to provide more opportunities to authors to have a paper in a satellite event of the conference.

In this edition of ICDAR, we will be re-introducing "outstanding reviewer" awards (implemented once in 2013) to acknowledge those who performed their tasks exceptionally well.

We would like to take this opportunity to thank all the reviewers for their tremendous effort in producing careful reviews for our submissions. A special thanks should go to the Area Chairs - their deep involvement in the process, and their insightful comments, have enabled us to manage a complex reviewing process and improve both the quality of the feedback given to authors, as well as the overall technical quality of the conference itself.

Daniel Lopresti, C.V. Jawahar, Dimosthenis Karatzas

ICDAR 2017 Technical Program Chairs

Organizers

Honorary Chairs
Prof. Kazuhiko Yamamoto
Gifu University, Japan
Prof. Masaki Nakagawa
Tokyo University of Agriculture and Technology, Japan

General Chair
Koichi Kise
Osaka Prefecture University, Japan

Executive Co-Chairs
Shinichiro Omachi
Tohoku University, Japan
Seiichi Uchida
Kyushu University, Japan
Masakazu Iwamura
Osaka Prefecture University, Japan

Program Committee Chairs
C.V. Jawahar
IIIT Hyderabad, India
Daniel Lopresti
Lehigh University, USA
Dimothenis Karatzas
Computer Vision Center, Spain

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

Competition Chair
Jean-Marc Ogier
University of La Rochelle, France
Marcus Liwicki
University of Kaiserslautern, Germany &
University of Fribourg, Switzerland

Tutorial Chairs
Simone Marinai
University of Florence, Italy
Josep Llados
Computer Vision Center, Spain

Publication Chairs
Wataru Ohyama
Mie University, Japan
Kengo Terasawa
Future University Hakodate, Japan

Publicity Chairs
David Doermann
DARPA, USA
Cheng-Lin Liu
Chinese Academy of Sciences, China
Gernot Fink
TU Dortmund University, Germany
Tomo Miyazaki
Tohoku University, Japan

Sponsorship Chairs
Andreas Dengel
DFKI, Germany
Hisashi Ikeda
Hitachi, Japan

Finance Chair
Masakazu Iwamura
Osaka Prefecture University, Japan

Doctoral Consortium Chairs
Véronique Eglin
INSA, France
Rafael Dueire Lins
Federal University de Pernambuco, Brasil

Local Arrangement Chairs
Motoi Iwata
Osaka Prefecture University, Japan
Olivier Augereau
Osaka Prefecture University, Japan

Registration Desk

Nov. 9   8:30-18:00 AV Study Room
Nov. 10 8:30-18:00 Seminar Room #1
Nov. 11 8:30-18:00 Seminar Room #1
Nov. 12 8:30-17:30 Seminar Room #1
         18:30-20:00 Entrance of Terrsa Hall
Nov. 13 8:30-18:00 Entrance of Terrsa Hall
Nov. 14 8:30-18:00 Entrance of Terrsa Hall
Nov. 15 8:30-18:00 Entrance of Terrsa Hall

We are sorry but we cannot keep your luggage at registration desk. Instead, we have prepared a luggage space around the entrance of Kyoto Terrsa. You may put your luggage there at your own risk.

Instructions for presenters

Oral Presentations

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. All presenters should be in the conference room and must report to the session chair no later than 5 minutes before the start of the session.

A public laptop 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. If you have hardware questions about the conference room facilities or you have special needs (e.g., audio playback, a live Internet connection, etc.), please contact the Local Arrangements team at: *icdar2017-local@m.cs.osakafu-u.ac.jp*.

Poster Presentations

As we have a large, dedicated room for the posters, all posters can remain on display for all days of the conference. You should plan to mount your poster on the first day of ICDAR (Monday, November 13), sometime before the start of the first poster session which begins at 15:40. Push pins will be available for mounting posters.

Posters should be A0 size, printed in portrait mode. 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 web-site.

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.

Wi-Fi

Free Internet Wi-Fi will be available throughout the conference.
SSID: icdar2017
Password: document

Coffee Break

Coffees will be served at the coffee-serving tables at the back of session room or at the front of Terrsa Hall.

Lunch map

For your convenience, we will prepare lunch map around the conference venue. We will distribute it at Registration desk.

Smoking Policy

Smoking is not allowed inside the building and in all public places.

ICDAR2017 Pre-Events

GREC
MANPU
HIP
OST
WML
CBDAR
MOCR
HDI
IWCDF
DC
Tutorial
Sp. WS

GREC: 12th International Workshop on Graphics Recognition
Organizers: Alicia Fornés and Bart Lamiroy
Location: AV Study Room (East building, 2nd Floor)

Thursday, November 9

9:00 **Welcome**

Alicia Fornés & Bart Lamiroy

9:15 **Session 1: Interpretation of engineering drawings, maps, charts, etc.**

Session Chairs: Christophe Rigaud & Richard Zanibbi

Extraction of ancient maps content by using trees of connected components

Jordan Drapeau, Thierry Géraud, Mickaël Coustaty, Joseph Chazalon, Jean-Christophe Burie, Véronique Eglin, Stephane Bres

Automatic Elevation Datum Detection and Hyperlinking of Architecture, Engineering & Construction Documents

Purnendu Banerjee, Supriya Das, Bhagesh Seraogi, Bidyut Chaudhuri, Himadri Majumdar, Srinivas Mukkamala, Rahul Roy

Extracting interactions from molecular pathways

Antonio Foncubierta-Rodriguez, Anca-Nicoleta Ciubotaru, Costas Bekas, Maria Gabrani

Floor Plan Generation and Auto Completion Based on Recurrent Neural Networks

Johannes Bayer, Saqib Bukhari, Andreas Dengel

10:40 **Coffee Break**

11:00 **Session 2: Symbol Recognition and Spotting**

Session Chairs: Eric Anquetil & Muzzamil Luqman

Learning structural loss parameters on graph embedding applied on symbolic graphs

Hana Jarraya, Oriol Ramos-Terrades, Josep Lladós

Automated Analysis of Phase Diagram

Bhargava Urala Kota, Nair Rathin Radhakrishnan, Srirangaraj Setlur, Scott Broderick, Krishna Rajan, Venugopal Govindaraju

Shallow Neural Network Model for Hand-drawn Symbol Recognition in Multi-Writer Scenario

Sounak Dey, Anjan Dutta, Josep Lladós, Alicia Fornés, Umapada Pal

Graph-based deep learning for graphics classification

Pau Riba, Anjan Dutta, Josep Lladós, Alicia Fornés

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Bringing back Hieroglyph

Sounak Dey, Anjan Dutta, Josep Lladós, Umapada Pal

12:30   **Lunch**

14:00   **IAPR Invited Speaker: Prof. Ichiro Fujinaga**

       A Retrospective on Optical Music Recognition Research

       Chair: TBD

14:45   **Session 3: Optical Music Recognition**

       Session Chair: Nina Hirata & Josep Lladós

       On the Potential of Fully Convolutional Neural Networks for Musical Symbol Detection

       Matthias Dorfer, Jan Hajič, Gerhard Widmer

       Towards a Universal Music Symbol Classifier

       Alexander Pacha, Horst Eidenberger

       Bootstrapping Samples of Accidentals in Dense Piano Scores for CNN-Based Detection

       Kwon-Young Choi, Bertrand Coüasnon, Richard Zanibbi, Yann Ricquebourg

       Optical Music Recognition by Recurrent Neural Networks

       Arnau Baró, Pau Riba, Jorge Calvo Zaragoza, Alicia Fornés

       Pen-based Music Document Transcription

       Javier Sober-Mira, Jorge Calvo Zaragoza, David Rizo, Jose Manuel Inesta

16:20   **Coffee Break**

16:40   **Contest: Engineering Drawing Challenge II**

       Bart Lamiroy

17:00   **Discussion Groups**

       Alicia Fornés & Bart Lamiroy

17:45   **End of Day 1**

Friday, November 10

9:00   **Session 4: Interpretation of drawings, music scores, tables, etc.**

       Session Chairs: Mickaël Coustaty & Véronique Eglin

       Music Document Layout Analysis through Machine Learning and Human Feedback

       Jorge Calvo Zaragoza, Ke Zhang, Zeyad Saleh, Gabriel Vigliensoni, Ichiro Fujinaga

       Camera-based Optical Music Recognition using a Convolutional Neural Network

       Adrià Rico, Alicia Fornés

Automatic Orientation Correction of AEC Drawing Documents

Bhagesh Seraogi, Supriya Das, Purnendu Banerjee, Bidyut Chaudhuri, Himadri Majumdar, Srinivas Mukkamala, Rahul Roy

Interpreting data from scanned tables

Waleed Farrukh, Antonio Foncubierta-Rodriguez, Anca-Nicoleta Ciubotaru, Guillaume Jaume, Costas Bekas, Orcun Goksel, Maria Gabrani

10:25   **Coffee Break**

10:45   **Session 5: Raster to Vector and drawings**

Session Chairs: Jorge Calvo & Wataru Ohyama

Approximate Fitting a Circular Arc When Two Points Are Known

Alexander Gribov

A Novel Approach for Detecting Circular Callouts in AEC Drawing Documents

Sandip Maity, Bidyut Chaudhuri, Bhagesh Seraogi, Purnendu Banerjee, Supriya Das, Himadri Majumdar, Srinivas Mukkamala, Rahul Roy

An Efficient Combinatorial Algorithm for Optimal Compression of a Polyline with Segments and Arcs

Alexander Gribov

Extracting the ground level enhancement event of February 1956 from legacy cosmic ray recordings

Vincent Mattana, Gunther Drevin, Du Toit Strauss

Searching for a Compressed Polyline with a Minimum Number of Vertices

Alexander Gribov

12:20   **Lunch**

14:00   **Session 6: Performance Evaluation and Interpretation**

Session Chairs: Syed Saqib Bukhari & Gunther Drevin

Groundtruthing (not only) Music Notation with MUSCIMarker: a Practical Overview

Jan Hajič

Pixel.js: Web-based Pixel Classification Correction Platform for Ground Truth Creation

Zeyad Saleh, Ke Zhang, Jorge Calvo Zaragoza, Gabriel Vigliensoni, Ichiro Fujinaga

Document embedded images classification

Matheus Viana, Quoc-Bao Nguyen, John Smith, Maria Gabrani

How to Exploit Music Notation Syntax for OMR?

Jan Hajič

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15:25   **Coffee Break**

15:45   **Summary of Discussion Groups and Closing**

17:00   **End of Day 2**

MANPU Workshop (November 10)

MANPU: 2nd International Workshop on coMics Analysis, Processing and Understanding

Organizers: Jean-Christophe Burie, Toshihiko Yamasaki and Motoi Iwata

Location: Morning: Seminar Room #2 (East building, 2nd Floor)

 Afternoon: Kyoto International Manga Museum

 Location on Google map: https://goo.gl/maps/J3kDSiza5wD2

9:40   **Opening**

9:50   **Oral Session 1**

 Accessible Comics for Visually Impaired People: Challenges and Opportunities

 Frédéric Rayar

 The Graphic Narrative Corpus (GNC): Design, Annotation, and Analysis for the Digital Humanities

 Alexander Dunst, Rita Hartel, Jochen Laubrock

 Using Posters to Recommend Anime and Mangas in a Cold-Start Scenario

 Jill-Jênn Vie, Florian Yger, Ryan Lahfa, Basile Clement, Kévin Cocchi, Thomas Chalumeau, Hisashi Kashima

10:50   **Coffee Break**

11:00   **Oral Session 2**

 Segmentation-Free Speech Text Recognition for Comic Books

 Christophe Rigaud, Jean-Christophe Burie, Jean-Marc Ogier

 Into the Colorful World of Webtoons: Through the Lens of Neural Networks

 Ceyda Cinarel, Byoung-Tak Zhang

 Comic Characters Detection Using Deep Learning

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

12:00   **Lunch**

13:30   **Invited Talk 1**

 Introduction to Manga Box: Manga App Business and Engineering

 Daiki Suzuki

14:20   **Break**

14:30   **Invited Talk 2**

 Reality Impedance Matching: a method to bridge real and virtual worlds

 Sohei Wakisaka

MANPU Workshop (November 10)

15:30   **Poster Session (short presentations)**

15:50   **Poster Session**

       Sketch-Based Manga Retrieval Using Deep Features

       Rei Narita, Koki Tsubota, Toshihiko Yamasaki, Kiyoharu Aizawa

       An Overview of Comics Research in Computer Science

       Olivier Augereau, Motoi Iwata, Koichi Kise

       Comic Story Analysis Based on Genre Classification

       Yuki Daiku, Olivier Augereau, Motoi Iwata, Koichi Kise

       Histogram of Exclamation Marks and Its Application for Comics Analysis

       Sotaro Hiroe, Seiji Hotta

       cGAN-Based Manga Colorization Using a Single Training Image

       Paulina Hensman, Kiyoharu Aizawa

       Story Pattern Analysis Based on Scene Order Information in Four-Scene Comics

       Miki Ueno, Hitoshi Isahara

17:00   **Closing**

HIP Workshop (November 10-11)

HIP: 4th International Workshop on Historical Document Imaging and Processing
Organizers: Andreas Fischer, Angelika Garz, Kengo Terasawa and Bill Barrett
Location: 1st day: Medium Conference Room (East building, 2nd Floor)
            2nd day: Ritsumeikan University Art Research Center

Friday, November 10

9:00   **Opening**

Session 1: Character Datasets and Text Retrieval

9:15   **A New Khmer Palm Leaf Manuscript Dataset for Document Analysis and Recognition – SleukRith Set**

Dona Valy, Michel Verleysen, Sophea Chhun and Jean-Christophe Burie

9:35   **Isolated Character Forms from Dated Syriac Manuscripts**

Nicholas Howe, Minyue Dai and Michael Penn

9:55   **Towards Letter Shape Prior and Paleographic Tables Estimation in Hebrew First Temple Period Ostraca**

Arie Shaus and Eli Turkel

10:15   **Text Retrieval for Japanese Historical Documents by Image Generation**

Chisato Sugawara, Tomo Miyazaki, Yoshihiro Sugaya and Shinichiro Omachi

10:35   **A Handwritten French Dataset for Word Spotting – CFRAMUZ**

Nikolaos Arvanitopoulos, Gaspard Chevassus, Daniele Maggetti and Sabine Süsstrunk

10:55   **Coffee Break**

Session 2: Character Recognition

11:15   **Attempts to recognize anomalously deformed Kana in Japanese historical documents**

Hung Tuan Nguyen, Nam Tuan Ly, Kha Cong Nguyen, Cuong Tuan Nguyen and Masaki Nakagawa

11:35   **Tens of Thousands of Nom Character Recognition by Deep Convolution Neural Networks**

Kha Cong Nguyen, Cuong Tuan Nguyen and Masaki Nakagawa

11:55   **Convolutional Neural Network with Attention Mechanism for Historical Chinese Character Recognition**

Haoyu Qin and Liangrui Peng

12:15   **Training LSTM-RNN with Imperfect Transcription - Limitations and Outcomes**

Martin Jenckel, Syed Saqib Bukhari and Andreas Dengel

12:35   **Methods of data augmentation for palimpsest character recognition with Deep Neural Network**

Anna Starynska, Roger L. Jr. Easton and David Messinger

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12:55   **Lunch Break**

Session 3: Layout Analysis and Complete Workflows

14:30   **PageNet: Page Boundary Extraction in Historical Handwritten Documents**

          Christopher Tensmeyer, Brian Davis, Curtis Wigington, Iain Lee and Bill Barrett

14:50   **Mass Digitization of Archival Documents using Mobile Phones**

          Florian Kleber, Markus Diem, Fabian Hollaus and Stefan Fiel

15:10   **Robust Heartbeat-based Line Segmentation Methods for Regular Texts and Paratextual Elements**

          Mathias Seuret, Daniel Stökl Ben Ezra and Marcus Liwicki

15:30   **Deep Convolutional Neural Networks for Image Resolution Detection**

          Felix Trier, Muhammad Zeshan Afzal, Markus Ebbecke and Marcus Liwicki

15:50   **Creating a Complete Workflow for Digitising Historical Census Documents: Considerations and Evaluation**

          Christian Clausner, Justin Hayes, Apostolos Antonacopoulos and Stefan Pletschacher

16:10   **Coffee Break**

Session 4: Binarization and Page Segmentation

16:30   **Automatic Document Image Binarization using Bayesian Optimization**

          Ekta Vats, Anders Hast and Prashant Singh

16:50   **Historical Document Image Segmentation with LDA-Initialized Deep Neural Networks**

          Michele Alberti, Mathias Seuret, Vinaychandran Pondenkandath, Rolf Ingold and Marcus Liwicki

17:10   **Document Image Page Segmentation and Character Recognition as Semantic Segmentation**

          Seth Stewart and Bill Barrett

17:30   **HBA 1.0: A Pixel-based Annotated Dataset for Historical Book Analysis**

          Maroua Mehri, Pierre Héroux, Rémy Mullot, Jean-Philippe Moreux, Bertrand Coüasnon and Bill Barrett

17:50   **ICDAR 2017 HBA Competition**

18:00   **IAPR Best Paper Award and Closing**

Saturday, November 11

13:00   Departure from Kyoto Terrsa

          Visit of the Ritsumeikan University Art Research Center

          Visit of the Kyoto Institute, Library and Archives

17:30   Return to Kyoto Terrsa

ICDAR-OST Workshop (November 10-11)

ICDAR-OST: 1st International Workshop on Open Services and Tools for Document Analysis
Organizers: Marcel Würsch and Joseph Chazalon
Location: Seminar Room #3 (East building, 2nd Floor)

Friday, November 10

9:00	**Welcome notes**

9:15 – 10:30	**1st interactive pitch & demo session**
published paper	**PyStruct Extension for Typed CRF Graphs**
	Jean-Luc Meunier.
published paper	**Massive, free and reproducible grountruthed document image databases generation with DocCreator**
	Nicholas Journet, Boris Mansencal and Muriel Visani.
published paper	**A Comparative Study of Margin Noise Removal Algorithms on MarNR: A Margin Noise Dataset of Document Images**
	Soumyadeep Dey, Jayanta Mukhopadhyay, Shamik Sural and Barsha Mitra.
published paper	**Open Evaluation Tool for Layout Analysis of Document Images**
	Michele Alberti, Manuel Bouillon and Rolf Ingold.
short paper	**DMOS, It's your turn!**
	Bertrand Coüasnons and Aurélie Lemaitre.

10:30 – 10:50	**Coffee break and informal discussions (+ slack)**

11:00 – 12:15	**2nd interactive pitch & demo session**
published paper	**Transkribus - a Platform for Transcription, Recognition and Retrieval of Document Images**
	Philip Kahle, Sebastian Colutto, Günter Hackl and Günter Mühlberger.
published paper	**A Framework for Document Specific Error Detection and Corrections in Indic OCR**
	Rohit Saluja, Devaraj Adiga, Ganesh Ramakrishnan, Parag Chaudhuri and Mark Carman.
published paper	**SmartDoc 2017 Video Capture: Mobile Document Acquisition in Video Mode**
	Joseph Chazalon, Petra Gomez-Krämer, Jean-Christophe Burie, Mickaël Coustaty, Sébastien Eskenazi, Muzzamil Luqman, Nibal Nayef, Marçal Rusiñol, Nicolas Sidère and Jean-Marc Ogier.
short paper	**The Robust Reading Competition Annotation and Evaluation Platform**
	Dimosthenis Karatzas, Lluis Gómez, and Marçal Rusiñol.

12:30 – 13:30	**Lunch break**

13:30 – 14:15	<u>**Keynote**</u> **(+ slack)**

14:45 – 16:00	<u>**3rd interactive pitch & demo session**</u>
published paper	**Transkribus Python Toolkit**
	Jean-Luc Meunier and Hervé Déjean.
published paper	**Turning Document Image Analysis Methods into Web Services – An Example Using OCRopus**
	Marcel Würsch, Fotini Simistira, Rolf Ingold and Marcus Liwicki.
published paper	**DAE-NG: a Shareable and Open Document Image Annotation Data Framework**
	Bart Lamiroy.
short paper	**PiFF: a Pivot File Format**
	Harold Mouchère, Christopher Kermorvant, Andres Rojas, Mickaël Coustaty, Joseph Chazalon, and Bertrand Coüasnon.

16:00 – 16:20	**Coffee break and informal discussions (+ slack)**

16:30 – 17:15	**1st group discussion session (+ slack for intro)**
17:30 – 18:15	**2nd group discussion session**
18:15 – 18:45	**Plenary Conclusions**

Saturday, November 11

9:00	**Heads up: global directions, teams and goals**
9:15 – 12:15	**✄ Hack hack hack hack ✄**
	(coffee break: 10:30-11:00)
12:30 - 13:30	**Lunch break, inter-team discussions**
13:30 - 17:30	**✄ Hack hack hack hack ✄**
	(Coffee break: 16:00-16:30)
17:30	**Hackathon close end: participant prepare presentations**
18:30	**Public demos and final words**

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ICDAR-WML Workshop (November 11)

ICDAR-WML: Workshop on Machine Learning
Organizers: Umapada Pal and Eric Granger
Location: Medium Conference Room (East building, 2nd Floor)

9:30 – 9:45   **Inauguration**

9:45 – 10:30   <u>**Keynote talk**</u>

      Frontiers of Vision and Language: Bridging Images and Texts by Deep Learning

      Prof. Yoshitaka Ushiku, The University of Tokyo, Japan

10:30 – 11:30   <u>**WML-Session -1**</u>

      Handwritten text line segmentation using Fully Convolutional Network

      Guillaume Renton, Clément Chatelain, Sébastien Adam, Christopher Kermorvant and Thierry Paquet

      Multilevel Context Representation for Improving Object Recognition

      Andreas Kölsch, Muhammad Zeshan Afzal and Marcus Liwicki

      Semantic Text Encoding for Text Classification using Convolutional Neural Networks

      Ignazio Gallo, Shah Nawaz and Alessandro Calefati

11:30 – 12:00   **Tea/Coffee break**

12:00 – 13:00   <u>**WML-Session -2**</u>

      Combination of ResNet and Center Loss Based Metric Learning for Handwritten Chinese Character Recognition

      Ruyu Zhang, Qingqing Wang and Yue Lu

      Exploiting State-of-the-Art Deep Learning Methods for Document Image Analysis

      Vinaychandran Pondenkandath, Mathias Seuret, Rolf Ingold, Muhammad Zeshan Afzal and Marcus Liwicki

      Multimodal Classification Fusion in Real-World Scenarios

      Ignazio Gallo, Alessandro Calefati and Shah Nawaz

13:00 – 14:30   **Lunch**

14:30 – 15:00   <u>**Invited talk**</u>

      ML for DAR, DAR for ML --- How machine learning and document analysis and recognition benefit each other

      Prof. Seiichi Uchida, Kyushu University, Japan

15:00 – 16:00   **<u>WML-Session -3</u>**

        Orthographic Properties Based Telugu Text Recognition Using Hidden Markov Models

        Devarapalli Koteswara Rao and Atul Negi

        Neural Font Style Transfer

        Gantugs Atarsaikhan, Brian Kenji Iwana, Atsushi Narusawa, Keiji Yanai and Seiichi Uchida

        New Word Pair Level Embeddings to Improve Word Pair Similarity

        Asma Shaukat and Nazar Khan

16:00 – 16:30   **Tea/Coffee break**

16:30 – 17:30   **<u>WML-Session -4</u>**

        Text Independent Writer Identification for Telugu Script using Directional Filter based Features

        Chris Andrew, Santhoshini Reddy, Viswanath Pulabaigari and Umapada Pal

        A novel feature ranking criterion for supervised interval valued feature selection for classification

        Vinay Kumar N and Guru D S

        Machine Learning vs Deterministic Rule-Based System for Document Stream Segmentation

        Ahmed Hamdi, Joris Voerman, Mickaël Coustaty, Aurelie Joseph, Vincent Poulain d'Andecy and Jean-Marc Ogier

17:30 – 17:45   **Closing session**

WML

CBDAR Workshop (November 11)

CBDAR: 7th International Workshop on Camera-Based Document Analysis and Recognition
Organizers: Lluis Gomez-Bigorda, Muhammad Muzzamil Luqman and Dimosthenis Karatzas
Location: AV Study Room (East building, 2nd Floor)

9:00   **Welcome**

9:10   **<u>Keynote Talk 1</u>**
        Making Scene Text Useful for Mobile Recognition.
        R. Manmatha.

10:00   **<u>Oral session 1: Camera Based Document Analysis 1</u>**
        Guiding text image keypoints extraction through layout analysis.
        E. Royer and F. Bouchara.
        Information Extraction from Hand-marked Industrial Inspection Sheets.
        G. Gupta, S. Jindal, M. Sharma and L. Vig.

10:40   **Coffee Break**

11:10   **<u>Oral session 2: Camera-Based Document Analysis 2</u>**
        Click-Free, Video-Based Document Capture -- Methodology and Evaluation.
        W. Tariq and N. Khan.
        Smart IDReader: Document Recognition in Video Stream.
        K. Bulatov, V. Arlazarov, T. Chernov, O. Slavin and D. Nikolaev.
        Binarizing Document Images Acquired with Portable Cameras.
        R. Lins, R. Bernardino, D. M. de Jesus and J. M. Oliveira.
        Robust perspective rectification of camera-captured document images.
        Y. Takezawa, M. Hasegawa and S. Tabbone.

12:30   **Lunch**

14:30   **<u>Keynote Talk 2</u>**
        Considerations in Chinese Scene Text Detection and Recognition.
        Cheng-Lin Liu.

15:20   **<u>Oral Session 3: Scene Text Understanding</u>**
        Text Detection by Faster R-CNN with Multiple Region Proposal Network.
        Y. Nagaoka, T. Miyazaki, Y. Sugaya and S. Omachi.
        Feature Pyramid Based Scene Text Detector.
        M. En, R. Li and J. Li.

16:00   **Coffee Break**

        <u>Special session: ICDAR2017 Robust Reading Competitions</u>
16:30   **Robust Reading Competitions (RRC) presentations**
17:30   **RRC participant methods' spotlights**
18:00   **RRC Scientific Report**
18:30   **Discussion Panel**

MOCR Workshop (November 11)

MOCR: 6th International Workshop on Multilingual OCR
Organizers: Venu Govindaraju, Prem Natarajan, Santanu Chaudhury and Srirangaraj Setlur
Location: Seminar Room #2 (East building, 2nd Floor)

9:15 – 9:30   **Welcome Remarks**

9:30 – 10:30   <u>**Keynote 1:**</u>

Is Deep Learning a Boon for OCRs for Low Resource Indian Languages?

Professor C.V. Jawahar, International Institute of Information Technology, Hyderabad, India

10:30 – 11:00   **Coffee Break**

<u>**Oral Session 1**</u>

11:00 – 11:20   **Deep Convolutional Recurrent Network for Segmentation-free Offline Handwritten Japanese Text Recognition**

Nam Tuan Ly, Cuong Tuan Nguyen, Cong Kha Nguyen and Masaki Nakagawa

11:20 – 11:40   **DeepKHATT: A Deep Learning Benchmark on Arabic Script**

Riaz Ahmad, Saeeda Naz, M. Zeshan Afzal, S. Faisal Rashid, Marcus Liwicki and Andreas Dengel

11:40 – 12:00   **Detection and Recognition of Arabic Text in Video Frames**

Wataru Ohyama, Seiya Iwata, Tetsushi Wakabayashi and Fumitaka Kimura

12:00 – 12:20   **The Impact of Visual Similarities of Arabic-like scripts in Terms of Learning in an OCR System**

Riaz Ahmad, Saeeda Naz, M. Zeeshan Afzal, Shiekh Faisal Rashid, Markus Liwicki and Andreas Dengel

12:20 – 14:30   **Lunch**

<u>**Oral Session 2**</u>

14:30 – 14:50   **Implicit Language Model in LSTM for OCR**

Ekraam Sabir, Stephen Rawls and Prem Natarajan

14:50 – 15:10   **An Empirical Study of Effectiveness of Post-processing in Indic Scripts**

V S Vinitha, C V Jawahar and Minesh Mathew

15:10 – 15:30   **Improving Classical OCRs for Brahmic Scripts using Script Grammar Learning**

Dipankar Ganguly, Sumeet Agarwal and Santanu Chaudhury

15:30 – 15:50   **Benchmarking Scene Text Recognition in Devanagari, Telugu and Malayalam**

Minesh Mathew, Mohit Jain and C V Jawahar

15:50 – 16:20   **Coffee Break**

16:20 – 16:40   **Demos**

16:40 – 16:45   **Closing Remarks**

HDI Workshop (November ~~11~~ **12**)

HDI: 1st International Workshop on Human-Document Interaction
Organizers: Jean-Christophe Burie, Mickaël Coustaty, Dimosthenis Karatzas and Koichi Kise
Location: Medium Conference Room (East building, 2nd Floor)

9:00   **Welcome**

9:10   <u>**Oral Session 1**</u>

Human-Assisted Signature Recognition Based on Comparative Attributes

Derlin Morocho, Aythami Morales, Julian Fierrez, Ruben Vera-Rodriguez

On-the-fly Historical Handwritten Text Annotation

Ekta Vats, Anders Hast

Exploring Old Maps by Finger Tracing of Characters

Yuichi Watanabe, Kengo Terasawa, Yasuyuki Sumi

Landscape or Portrait? The Impact of Page Orientation on the Understandability of Scientific Posters

Marc Beck, Seyyed Saleh Mozaffari Chanijani, Syed Saqib Bukhari, Andreas Dengel

10:30   **Coffee Break**

11:00   <u>**Oral Session 2**</u>

Using the Eye Gaze to Predict Document Reading Subjective Understanding

Charles Lima Sanches, Olivier Augereau, Koichi Kise

Cognitive State Measurement on Learning Materials by Utilizing Eye Tracker and Thermal Camera

Shoya Ishimaru, Soumy Jacob, Apurba Roy, Syed Saqib Bukhari, Carina Heisel, Nicolas Großmann, Michael Thees, Jochen Kuhn, Andreas Dengel

11:40   **Panel Discussion**

IWCDF Workshop (November 12)

IWCDF: 1st International Workshop on Computational Document Forensics
Organizers: Jean-Marc Ogier, Utpal Garain and Apostolos Antonacopoulos
Location: AV Study Room (East building, 2nd Floor)

9:00   <u>**Keynote**</u>
       Securing hybrid documents by document image analysis
       Petra Gomez-Krämer, University of La Rochelle, France

9:45   <u>**1st Oral Session:**</u> *10 min/presentation*
       E-Counterfeit: A Mobile-Server Platform for Document Counterfeit Detection
       Albert Berenguel Centeno, Oriol Ramos Terrades, Josep Lladós i Canet, Cristina Cañero Morales
       A Spatial Domain Steganography for Grayscale Documents Using Pattern Recognition Techniques
       Vinh Loc Cu, Jean-Christophe Burie and Jean-Marc Ogier
       A Case Study of the Relationship between Local Pen Action and Three Dimensional Shapes of Handwritten Strokes
       Yoshinori Akao, Yoshiyasu Higashikawa
       Round Table, Questions

10:30   **Coffee Break**

11:00   <u>**2nd Oral Session:**</u> *10 min/presentation*
       Study of the Factors Influencing OCR Stability for Hybrid Security
       Sébastien Eskenazi, Petra Gomez-Krämer, Jean-Marc Ogier
       Robustness of Character Recognition Techniques to Double Print-and-Scan Process
       Iuliia Tkachenko, Petra Gomez-Krämer
       Round Table, Questions

11:30   <u>**Open discussion: Dataset and Reproducibility**</u>
       Introduced by
       Receipt Dataset for Fraud Detection
       Chloé Artaud, Antoine Doucet, Jean-Marc Ogier and Vincent Poulain d'Andecy

11:50   <u>**Senior panel discussions :**</u>
       Andreas Dengel, DFKI, Germany
       Chang-Tsun Li, Charles Sturt University, Australia
       Jean-Marc Ogier, University of La Rochelle, France
       Josep Llados, CVC, Spain
       Vincent Poulain d'Andecy, Yooz, France

HDI

IWCDF

Doctoral Consortium (November 12, A.M.)

ICDAR2017 Doctoral Consortium
Chairs: Véronique Eglin and Rafael Dueire Lins
Location: Large Conference Room (East building, 3rd Floor)

Program:
  9:00 - 9:15   Opening / Introduction of DC
  9:15 - 10:30 Brief presentation of the projects from tutees and mentors
10:30 - 11:00 Coffee Break and Setting-up of Posters
11:00 - 11:30 Talk given by Dan Lopresti: "How to succeed in your Ph.D. degree"
11:30 - 13:00 Poster session
13:00 - 13:10 Concluding remarks and Best Poster Award

List of accepted PhD Students and title of the work:
Chandranath Adak. Automated Handwriting Analysis on Unconventional Documents

Paul Maergner. Graph-based Signature Verification

Momina Moetesum. Deformation Estimation and Classification of Graphomotor Impressions-An Application to Neuropsychological Assessments

Héloïse Alhéritière. Securisation of hybrid documents by content-based physical analysis

Michele Alberti. Understanding Deep Neural Networks Learning Behaviour

Daniel Wilson-Nunn. A Path Signature Approach to Online and Offline Arabic Handwriting Recognition

Florian Westphal. Efficient Processing of Large Document Image Repositories

Rohit Saluja. Indic OCR with Font and Layout Preservation

Ahmed Sabir. Enhancing Text Spotting with Visual Context Information

Thi Tuyet Hai Nguyen. Multilingual OCR correction for ancient books: Looking at multiple documents to fix multiple words

Made Windu Antara Kesiman. Document Image Analysis of Balinese Palm Leaf Manuscripts

Jianshu Zhang. Deep Learning Based Approach to Handwritten Mathematical Expression Recognition

Minghui Liao. Phd Research Work of Scene Text Detection

Pau Riba. Graph-based representations for Document Analysis

Hussein Mohammed. Computational Analysis of Writing Style in Digital Manuscripts

Albert Berenguel Centeno. Document counterfeit detection through background texture printing analysis

Bastien Moysset. Detection and localization of text lines in heterogeneous document images with deep neural networks

Amir Ghodrati. Grouping and Recognition of Digital Ink Diagrams

Alexander Pacha. Optical Music Recognition with Deep Learning

Axel Jean-Caurant. Analysis of heterogeneous documents and user behavior to improve accessibility

Martin Schall. Segmentation-free multi-line offline handwriting recognition using LSTM networks

Divya Sharma. Content Based Architectural Floor Plan Retrieval

Doctoral Consortium (November 12, A.M.)

Vivek Venugopal. Exploration of novel strategies for Online Writer Identification

Christopher Tensmeyer. Deep Learning for Document Binarization and Segmentation

List of Mentors:

Olivier Augereau, Najoua Benamara, Jean-Christophe Burie, Florence Cloppet, Bertrand Coüasnon, Mickael Coustaty, Chawki Djeddi, Uptal Garain, C.V. Jawahar, Christopher Kermorvant, Bart Lamiroy, Angelo Marcelli, Simone Marinai, Harold Mouchere, Umapada Pal, Ioannis Pratikatis, Oriol Ramos, Marçal Rossinyol, Ernest Valveny, Nicole Vincent

Tutorials (November 12, A.M.)

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

Time: 9:00 – 12:30
Location: Seminar Room #2 and #3 (East building, 2nd Floor)

Organizing Committee and speakers: Dr. Anjan DUTTA (CVC, Autonoma University of Barcelona, Spain) and Dr. Muhammad Muzzamil LUQMAN (L3i Laboratory, University of La Rochelle, France)

Scientific Committee: Prof. Josep LLADOS CANET (CVC, Autonoma University of Barcelona, Spain) and Prof. Jean-Marc OGIER (L3i Laboratory, University of La Rochelle, France)

Abstract: Many tasks in Pattern Recognition and Document 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 techniques is a real interest of the community. In this half day tutorial, we will present few methodologies for obtaining stable graph representation for different applications. Afterwards, we will explain different graph-based algorithms, methods and techniques and their evolution through ages for performing recognition, classification, detection in graph domain. Moreover, different applications of these algorithms in the field of Pattern Recognition and Document Analysis will also be described in the tutorial.

Keywords: Structural Pattern Recognition, Graph-based representations, Graph matching, Graph embedding, Graph kernel, Graph serialization, Graph indexing, Graph hashing, Subgraph spotting

Website: http://gmprdia.univ-lr.fr

Program:
Registration (08:30 – 09:00)
Session-1 (09:00 – 10:30)
Introduction and opening of GMPRDIA tutorial
Graph Representation
Graph Matching
Graph Embedding
Applications to Document Image Analysis and Graphics RECognition
Coffee Break (10:30 – 11:00)
Session-2 (11:00 – 12:30)
Graph Indexing, Diffusion, Serialisation, Subgraph Spotting (SSGCI competition)
Graph Convolutional Networks
How to program a graph-based method? What are the popular programming languages, libraries, datasets, evaluation tools and protocols
Discussion and closing

Tutorials (November 12, P.M.)

Building a Robust Text Reading System for Unconstrained Scene Images (RTRS)

Time: 14:30 – 18:00

Location: AV Study Room (East building, 2nd Floor)

Speakers: Chengquan Zhang and Shufu Xie

Abstract: Reading unconstrained scene text in the wild has already attracted more and more attention in the field of computer vision. As many real-world applications can benefit from the rich semantic information embedded in the scene text such as image retrieval and self- driving car, huge efforts have been put into building up a robust reading system for unconstrained scene text. Usually, a reading sys- tem for scene text can be divided into two parts: scene text detector and recogniser.

In this tutorial, we first analyze the challenges on text reading for unconstrained scene images. Then, some recent progress and important results which include text detection and recognition are concisely retrospected. Comprehensive evaluations and comparisons among these methods will also be covered. Previous works for text detection can be coarsely grouped into three categories: connected component based, sliding window based and text-line proposal based. And text recognition methods have made a significant breakthrough, since RNN is adopted to make sequence-to-sequence prediction.

In addition, we will introduce how to construct a complete reading system for unconstrained scene text. An enterprise-level scene text reading system (Baidu-OCR) will be proposed. Key components in our solutions will be discussed in detail. To illustrate the effectiveness of the reading system, several real-world applications will also be introduced.

Biography:

Shufu Xie received his Ph. D degree at Institute of Computing Technology (ICR), Chinese Academy Sciences (CAS) in 2011 and M.S. degree in computer science at Shandong Normal University in 2006, respectively. During 2011 January and 2015 January he worked in Fujitsu Research & Development Center (FRDC). He joined Institute of Deep Learning (IDL) Baidu as a research Engineer in 2015, and worked in Computer Vision Technology Department since 2017 September. He is mainly responsible for the research & development of the online Optical Character Recognition (OCR) system of Chinese text. He has published more than 10 publications and patents.

Chengquan Zhang received the M.S. degree in electronics and information engineering from the Huazhong University of Science and Technology (HUST), Wuhan, China in 2016. His research interests include document analysis, scene text detection and text reading system. His works about text reading have been presented at ICDAR15 (oral), ICPR16, CVPR16, ICCV17, etc. In the summer of 2016, he joined the OCR team of Institute of Deep Learning (IDL) Baidu and worked in Computer Vision Technology Department since 2017 September. His main work is not only to maintain an efficient text detection system but also to explore new techniques of text detection in unconstrained images.

Program:

1. Introduction (Shufu Xie) 14:30-14:50 (20 mins)
Bio: who is who? / Problem definition / Tutorial overview
2. History of unconstrained text reading methods in scene images (Chengquan Zhang) 14:50~15:30 (40 mins)
Review of previous scene text detection and recognition methods / General public datasets and evaluation measurements / Comparisons and discussion of existing methods
3. Build a unified text detection system (Chengquan Zhang) 15:30~16:00 (30 mins)
Pipeline description / Learning a strong character detector from word annotation (WordSup) / Text structure analysis
4. Build a high accurate text recognition system (Shufu Xie) 16:30~17:00 (30 mins)
Sequence-to-sequence learning with attention model / High accurate recognition system with large scale training set
5. Enterprise-level scene text reading system (Shufu Xie) 17:00~17:30 (30 mins)
Key modules of an enterprise-level reading system / Strategies for Fast CPU/GPU based OCR System
6. Applications and Discussion (Chengquan Zhang and Shufu Xie) 17:30~18:00 (30 mins)
Real-world applications of the text reading system / Disscusion

Tutorial

Tutorials (November 12, P.M.)

Word Spotting - From Bag-of-Features to Deep Learning

Time: 14:00 – 18:00 (with the break from 16:00 to 16:30).
Location: Medium Conference Room (East building, 2nd Floor)
Organizers: Gernot A. Fink, Sebastian Sudholt

Abstract: Today, quite mature techniques are available for the automatic recognition of machine-printed text. However, the automatic reading of handwriting is a considerably more challanging task, especially when it comes to historical manuscripts. When current methods for handwriting recognition reach their limits, approaches for so-called word spotting come into play. These can be considered as specialized versions of image retrieval techniques. The most successful methods rely on machine learning methods in order to derive powerful models for representing queries for handwriting retrieval.

This tutorial will be organized in two parts: After an introduction to the problem of word spotting, word spotting models. These all build on Bag-of-Features (BoF) representations that were developed in the field of computer vision for being able to learn characteristic representation for image content in an unsupervised manner. It will be shown how word spotting models can be built applying the BoF principle. It will also be described, how basic BoF models can be extended by incorporating statistical sequence models and, more importantly, by learning common sub-space representations between different modalities.

In the second part of the tutorial, advanced models for word spotting will be presented that apply techniques of deep learning and, currently, define the state-of-the-art in the field. After a discussion of pros and cons of the classical approaches, first foundations of neural networks in general and deep architectures in particular will be laid. The success of such deep networks largely became possible because only recently solutions to the crucial problem of vanishing gradients were proposed. Combining the idea of common sub-space representations and the application of a unified framework that can be learned in an end-to-end fashion, unprecedented performance on a number of challenging word spotting tasks can be achieved, as has been demonstrated by the PHOCNet.

Website: http://patrec.cs.tu-dortmund.de/cms/en/home/Resources/ws_tutorial

Resumes of the Presenters

Gernot A. Fink received the diploma in computer science from the University of Erlangen-N¨urnberg, Erlangen, Germany, in 1991 and the Ph.D. degree (Dr.-Ing.) also in computer science from Bielefeld University, Germany, in 1995. In 2002 he received the *venia legendi* (Habilitation) in Applied Computer Science from Bielefeld University.

From 1991 to 2005 he was with the Applied Computer Science Group at the Faculty of Technology of Bielefeld University. Since 2005 he is professor for *Pattern Recognition in Embedded Systems* within the Department of Computer Science at TU Dortmund University, Dortmund, Germany.

His research interests lie in the development and application of pattern recognition methods in the fields of man machine interaction, multimodal machine perception including speech and image processing, statistical pattern recognition, and handwriting recognition.

Dr. Fink has published extensively on the use of Markov-Model based techniques for pattern recognition problems. He is the author of a textbook on Markov Models for Pattern Recognition and co-author of a survey article and a specialized monograph on the application of markov Models for handwriting recognition. He has been working on various problems in the fields of handwriting recognition and document analysis. Today, his team at TU Dortmund University is among the leading research groups in the field of word spotting.

Sebastian Sudholt received his bachelor's and master's degree in computer science from TU Dortmund University, Germany, in 2011 and 2014. Afterwards he joined the group for *Pattern Recognition in Embedded Systems* in the Department of Computer Science of TU Dortmund University as a PhD student. His research focus lies in integrating deep learning architectures and attribute representations.

Together with Gernot A. Fink he developed a word spotting method based on deep learning, the so-called PHOCNet, that, at ICFHR 2016, won both a track within the Word Spotting Competition and the Best Paper Award.

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This special workshop is free of charge. Everyone without registration is welcome.

The Workshop on the Future of Document Analysis and Recognition

in cooperation with the Institute of Document Analysis and Knowledge Science (IDAKS), Osaka Prefecture University

Time: 14:30 – 18:30
Location: Large Conference Room (East Building, 3rd Floor)
Workshop Chairs: Koichi Kise and Andreas Denegel
URL: https://goo.gl/2JV9qD

Objective

Let's discuss the future of document analysis and recognition. In the history of ICDAR in the last 26 years, we have been working in a variety of fields of document analysis and recognition, and have solved many important problems. The emergence of machine learning technologies, however, has shifted the nature of unsolved problems. For example, improving the accuracy of methods for existing problems attracts few researchers. This brings us to the following questions: What are exciting open problems that interest more researchers? What are research topics young researchers and outsiders of the ICDAR community cannot help joining us?

This workshop is planned to discuss possible research topics and open problems to start new chapters of research on document analysis and recognition.

Workshop format

The purpose of the workshop is to have deeper discussions about the future of document analysis and recognition. For stimulating the discussion, we have short presentations by invited speakers listed below to share their views of the future. After the presentation, we select some representative topics for discussion. Then participants and invited speakers are divided into some groups of selected topics for discussion. The results of discussion will be summarized at the end of the workshop and final results will be presented at the main conference. We plan to have a short summary presentation at the banquet and more detailed presentation and discussion at the panel on the last day of the conference.

Tutorial Sp. WS

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Special Workshop (November 12)

Program

14:30-14:40 Opening

14:40-15:50 Position paper presentation (5 min./invited speaker)

15:50-16:20 Coffee break

16:20-16:30 Discussion group formation (about 4 groups)

16:30-17:50 Discussion

17:50-18:30 Wrap-up (5 min./group + summary)

List of Invited Speakers and Position Papers

- Apostolos Antonacopoulos: **Context-Aware Document Analysis**
- Michael Blumenstein: **Beyond Deep Learning – the next big thing in Artificial Intelligence for Document Analysis Research**
- Andreas Dengel: **Who are we now? A Multi-Perspective View to Documents as well as Document Analysis and Recognition**
- Dimosthenis Karatzas: **Large scale datasets – Is data holding us back?**
- Koichi Kise: **Mutual Analysis of Documents and their Readers/Writers**
- C. V. Jawahar: **Towards Deeper Understanding of Wider Category of Documents**
- Bart Lamiroy: **Document Analysis and Machine Learning ... beyond simply fancy classification?**
- Cheng-Lin Liu: **Document Image Analysis: Big Data or Small Data**
- Marcus Liwicki: **Really Open Services and Tools for Reproducible Research**
- Josep Llados: **From OCR (Optical Character Recognition) to IDS (Intelligent Decoding Systems): an edit distance of 3, a time span of 100.**
- Dan Lopresti: **Document Analysis and Recognition: Taking the Pulse of Our Field**
- Simone Marinai: **Document Image Analysis and Pattern Recognition, what is their position today?**
- Jean-Marc Ogier: **Which challenges for DAR in the context of a hybrid world?**
- Seiichi Uchida: **Beyond 100%**

ICDAR2017 Main Conference

Keynote Speech 1 / November 13

Prof. Rangachar Kasturi

University of South Florida

Time: 9:40-10:40
Location: Terrsa Hall (West building)
Chair: Venugopal Govindaraju (University at Buffalo, USA)

Title: Graphics Recognition: A Historical Perspective and Recent Advances

Abstract: Graphics predates text as a means of human communication. However, Graphics Recognition as an identified scientific discipline is much more recent [1]. In this talk, I trace the history and contributions of graphics recognition as a part of the larger pattern recognition research over the past forty years. I conclude with a few remarks on its state of the art and open challenges.

[1] Karl Tombre, "Is Graphics Recognition an Unidentified Scientific Object?", a summary of the panel discussion held at GREC 2007, in Graphics Recognition: Recent Advances and New Opportunities, LNCS 5046, Springer, 2008

Bio: Dr. Kasturi is a professor of Computer Science and Engineering at the University of South Florida. He was born in Bangalore (1949) and received his BE degree from Bangalore University (1968) and MSEE (1980) and Ph.D. (1982) degrees from Texas Tech University. He was a Professor at the Pennsylvania State University (1982-2003). He was the Editor-in-Chief of the Machine Vision and Applications (1993-94) and the IEEE Transactions on Pattern Analysis and Machine Intelligence (1995-98). He was the President of the IAPR (2002-04) and the IEEE Computer Society (2008). He is a Fellow of IEEE and IAPR. As a current Fulbright Specialist, he is available to share his expertise with educators and researchers worldwide.

19:00-20:30 (November 12) **Reception**

    Location: Terrsa Hall (West building)

    * for more detail, refer p.60.

9:30 - 9:40   **Opening Ceremony**

    Location: Terrsa Hall (West building)

9:40 - 10:40   **Keynote Speech 1**

    Location: Terrsa Hall (West building)

    * for more detail, refer p.36.

10:40 - 11:10 **Coffee Break**

11:10 - 12:30 **Oral Session 1: Character Recognition I**

    Location: Terrsa Hall (West building)

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

O1-1   **Improving Offline Handwritten Chinese Character Recognition by Iterative Refinement**

    Xiao Yang, Dafang He, Zihan Zhou, Daniel Kifer, C. Lee Giles

O1-2   **High Performance Text Recognition Using a Hybrid Convolutional-LSTM Implementation**

    Thomas M. Breuel

O1-3   **Error Detection and Corrections in Indic OCR Using LSTMs**

    Rohit Saluja, Devaraj Adiga, Parag Chaudhuri, Ganesh Ramakrishnan, Mark Carman

O1-4   **Qumran Letter Restoration by Rotation and Reflection Modified PixelCNN**

    Lior Uzan, Nachum Dershowitz, Lior Wolf

11:10 - 12:30 **Oral Session 2: Graphics Recognition**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Bart Lamiroy (LORIA, France)

O2-1   **Pyramidal Stochastic Graphlet Embedding for Document Pattern Classification**

    Anjan Dutta, Pau Riba, Josep Lladós, Alicia Fornés

O2-2   **The MUSCIMA++ Dataset for Handwritten Optical Music Recognition**

    Jan Hajic jr., Pavel Pecina

O2-3   **Partitioning Open Plan Areas in Floor Plans**

    Anuradha Madugalla, Kim Marriott, Simone Marinai

O2-4   **Image Operator Learning Coupled with CNN Classification and Its Application to Staff Line Removal**

    Frank Dennis Julca Aguilar, Nina S.T. Hirata

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12:30 - 14:20 **Lunch Break**

14:20 - 15:40 **Oral Session 3: Offline Handwriting Recognition I**

    Location: Terrsa Hall (West building)

    Chair: Gernot Fink (TU Dortmund University, Germany)

O3-1   **Sequence Discriminative Training for Offline Handwriting Recognition by an Interpolated CTC and Lattice-Free MMI Objective Function**

    Wenping Hu, Meng Cai, Kai Chen, Haisong Ding, Lei Sun, Sen Liang, Xiongjian Mo, Qiang Huo

O3-2   **Are Multidimensional Recurrent Layers Really Necessary for Handwritten Text Recognition?**

    Joan Puigcerver

O3-3   **Cortical-Inspired Open-Bigram Representation for Handwritten Word Recognition**

    Theodore Bluche, Christopher Kermorvant, Claude Touzet, Hervé Glotin

O3-4   **Handwritten Chinese Text Recognition Using Separable Multi-Dimensional Recurrent Neural Network**

    Yi-Chao Wu, Fei Yin, Zhuo Chen, Cheng-Lin Liu

14:20 - 15:40 **Oral Session 4: Document Image Processing**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Bidyut Baran Chaudhuri (Indian Statistical Institute, India)

O4-1   **Automatic Static/Variable Content Separation in Administrative Document Images**

    David Aldavert, Marçal Rusiñol, Ricardo Toledo

O4-2   **An Iterative Refinement Framework for Image Document Binarization with Bhattacharyya Similarity Measure**

    Ning Liu, Dongxiang Zhang, Xing Xu, Wenju Liu, Dengfeng Ke, Long Guo, Shengkun Shi, Hui Liu, Lijiang Chen

O4-3   **Document Image Binarization with Fully Convolutional Neural Networks**

    Chris Tensmeyer, Tony Martinez

O4-4   **Real-Time Document Localization in Natural Images by Recursive Application of a CNN**

    Khurram Javed, Faisal Shafait

15:45 - 16:15 **Competition Reports 1**

 Location: Large Conference Room (East building, 3rd Floor)

 Chair: Jean-Marc Ogier (University of La Rochelle, France) and Marcus Liwicki (University of Kaiserslautern, Germany & University of Fribourg, Switzerland)

C1-1 **ICDAR2017 Robust Reading Challenge on Multi-lingual Scene Text Detection and Script Identification – RRC-MLT**

 Nibal Nayef, Fei Yin, Imen Bizid, Hyunsoo Choi, Yuan Feng, Dimosthenis Karatzas, Zhenbo Luo, Umapada Pal, Christophe Rigaud, Joseph Chazalon, Wafa Khlif, Muhammad Muzzamil Luqman, Jean-Christophe Burie, Cheng-lin Liu, Jean-Marc Ogier

C1-2 **ICDAR2017 Robust Reading Challenge on COCO-Text**

 Raul Gomez, Baoguang Shi, Lluis Gomez, Lukas Numann, Andreas Veit, Jiri Matas, Serge Belongie, Dismosthenis Karatzas

15:40 - 17:40 **Poster Session 1**

 Location: Seminar Room, Medium Conference Room, AV Study Room (East building, 2nd Floor)

 Chair: Srirangaraj Setlur (University at Buffalo, USA), Alicia Fornés (Computer Vision Center, Spain) and Veronique Eglin (INSA, France)

P1-1 **Robust Math Formula Recognition in Degraded Chinese Document Images**

 Ning Liu, Dongxiang Zhang, Xing Xu, Long Guo, Lijiang Chen, Wenju Liu, Dengfeng Ke

P1-2 **Chinese Writer Identification Using Contour-Directional Feature and Character Pair Similarity Measurement**

 Yu-Jie Xiong, Lu Yue

P1-3 **A Complete Scheme of Spatially Categorized Glyph Recognition for the Transliteration of Balinese Palm Leaf Manuscripts**

 Made Windu Antara Kesiman, Jean-Christophe Burie, Jean-Marc Ogier

P1-4 **Impact of Ligature Coverage on Training Practical Urdu OCR Systems**

 Muhammad Ferjad Naeem, Noor ul Sehr Zia, Aqsa Ahmed Awan, Faisal Shafait, Adnan ul Hasan

P1-5 **Handwriting Recognition with Multigrams**

 Wassim Swaileh, Thierry Paquet, Yann Soullard, Pierrick Tranouez

P1-6 **Compact and Efficient WFST-Based Decoders for Handwriting Recognition**

 Meng Cai, Qiang Huo

P1-7 **Supervised Feature Learning via Within-Class Reconstruction**

 Yunxue Shao, Jiantao Zhou, Guanglai Gao

P1-8 **Combining Convolutional Neural Networks and LSTMs for Segmentation-Free OCR**

 Stephen Rawls, Huaigu Cao, Senthil Kumar, Prem Natarajan

P1-9 **Sequence-to-Label Script Identification for Multilingual OCR**

 Yasuhisa Fujii, Karel Driesen, Jonathan Baccash, Ash Hurst, Ashok C. Popat

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P1-10 **Selecting Automatically Pre-Processing Methods to Improve OCR Performances**
Quang Anh Bui, David Mollard, Salvatore Tabbone

P1-11 **Legibility and Aesthetic Analysis of Handwriting**
Chandranath Adak, Bidyut B. Chaudhuri, Michael Blumenstein

P1-12 **New Morphological Markovian Approach for Analysis and Recognition of Open Arabic Canonical Vocabulary**
Imen Ben Cheikh, Anas Laffet

P1-13 **Online Handwritten Mongolian Word Recognition Using a Novel Sliding Window Method with Recurrent Neural Networks**
Ji Liu, Long-Long Ma, Jian Wu

P1-14 **Complexity-Based Biometric Signature Verification**
Ruben Tolosana, Ruben Vera-Rodriguez, Richard Guest, Julian Fierrez, Javier Ortega-Garcia

P1-15 **A Long Term Memory Recognition Framework on Multi-Complexity Motion Gestures**
Songbin Xu, Yang Xue

P1-16 **Stroke-Order Normalization for Online Bangla Handwriting Recognition**
Nilanjana Bhattacharya, Umapada Pal, Partha Pratim Roy

P1-17 **Early Recognition of Handwritten Gestures Based on Multi-Classifier Reject Option**
Zhaoxin Chen, Eric Anquetil, Christian Viard-Gaudin, Harold Mouchère

P1-18 **Personalized Hand Writing Recognition Using Continued LSTM Training**
Pragya Paramita Sahu, Vikrant Singh, Indra Kiran, Viswanath Veera, Thanda Abhinav, Ankit Vijay, Shankar M. Venkatesan

P1-19 **Browsing through Closed Books: Fully Automatic Book Page Extraction from a 3-D X-Ray CT Volume**
Daniel Stromer, Vincent Christlein, Tobias Schoen, Wolfgang Holub, Andreas Maier

P1-20 **CNN Based Page Object Detection in Document Images**
Xiaohan Yi, Liangcai Gao, Yuan Liao, Xiaode Zhang, Runtao Liu, Zhuoren Jiang

P1-21 **A Robust and Binarization-Free Approach for Text Line Detection in Historical Documents**
Tobias Grüning, Gundram Leifert, Tobias Strauss, Roger Labahn

P1-22 **Enhancing Table of Contents Extraction by System Aggregation**
Thi-Tuyet-Hai Nguyen, Antoine Doucet, Mickael Coustaty

P1-23 **D-StaR: A Generic Method for Stamp Segmentation from Document Images**
Junaid Younas, Muhammad Zeshan Afzal, Muhammad Imran Malik, Faisal Shafait, Paul Lukowicz, Sheraz Ahmed

P1-24 **Multi-Scale Multi-Task FCN for Semantic Page Segmentation and Table Detection**
Dafang He, Scott Cohen, Brian Price, Daniel Kifer, C. Lee Giles

P1-25 **Academic Community Explorer (ACE) for Syntactic, Semantic and Pragmatic Document Analysis**
Akansha Bhardwaj, Dominique Mercier, Hisham Hashmi, Sheraz Ahmed, Andreas Dengel

P1-26   **A Rectangle Mining Method for Understanding the Semantics of Financial Tables**

Xilun Chen, Laura Chiticariu, Marina Danilevsky, Alexandre Evfimievski, Prithviraj Sen

P1-27   **Relating Articles Textually and Visually**

Nachum Dershowitz, Daniel Labenski, Adi Silberpfennig, Lior Wolf, Yaron Tsur

P1-28   **Selecting Fine-Tuned Features for Layout Analysis of Historical Documents**

Hao Wei, Mathias Seuret, Marcus Liwicki, Rolf Ingold, Pei Fu

P1-29   **Bio-Inspired Modeling for the Enhancement of Historical Handwritten Documents**

Konstantinos Zagoris, Ioannis Pratikakis

P1-30   **Alignment of Historical Handwritten Manuscripts Using Siamese Neural Network**

Majeed Kassis, Jumana Nassour, Jihad El-Sana

P1-31   **Local Enlacement Histograms for Historical Drop Caps Style Recognition**

Michaël Clément, Mickaël Coustaty, Camille Kurtz, Laurent Wendling

P1-32   **anyOCR: An Open-Source OCR System for Historical Archives**

Syed Saqib Bukhari, Ahmad Kadi, Mohammad Ayman Jouneh, Fahim Mahmood Mir, Andreas Dengel

P1-33   **Preparatory KWS Experiments for Large-Scale Indexing of a Vast Medieval Manuscript Collection in the HIMANIS Project**

Théodore Bluche, Sebastien Hamel, Christopher Kermorvant, Joan Puigcerver, Dominique Stutzmann, Alejandro H. Toselli, Enrique Vidal

P1-34   **A Machine Learning System for Assisting Neophyte Researchers in Digital Libraries**

Bissan Audeh, Michel Beigbeder, Christine Largeron

P1-35   **Weakly Supervised Text Attention Network for Generating Text Proposals in Scene Images**

Li Rong, En MengYi, Li JianQiang, Zhang HaiBin

P1-36   **A Unified Video Text Detection Method with Network Flow**

Xue-Hang Yang, Wenhao He, Fei Yin, Cheng-Lin Liu

P1-37   **Segments Graph-Based Approach for Document Capture in a Smartphone Video Stream**

Alexander Zhukovsky, Dmitriy Nikolaev, Vladimir Arlazarov, Vasiliy Postnikov, Dmitriy Polevoy, Natalya Skoryukina, Timofey Chernov, Julia Shemiakina, Arseniy Mukovozov, Ivan Konovalenko, Mikhail Povolotsky

P1-38   **Benchmarking Keypoint Filtering Approaches for Document Image Matching**

Emilien Royer, Joseph Chazalon, Marçal Rusiñol, Frédéric Bouchara

P1-39   **Temporal Integration for Word-Wise Caption and Scene Text Identification**

Sangheeta Roy, Palaiahnakote Shivakumara, Umapada Pal, Tong Lu, Ainuddin Wahid Bin Abdul Wahab

P1-40   **Whiteboard Video Summarization via Spatio-Temporal Conflict Minimization**

Kenny Davila, Richard Zanibbi

P1-41   **Learning Spatially Embedded Discriminative Part Detectors for Scene Character Recognition**

Yanna Wang, Cunzhao Shi, Baihua Xiao, Chunheng Wang

P1-42 **Bag of Local Convolutional Triplets for Script Identification in Scene Text**
Jan Zdenek, Hideki Nakayama

P1-43 **Text Proposals Based on Windowed Maximally Stable Extremal Region for Scene Text Detection**
Feng Su, Wenjun Ding, Lan Wang, Susu Shan, Hailiang Xu

P1-44 **Local Discriminant Training and Global Optimization for Convolutional Neural Network Based Handwritten Chinese Character Recognition**
Xiangsheng Zeng, Donglai Xiang, Liangrui Peng, Changsong Liu, Xiaoqing Ding

P1-45 **Analysis of Convolutional Neural Networks for Document Image Classification**
Chris Tensmeyer, Tony Martinez

P1-46 **Component Awareness in Convolutional Neural Networks**
Brian Kenji Iwana, Letao Zhou, Kumiko Tanaka-Ishii, Seiichi Uchida

P1-47 **Online Signature Verification Using Recurrent Neural Network and Length-Normalized Path Signature Descriptor**
Songxuan Lai, Lianwen Jin, Weixin Yang

P1-48 **CloudScan - A Configuration-Free Invoice Analysis System Using Recurrent Neural Networks**
Rasmus Berg Palm, Ole Winther, Florian Laws

P1-49 **Fully Convolutional Neural Networks for Newspaper Article Segmentation**
Benjamin Meier, Thilo Stadelmann, Jan Stampfli, Marek Arnold, Mark Cieliebak

P1-50 **DANIEL: A Deep Architecture for Automatic Analysis and Retrieval of Building Floor Plans**
Divya Sharma, Nitin Gupta, Chiranjoy Chattopadhyay, Sameep Mehta

P1-51 **Complex Document Classification and Localization Application on Identity Document Images**
Ahmad Montaser Awal, Nabil Ghanmi, Ronan Sicre, Teddy Furon

P1-52 **Classification of Graphomotor Impressions Using Convolutional Neural Networks: An Application to Automated Neuro-Psychological Screening Tests**
Haris Bin Nazar, Momina Moetesum, Shoaib Ehsan, Imran Siddiqi, Khurram Khurshid, Nicole Vincent, Klaus D. McDonald-Maier

* Competition Outcomes are also displayed at Poster Session Room. for more detail, refer pp.58 - 59.

17:40 - 18:40 **TC10/TC11 Joint Meeting**
Location: Terrsa Hall (West building)

Keynote Speech 2 / November 14

Prof. Andreas Dengel

German Research Center for
Artificial Intelligence (DFKI)

Time: 9:00-10:00
Location: Terrsa Hall (West building)
Chair: Koichi Kise (Osaka Prefecture University, Japan)

Title: Who are we now? An attempt to understand the ICDAR community!

Abstract: In an atmosphere motivated by the colloquial 'publish or perish' mindset, for every scientific community, the significance of its mission is a must-see. With more and more publications, it becomes important to develop 'productivity' indicators demonstrating sustainable impact to survive. While in traditional approaches, it was sufficient to collect quantitative data on scientific publications, i.e. number of citations, nowadays there is an increasing demand for multidimensional and qualitative methods to evaluate a scientific work, e.g. citation polarity, authority of an author.

Document Analysis and Recognition has a long tradition culminating in the foundation of the ICDAR conference series. This series started in 1991 leading to 14 biannual conferences. As one important outcome there is access to an entire corpus of proceedings capturing a rich source to learn about document analysis methods, datasets, models, and architectures. Moreover, the papers in the ICDAR corpus deal with various research fields, applications, and approaches. They contain text, diagrams, tables, formulas, and pictures. They are originated by authors from many different organizations who refer to each other's work published in ICDAR proceedings or somewhere else. In summary the corpus records the historical change of contributors, topics, and technology. It captures hidden patterns revealing the various evolutionary aspects of a community, its scientific trends and opinion leaders, its citation behavior as well as collaborating cliques. In my talks I like to address several aspects of mining

this document corpus by syntactic, semantic, and pragmatic approaches aiming at a quantitative and qualitative analysis of our community, its individual members.

Bio: Professor Andreas Dengel is a member of the Management Board as well as Scientific Director at the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern where he is leading the Smart Data & Knowledge Services Research Department. In 1993 he became a Professor at the Computer Science Department of the University of Kaiserslautern. Since 2009 he also holds an Honorary Professorship at the Dept. of Computer Science and Intelligent Systems, Graduate School of Engineering of the Osaka Prefecture University.

From 1980 to 1986 Andreas studied Computer Science and Economics at the University of Kaiserslautern. He subsequently worked at the Siemens research lab in Munich and at the University of Stuttgart where he completed his doctoral thesis in 1989. In 1991 he worked as a guest researcher at Xerox Parc in Palo Alto. Andreas is a member of many international advisory boards but also was a member of the ICDAR advisory board from its foundation in 2001 until 2015. Furthermore, he is the co-founder of the DAS workshop series and hosted the first DAS in Kaiserslautern. Andreas was/is program/technical chair of international conferences, such as ICPR, ICDAR, ICFHR, DAS, KES, KI, ICMU and KM. Moreover, he is founder or initiator of several successful start-up companies. In 2005 he received a "Pioneer Spirit Award" for one of his start-up concepts and at Cebit 2015 his recent start-up digipen technologies has received the Cebit Innovation Award. He is co-editor of various international computer science journals, i.e. IJDAR, and of book series on Machine Perception and Artificial Intelligence (World Scientific), has written or edited 12 books and is author of more than 350 peer-reviewed scientific publications, several of which received a Best-Paper Award. He supervised more than 200 PhD, master and bachelor theses.

In Cambridge, UK, in 2004, Andreas Dengel has been elected a Fellow of the International Association for Pattern Recognition (IAPR). His scientific contributions have been honored several times by international scientific prizes. His main scientific emphasis is in the areas of Document Analysis and Recognition, Smart Data, Deep Learning, Semantic Technologies, Information Retrieval, Multimedia Mining, and Social Media.

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

    Location: Terrsa Hall (West building)

    * for more detail, refer pp.43 - 44.

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

10:30 - 12:10 **Oral Session 5: Character Recognition II**

    Location: Terrsa Hall (West building)

    Chair: Thomas Breuel (NVIDIA Research)

O5-1   **Semi-Supervised Transfer Learning for Convolutional Neural Network Based Chinese Character Recognition**

    Yejun Tang, Bing Wu, Liangrui Peng, Changsong Liu

O5-2   **Extremely Sparse Deep Learning Using Inception Modules with Dropfilters**

    Woo-Young Kang, Kyung-Wha Park, Byoung-Tak Zhang

O5-3   **Building a Compact MQDF Classifier by Sparse Coding and Vector Quantization Technique**

    Xiaohua Wei, Shujing Lu, Yue Lu

O5-4   **A Comprehensive Analysis of Misclassified Handwritten Chinese Character Samples by Incorporating Human Recognition**

    Kaihuan Liang, Lianwen Jin, Zecheng Xie, Xuefeng Xiao, Weiguo Huang

O5-5   **A Noise-Resilient Super-Resolution Framework to Boost OCR Performance**

    Manoj Sharma, Anupama Ray, Santanu Chaudhury, Brejesh Lall

10:30 - 12:10 **Oral Session 6: Spotting and Information retrieval**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Seiichi Uchida (Kyushu University, Japan)

O6-1   **Improving Information Retrieval in Multiwriter Scenario by Exploiting the Similarity Graph of Document Terms**

    Pau Riba, Anjan Dutta, Sounak Dey, Josep Lladós, Alicia Fornés

O6-2   **Query-by-Online Word Spotting Revisited: Using CNNs for Cross-Domain Retrieval**

    Sebastian Sudholt, Leonard Rothacker, Gernot A. Fink

O6-3   **Nonlinear Manifold Embedding on Keyword Spotting Using t-SNE**

    George Retsinas, Nikolaos Stamatopoulos, Georgios Louloudis, Giorgos Sfikas, Basilis Gatos

O6-4   **Evaluating Word String Embeddings and Loss Functions for CNN-Based Word Spotting**

    Sebastian Sudholt, Gernot A. Fink

O6-5   **LSDE: Levenshtein Space Deep Embedding for Query-by-String Word Spotting**

    Lluís Gómez, Marçal Rusiñol, Dimosthenis Karatzas

12:10 - 14:00 **Lunch Break**

Nov. 14

14:00 - 15:20 **Oral Session 7: Offline Handwriting Recognition II**

    Location: Terrsa Hall (West building)

    Chair: Venugopal Govindaraju (University at Buffalo, USA)

O7-1   **A Compact CNN-DBLSTM Based Character Model for Offline Handwriting Recognition with Tucker Decomposition**

    Haisong Ding, Kai Chen, Ye Yuan, Meng Cai, Lei Sun, Sen Liang, Qiang Huo

O7-2   **A PHOC Decoder for Lexicon-Free Handwritten Word Recognition**

    Giorgos Sfikas, George Retsinas, Basilis Gatos

O7-3   **An Open Vocabulary OCR System with Hybrid Word-Subword Language Models**

    Meng Cai, Wenping Hu, Kai Chen, Lei Sun, Sen Liang, Xiongjian Mo, Qiang Huo

O7-4   **Simultaneous Script Identification and Handwriting Recognition via Multi-Task Learning of Recurrent Neural Networks**

    Zhuo Chen, Yichao Wu, Fei Yin, Cheng-Lin Liu

14:00 - 15:20 **Oral Session 8: Segmentation and Layout Analysis**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Apostolos Antonacopoulos (University of Salford, UK)

O8-1   **A Data Driven Approach for Compound Figure Separation Using Convolutional Neural Networks**

    Satoshi Tsutsui, David J. Crandall

O8-2   **Page Segmentation for Historical Handwritten Documents Using Fully Convolutional Networks**

    Yue Xu, Wenhao He, Fei Yin, Cheng-Lin Liu

O8-3   **A General Approach for Handwritten Digits Segmentation Using Spectral Clustering**

    Cheng Chen, Jun Guo

O8-4   **A Deep Learning-Based Formula Detection Method for PDF Documents**

    Liangcai Gao, Xiaohan Yi, Yuan Liao, Zhuoren Jiang, Zuoyu Yan, Zhi Tang

15:25 - 15:55 **Competition Reports 2**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Jean-Marc Ogier (University of La Rochelle, France) and Marcus Liwicki (University of Kaiserslautern, Germany & University of Fribourg, Switzerland)

C2-1   **ICDAR2017 Competition on Document Image Binarization (DIBCO 2017)**

    Ioannis Pratikakis, Konstantinos Zagoris, George Barlas, Basilis Gatos

C2-2   **ICDAR2017 Competition on Layout Analysis for Challenging Medieval Manuscripts**

    Fotini Simistira,Manuel Bouillon, Mathias Seuret, Marcel Würsch, Michele Alberti, Rolf Ingold, Marcus Liwicki

15:20 - 17:20 **Poster Session 2**

Location: Seminar Room, Medium Conference Room, AV Study Room (East building, 2nd Floor)

Chair: Rafael Lins (Federal University de Pernambuco, Brasil), Faisal Shafait (National University of Sciences and Technology, Pakistan) and Olivier Augereau (Osaka Prefecture University, Japan)

P2-1 **Vacuity Measure for Handwritten Character Analysis**

Van-Cuong Kieu, Dominique Stutzmann, Nicole Vincent

P2-2 **Improving Thai Optical Character Recognition Using Circular-Scan Histogram**

Natsuda Kaothanthong, Thanaruk Theeramunkong, Jinhee Chun

P2-3 **Propagation Based Prototype Prediction**

Tonghua Su, Hongliang Dai, Ce Liu, Lijun Yu

P2-4 **Radical-Based Chinese Character Recognition via Multi-Labeled Learning of Deep Residual Networks**

Tie-Qiang Wang, Fei Yin, Cheng-Lin Liu

P2-5 **Segmentation-Free Printed Traditional Mongolian OCR Using Sequence to Sequence with Attention Model**

Hui Zhang, Hongxi Wei, Feilong Bao, Guanglai Gao

P2-6 **Layout and Perspective Distortion Independent Recognition of Captured Chinese Document Image**

Yanwei Wang, Yuefang Sun, Changsong Liu

P2-7 **Glyph-Based Data Augmentation for Accurate Kanji Character Recognition**

Kenichiro Ofusa, Tomo Miyazaki, Yoshihiro Sugaya, Shinichiro Omachi

P2-8 **Similar Handwritten Chinese Character Recognition Using Hierarchical CNN Model**

Qingqing Wang, Yue Lu

P2-9 **Integrating Bilingual Named Entities Lexicon with Conditional Random Fields Model for Arabic Named Entities Recognition**

Emna Hkiri, Souheyl Mallat, Mounir Zrigui

P2-10 **Automating Transliteration of Cuneiform from Parallel Lines with Sparse Data**

Bartosz Bogacz, Maximilian Klingmann, Hubert Mara

P2-11 **A Comprehensive Survey on Handwriting and Computerized Graphology**

Afnan H. Garoot, Meadeh Safar, Ching Y. Suen

P2-12 **Core Region Detection for Off-Line Unconstrained Handwritten Latin Words Using Word Envelops**

Shilpa Pandey, Gaurav Harit

P2-13 **Self-Training of BLSTM with Lexicon Verification for Handwriting Recognition**

Bruno Stuner, Clément Chatelain, Thierry Paquet

P2-14 **Data Augmentation for Recognition of Handwritten Words and Lines Using a CNN-LSTM Network**

Curtis Wigington, Seth Stewart, Brian Davis, Bill Barrett, Brian Price, Scott Cohen

P2-15   **Gated Convolutional Recurrent Neural Networks for Multilingual Handwriting Recognition**
Théodore Bluche, Ronaldo Messina

P2-16   **Biometric Signature Verification Using Recurrent Neural Networks**
Ruben Tolosana, Ruben Vera-Rodriguez, Julian Fierrez, Javier Ortega-Garcia

P2-17   **A Hybrid Model for End to End Online Handwriting Recognition**
Partha Sarathi Mukherjee, Bappaditya Chakraborty, Ujjwal Bhattacharya, Swapan Kumar Parui

P2-18   **PS-LSTM: Capturing Essential Sequential Online Information with Path Signature and LSTM for Writer Identification**
Manfei Liu, Lianwen Jin, Zecheng Xie

P2-19   **Geometric Object 3D Reconstruction from Single Line Drawing Image with Bottom-Up and Top-Down Classification and Sketch Generation**
Ting Guo, Yongtao Wang, Yafeng Zhou, Zheqi He, Zhi Tang

P2-20   **A System for Creating Automatic Navigation among Architectural and Construction Documents**
Purnendu Banerjee, Sumit Choudhary, Supriya Das, Himadri Majumder, Srinivas Mukkamala, Rahul Roy, B.B. Chaudhuri

P2-21   **VASESKETCH: Automatic 3D Representation of Pottery from Paper Catalog Drawings**
Francesco Banterle, Barak Itkin, Matteo Dellepiane, Lior Wolf, Marco Callieri, Nachum Dershowitz, Roberto Scopigno

P2-22   **Recognition of Handwritten Music Symbols with Convolutional Neural Codes**
Jorge Calvo-Zaragoza, Antonio-Javier Gallego, Antonio Pertusa

P2-23   **Script Identification Based on Nonsubsampled Contourlet Transform**
Xing-Kun Han, Alimjan Aysa, Nurbiya Yadikar, Hornisa Mamat, Kurban Ubul

P2-24   **A Convolutional Neural Network Based Two-Stage Document Deblurring**
Jile Jiao, Jun Sun, Naoi Satoshi

P2-25   **Using Convolutional Encoder-Decoder for Document Image Binarization**
Xujun Peng, Huaigu Cao, Prem Natarajan

P2-26   **Ensembles for Graph-Based Keyword Spotting in Historical Handwritten Documents**
Michael Stauffer, Andreas Fischer, Kaspar Riesen

P2-27   **Class-Adapted Blind Deblurring of Document Images**
Marina Ljubenovic, Lina Zhuang, Mário A.T. Figueiredo

P2-28   **Deep Networks for Degraded Document Image Binarization through Pyramid Reconstruction**
Gaofeng Meng, Kun Yuan, Ying Wu, Shiming Xiang, Chunhong Pan

P2-29   **Robust, Simple Page Segmentation Using Hybrid Convolutional MDLSTM Networks**
Thomas M. Breuel

P2-30   **A Perceptual Image Hashing Algorithm for Hybrid Document Security**
Sébastien Eskenazi, Boris Bodin, Petra Gomez-Krämer, Jean-Marc Ogier

P2-31   **Document Layout Analysis Using Multigaussian Fitting**

Laiphangbam Melinda, Raghu Ghanapuram, Chakravarthy Bhagvati

P2-32   **Localizing and Recognizing Labels for Multi-Panel Figures in Biomedical Journals**

Jie Zou, Sameer Antani, George Thoma

P2-33   **A Font Setting Based Bayesian Model to Extract Mathematical Expression in PDF Files**

Xing Wang, Jyh-Charn Liu

P2-34   **Wikipedia-Based Entity Semantifying in Open Information Extraction**

Qiuhao Lu, Youtian Du

P2-35   **Table Detection Using Deep Learning**

Azka Gilani, Shah Rukh Qasim, Imran Malik, Faisal Shafait

P2-36   **Table Recognition in Heterogeneous Documents Using Machine Learning**

Sheikh Faisal Rashid, Abdullah Akmal, Muhammad Adnan, Ali Adnan Aslam, Andreas Dengel

P2-37   **Chronological Profiling for Paleography**

Nicholas R. Howe, Stephanie Xie

P2-38   **Convolutional Neural Networks for Figure Extraction in Historical Technical Documents**

Chun-Nam Yu, Caleb Carson Levy, Iraj Saniee

P2-39   **The Handwritten Sundanese Palm Leaf Manuscript Dataset from 15th Century**

Mira Suryani, Erick Paulus, Setiawan Hadi, Undang A. Darsa, Jean-Christophe Burie

P2-40   **R-PHOC: Segmentation-Free Word Spotting Using CNN**

Suman K. Ghosh, Ernest Valveny

P2-41   **Deep Residual Text Detection Network for Scene Text**

Xiangyu Zhu, Yingying Jiang, Shuli Yang, Xiaobing Wang, Wei Li, Pei Fu, Hua Wang, Zhenbo Luo

P2-42   **A Robust Approach to Detecting Text from Images of Whiteboards and Handwritten Notes**

Wei Jia, Lei Sun, Zhuoyao Zhong, Xiongjian Mo, Guoen Ma, Qiang Huo

P2-43   **Attention Based RNN Model for Document Image Quality Assessment**

Pengchao Li, Liangrui Peng, Junyang Cai, Xiaoqing Ding, Shuangkui Ge

P2-44   **Deep Strip-Based Network with Cascade Learning for Scene Text Localization**

Dao Wu, Rui Wang, Pengwen Dai, Yueying Zhang, Xiaochun Cao

P2-45   **Scene Text Eraser**

Toshiki Nakamura, Anna Zhu, Keiji Yanai, Seiichi Uchida

P2-46   **New Fuzzy-Mass Based Features for Video Image Type Categorization**

Sangheeta Roy, Palaiahnakote Shivakumara, Namita Jain, Vijeta Khare, Umapada Pal, Tong Lu

P2-47   **Attention-Based Extraction of Structured Information from Street View Imagery**

Zbigniew Wojna, Alexander N. Gorban, Dar-Shyang Lee, Kevin Murphy, Qian Yu, Yeqing Li, Julian Ibarz

P2-48   **Text Detection in Traffic Informatory Signs Using Synthetic Data**

Fangge Chen, Hirokatsu Kataoka, Yutaka Satoh

P2-49 **Semantic Text Detection in Born-Digital Images via Fully Convolutional Networks**

Nibal Nayef, Jean-Marc Ogier

P2-50 **Robust Document Image Dewarping Method Using Text-Lines and Line Segments**

Taeho Kil, Wonkyo Seo, Hyung Il Koo, Nam Ik Cho

P2-51 **Full-Page Text Recognition: Learning Where to Start and When to Stop**

Bastien Moysset, Christopher Kermorvant, Christian Wolf

P2-52 **PCA-Initialized Deep Neural Networks Applied to Document Image Analysis**

Mathias Seuret, Michele Alberti, Marcus Liwicki, Rolf Ingold

P2-53 **Cutting the Error by Half: Investigation of Very Deep CNN and Advanced Training Strategies for Document Image Classification**

Muhammad Zeshan Afzal, Andreas Kölsch, Sheraz Ahmed, Marcus Liwicki

* Competition Outcomes are also displayed at Poster Session Room. for more detail, refer pp.58 - 59.

19:00 - 21:00 **Banquet**

Location: Rihga Royal Hotel Kyoto

* for more detail, refer p.60.

Keynote Speech 3 / November 15

Prof. Xiang Bai

Huazhong University of
Science and Technology

Time: 9:00-10:00

Location: Terrsa Hall (West building)

Chair: Shinichiro Omachi (Tohoku University, Japan)

Title: Deep Neural Networks for Scene Text Reading Revisited

Abstract: Recently, the community of document analysis has seen a strong revival of neural networks, which is mainly stimulated by the great success of deep neural network models. Most scene text reading systems based on deep learning concern the problem of word spotting in natural scene images that is specific to horizontal text in Latin scripts, while text can be arbitrarily oriented and multilingual in the wild. In this talk, I will provide a thorough overview of the state-of-the-art deep learning methods for text detection and text recognition in natural scene images, and evaluate their performance in accuracy and efficiency. In addition, I will explore how deep learning methods can be effectively applied to the detection and recognition of both Latin and Non-Latin text with arbitrary orientations. Last, several successful applications of scene text reading are given as well as the prediction of potential research directions.

Bio: Xiang Bai is currently a Full Professor with the school of Electronic Information and Communications, Huazhong Univerisity of Science and Technology (HUST), Wuhan, China. He received the BS, MS, PhD degree from HUST in 2003, 2005, 2009, respectively. He was a joint PhD student at UCLA, co-supervised by Zhuowen Tu and Alan Yuille. In recent years, he has focused on scene text reading, and developed a series of state-of-the-art methods on text detection, text recognition, script identification in natural images. He is a major contributor of MSRA-TD 500 dataset for multi-oriented text detection. He serves as an associate editor for Pattern Recognition, Pattern Recognition Letters, Neurocomputing, and Frontier of Computer Science.

9:00 - 10:00   **Keynote Speech 3**

    Location: Terrsa Hall (West building)

    * for more detail, refer p.51.

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

10:30 - 12:10 **Oral Session 9: Online Handwriting Recognition**

    Location: Terrsa Hall (West building)

    Chair: Eric Anquetil (IRISA - INSA, France)

O9-1   **Design of a Very Compact CNN Classifier for Online Handwritten Chinese Character Recognition Using DropWeight and Global Pooling**

    Xuefeng Xiao, Yafeng Yang, Tasweer Ahmad, Lianwen Jin, Tianhai Chang

O9-2   **Speedup of Parsing for Recognition of Online Handwritten Mathematical Expressions**

    Anh Duc Le, Masaki Nakagawa

O9-3   **A GRU-Based Encoder-Decoder Approach with Attention for Online Handwritten Mathematical Expression Recognition**

    Jianshu Zhang, Jun Du, Lirong Dai

O9-4   **AirScript - Creating Documents in Air**

    Ayushman Dash, Amit Sahu, Rajveer Shringi, John Gamboa, Muhammad Zeshan Afzal, Muhammad Imran Malik, Andreas Dengel, Sheraz Ahmed

O9-5   **Tree-Based BLSTM for Mathematical Expression Recognition**

    Ting Zhang, Harold Mouchere, Christian Viard-Gaudin

10:30 - 12:10 **Oral Session 10: Scene Text Understanding**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Lluis Gomez (Universitat Autonoma de Barcelona, Spain)

O10-1   **Improved Localization Accuracy by LocNet for Faster R-CNN Based Text Detection**

    Zhuoyao Zhong, Lei Sun, Qiang Huo

O10-2   **Scene Text Detection with Novel Superpixel Based Character Candidate Extraction**

    Cong Wang, Fei Yin, Cheng-Lin Liu

O10-3   **Total-Text: A Comprehensive Dataset for Scene Text Detection and Recognition**

    Chee Kheng Ch'ng, Chee Seng Chan

O10-4   **Visual Attention Models for Scene Text Recognition**

    Suman K. Ghosh, Ernest Valveny, Andrew D. Bagdanov

O10-5   **Text Detection Based on MSER and CNN Features**

    Houssem Turki, Mohamed Ben Halima, Adel M. Alimi

12:10 - 14:00 **Lunch Break**

14:00 - 15:20 **Oral Session 11: Historical Document Image Analysis**

    Location: Terrsa Hall (West building)

    Chair: Josep Lladós (Computer Vision Center, Spain)

O11-1   **Geographic and Style Models for Historical Map Alignment and Toponym Recognition**

    Jerod Weinman

O11-2   **Convolutional Neural Networks for Page Segmentation of Historical Document Images**

    Kai Chen, Mathias Seuret, Jean Hennebert, Rolf Ingold

O11-3   **Assisted Transcription of Historical Documents by Keyword Spotting: A Performance Model**

    Adolfo Santoro, Claudio De Stefano, Angelo Marcelli

O11-4   **1990 US Census Form Recognition Using CTC Network, WFST Language Model, and Surname Correction**

    Huaigu Cao, Stephen Rawls, Prem Natarajan

14:00 - 15:20 **Oral Session 12: Font, Writer, and Style Classification**

    Location: Large Conference Room (East building, 3rd Floor)

    Chair: Marcus Liwicki (University of Kaiserslautern, Germany & University of Fribourg, Switzerland)

O12-1   **Convolutional Neural Networks for Font Classification**

    Chris Tensmeyer, Daniel Saunders, Tony Martinez

O12-2   **Unsupervised Feature Learning for Writer Identification and Writer Retrieval**

    Vincent Christlein, Martin Gropp, Stefan Fiel, Andreas Maier

O12-3   **Handwriting Style Mixture Adaptation**

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

O12-4   **How Does a CNN Manage Different Printing Types?**

    Shota Ide, Seiichi Uchida

15:20 - 17:20 **Poster Session 3**

    Location: Seminar Room, Medium Conference Room, AV Study Room (East building, 2nd Floor)

    Chair: Marc-Peter Schambach (Siemens AG, Germany), Muhammad Muzzamil Luqman (University of La Rochelle, France) and Nicholas Journet (University of Bordeaux, France)

P3-1   **Normalised Local Naïve Bayes Nearest-Neighbour Classifier for Offline Writer Identification**

    Hussein Mohammed, Volker Mäergner, Thomas Konidaris, H. Siegfried Stiehl

P3-2   **The Character Generation in Handwriting Feature Extraction Using Variational AutoEncoder**

    Tomoki Yamada, Mariko Hosoe, Kunihito Kato, Kazuhiko Yamamoto

P3-3   **A Comparative Study on Optical Modeling Units for Off-Line Arabic Text Recognition**

    Mohammed Faouzi BenZeghiba

P3-4 **Residual Recurrent Neural Network with Sparse Training for Offline Arabic Handwriting Recognition**

Ruijie Yan, Liangrui Peng, GuangXiang Bin, Shengjin Wang, Yao Cheng

P3-5 **Handwriting Recognition by Attribute Embedding and Recurrent Neural Networks**

J. Ignacio Toledo, Sounak Dey, Alicia Fornés, Josep Lladós

P3-6 **Subspace-Based Convolutional Network for Handwritten Character Recognition**

Bernardo Bentes Gatto, Eulanda Miranda dos Santos, Kazuhiro Fukui

P3-7 **Scan, Attend and Read: End-to-End Handwritten Paragraph Recognition with MDLSTM Attention**

Théodore Bluche, Jérôome Louradour, Ronaldo Messina

P3-8 **Training an End-to-End System for Handwritten Mathematical Expression Recognition by Generated Patterns**

Anh Duc Le, Masaki Nakagawa

P3-9 **GMU: A Novel RNN Neuron and Its Application to Handwriting Recognition**

Li Sun, Tonghua Su, Shengjie Zhou, Lijun Yu

P3-10 **A Compact CNN-DBLSTM Based Character Model for Online Handwritten Chinese Text Recognition**

Kai Chen, Li Tian, Haisong Ding, Meng Cai, Lei Sun, Sen Liang, Qiang Huo

P3-11 **A Faster R-CNN Based Method for Comic Characters Face Detection**

Xiaoran Qin, Yafeng Zhou, Zheqi He, Yongtao Wang, Zhi Tang

P3-12 **Handwritten Music Recognition for Mensural Notation: Formulation, Data and Baseline Results**

Jorge Calvo-Zaragoza, Alejandro H. Toselli, Enrique Vidal

P3-13 **PhyloParser: A Hybrid Algorithm for Extracting Phylogenies from Dendrograms**

Po-shen Lee, Sean T. Yang, Jevin D. West, Bill Howe

P3-14 **Auto-Encoder Guided GAN for Chinese Calligraphy Synthesis**

Pengyuan Lyu, Xiang Bai, Cong Yao, Zhen Zhu, Tengteng Huang, Wenyu Liu

P3-15 **Beyond OCRs for Document Blur Estimation**

Pranjal Kumar Rai, Sajal Maheshwari, Ishit Mehta, Parikshit Sakurikar, Vineet Gandhi

P3-16 **Improved Thresholding Method for Enhancing Jawi Binarization Performance**

Khairun Saddami, Khairul Munadi, Sayed Muchallil, Fitri Arnia

P3-17 **Fourier-Residual for Printer Identification**

Zhen Wang, Palaiahnakote Shivakumara, Tong Lu, Mahadevappa Basavanna, Umapada Pal, Michael Blumenstein

P3-18 **Rank-Reducing Two-Dimensional Grammars for Document Layout Analysis**

Daniel Průša, Akio Fujiyoshi

P3-19 **A Document Straight Line Based Segmentation for Complex Layout Extraction**

Héloïse Alhéritière, Florence Cloppet, Camille Kurtz, Jean-Marc Ogier, Nicole Vincent

P3-20 **Deep Learning System for Automatic License Plate Detection and Recognition**
Zied Selmi, Mohamed Ben Halima, Adel M. Alimi

P3-21 **A Symbol Dominance Based Formulae Recognition Approach for PDF Documents**
Xiaode Zhang, Liangcai Gao, Ke Yuan, Runtao Liu, Zhuoren Jiang, Zhi Tang

P3-22 **Identifying Machine-Printed and Handwritten Texts Using DropRegion and Deep Convolutional Network**
Zhaoyang Yang, Lianwen Jin, Ziyong Feng, Jun Sun, Weiying Zhou

P3-23 **Classification and Information Extraction for Complex and Nested Tabular Structures in Images**
Amir Riad, Christian Sporer, Syed Saqib Bukhari, Andreas Dengel

P3-24 **DeepDeSRT: Deep Learning for Detection and Structure Recognition of Tables in Document Images**
Sebastian Schreiber, Stefan Agne, Ivo Wolf, Andreas Dengel, Sheraz Ahmed

P3-25 **Page Retrieval System in Digitized Historical Books Based on Error-Tolerant Subgraph Matching**
Maroua Mehri, Pierre Héroux, Julien Lerouge, Rémy Mullot

P3-26 **Word Hypotheses for Segmentation-Free Word Spotting in Historic Document Images**
Leonard Rothacker, Sebastian Sudholt, Eugen Rusakov, Matthias Kasperidus, Gernot A. Fink

P3-27 **Technologies and Improvements of Image Search Service for Handwritten Character Patterns on Japanese Historical Documents**
Akihito Kitadai, Miyuki Inoue, Yuichi Takata, Guohua Fang, Hajime Baba, Akihiro Watanabe, Satoshi Inoue

P3-28 **DocEmul: A Toolkit to Generate Structured Historical Documents**
Samuele Capobianco, Simone Marinai

P3-29 **Lexicographical-Based Order for Post-OCR Correction of Named Entities**
Axel Jean-Caurant, Nouredine Tamani, Vincent Courboulay, Jean-Christophe Burie

P3-30 **Offline Signature Verification with VLAD Using Fused KAZE Features from Foreground and Background Signature Images**
Manabu Okawa

P3-31 **Recovering Western On-Line Signatures from Image-Based Specimens**
Moises Diaz, Miguel A. Ferrer, Antonio Parziale, Angelo Marcelli

P3-32 **A Vector Quantization Based Feature Descriptor for Online Signature Verification**
Vivek Venugopal, Abhishek Sharma, Rishabh Singh, Abhinav Sharma, Suresh Sundaram

P3-33 **A Structural Approach to Offline Signature Verification Using Graph Edit Distance**
Paul Maergner, Kaspar Riesen, Rolf Ingold, Andreas Fischer

P3-34 **Local Binary Patterns for Document Forgery Detection**
Francisco Cruz, Nicolas Sidère, Mickaël Coustaty, Vincent Poulain D'Andecy, Jean-Marc Ogier

P3-35 **Towards Automated Ink Mismatch Detection in Hyperspectral Document Images**
Asad Abbas, Khurram Khurshid, Faisal Shafait

P3-36 **Evaluation of Texture Descriptors for Validation of Counterfeit Documents**
Albert Berenguel Centeno, Oriol Ramos Terrades, Josep Lladós i Canet, Cristina Cañero Morales

P3-37 **On the Usage of I-Vector Representation for Online Handwritten Signature Verification**
Hossein Zeinali, Bagher BabaAli

P3-38 **A Robust Symmetry-Based Method for Scene/Video Text Detection through Neural Network**
Yirui Wu, Wenhai Wang, Shivakumara Palaiahnakote, Tong Lu

P3-39 **End-to-End Scene Text Recognition in Videos Based on Multi Frame Tracking**
Xiaobing Wang, Yingying Jiang, Shuli Yang, Xiangyu Zhu, Wei Li, Pei Fu, Hua Wang, Zhenbo Luo

P3-40 **Real-Time Text Localization in Natural Scene Images Using a Linear Spatial Filter**
Xavier Gironés, Carme Julià

P3-41 **Capturing Handwritten Ink Strokes with a Fast Video Camera**
Chelhwon Kim, Patrick Chiu, Hideto Oda

P3-42 **Cascaded Segmentation-Detection Networks for Word-Level Text Spotting**
Siyang Qin, Roberto Manduchi

P3-43 **Color Stability and Homogeneity Regions to Detect Text in Real Scene Images: CSHR**
Houda Gaddour, Slim Kanoun, Nicole Vincent

P3-44 **Scene Text Relocation with Guidance**
Anna Zhu, Seiichi Uchida

P3-45 **Max-Pooling Based Scene Text Proposal for Scene Text Detection**
Dinh Nguyen Van, Shijian Lu, Xiang Bai, Nizar Ouarti, Mounir Mokhtari

P3-46 **Grayscale-Projection Based Optimal Character Segmentation for Camera-Captured Faint Text Recognition**
Fuxi Jia, Cunzhao Shi, Yanna Wang, Chunheng Wang, Baihua Xiao

P3-47 **Learning a Fast Bipartite Ranker for Text Documents Using Lexicographical Rankers and ROC Curves**
Lucas de Souza Rodrigues, Edson Takashi Matsubara, Bruno Magalhães Nogueira

P3-48 **A Multi-Label Neural Network Approach to Solving Connected CAPTCHAs**
Ke Qing, Rong Zhang

P3-49 **Real-Time Document Image Classification Using Deep CNN and Extreme Learning Machines**
Andreas Kölsch, Muhammad Zeshan Afzal, Markus Ebbecke, Marcus Liwicki

P3-50 **A Man-Machine Cooperating System Based on the Generalized Reject Model**
Shunichi Kimura, Eiichi Tanaka, Masanori Sekino, Takuya Sakurai, Satoshi Kubota, Ikken So, Yutaka Koshi

P3-51 **Wearable Handwriting Recognition with an Inertial Sensor on a Finger Nail**
Lei Jing, Zeyang Dai, Yiming Zhou

P3-52   **Automatic Assignment of Topical Icons to Documents for Faster File Navigation**

Rishiraj Saha Roy, Abhijeet Singh, Prashant Chawla, Shubham Saxena, Atanu R. Sinha

P3-53   **Identification of Reader Specific Difficult Words by Analyzing Eye Gaze and Document Content**

Utpal Garain, Onkar Pandit, Olivier Augereau, Ayano Okoso, Koichi Kise

* Competition Outcomes are also displayed at Poster Session Room. for more detail, refer pp.58 - 59.

17:20 - 18:20 **Future Workshop Report & Panel**

Location: Terrsa Hall (West building)

18:20 - 18:30 **Closing**

Location: Terrsa Hall (West building)

Competitions

Competition Outcomes are displayed at Poster Session Room.

In addition, four competitions (Comp17, Comp14, Comp8, Comp2) will have oral presentations on November 13 and 14. Outcome of Competition 3 will be reported on HIP Workshop. A special session on the Robust Reading Competitions will be organized in the CBDAR workshop.

Competitions

Comp1	**cBAD: ICDAR2017 Competition on Baseline Detection**	
	Markus Diem, Florian Kleber, Stefan Fiel, Tobias Grüning, Basilis Gatos	
Comp2	**ICDAR2017 Competition on Layout Analysis for Challenging Medieval Manuscripts**	
	Fotini Simistira, Manuel Bouillon, Mathias Seuret, Marcel Würsch, Michele Alberti, Rolf Ingold, Marcus Liwicki	
Comp3	**ICDAR2017 Competition on Historical Book Analysis**	
	Maroua Mehri, Pierre Héroux, Rémy Mullot, Jean-Philippe Moreux, Bertrand Coüasnon, Bill Barrett	
Comp4	**ICDAR 2017 Competition on the Classification of Medieval Handwritings in Latin Script**	
	Florence Cloppet, Véronique Eglin, Marlène Helias-Baron, Cuong Kieu, Nicole Vincent, Dominique Stutzmann	
Comp5	**ICDAR2017 Competition on Historical Document Writer Identification (Historical-WI)**, Stefan Fiel, Florian Kleber, Markus Diem, Vincent Christlein, Georgios Louloudis, Stamatopoulos Nikos, Basilis Gatos	
Comp6	**ICDAR2017 Competition on Handwritten Text Recognition on the READ Dataset**	
	Joan Andreu Sánchez, Verónica Romero, Alejandro H. Toselli, Mauricio Villegas, Enrique Vidal	
Comp7	**ICDAR2017 Competition on Information Extraction in Historical Handwritten Records**	
	Alicia Fornés, Verónica Romero, Arnau Baró, Juan Ignacio Toledo, Joan Andreu Sánchez, Enrique Vidal, Josep Lladós	
Comp8	**ICDAR2017 Competition on Document Image Binarization (DIBCO 2017)**	
	Ioannis Pratikakis, Konstantinos Zagoris, George Barlas, Basilis Gatos	
Comp9	**ICDAR2017 Competition on Recognition of Documents with Complex Layouts – RDCL2017**	
	Christian Clausner, Apostolos Antonacopoulos, Stefan Pletschacher	
Comp10	**ICDAR2017 Competition on Recognition of Early Indian Printed Documents – REID2017**	
	Christian Clausner, Apostolos Antonacopoulos, Tom Derrick, Stefan Pletschacher	
Comp11	**ICDAR2017 Competition on Page Object Detection**	
	Liangcai Gao, Xiaohan Yi, Zhuoren Jiang, Leipeng Hao, Zhi Tang	
Comp12	**ICDAR2017 Competition on Post-OCR Text Correction**	
	Guillaume Chiron, Antoine Doucet, Mickaël Coustaty, Jean-Philippe Moreux	

Competitions

Comp13　**ICDAR2017 Competition on Reading Chinese Text in the Wild (RCTW-17)**
Baoguang Shi, Cong Yao, Minghui Liao, Mingkun Yang, Pei Xu, Linyan Cui, Serge Belongie, Shijian Lu, Xiang Bai

Comp14　**ICDAR2017 Robust Reading Challenge on COCO-Text**
Raul Gomez, Baoguang Shi, Lluis Gomez, Lukas Numann, Andreas Veit, Jiri Matas, Serge Belongie, Dismosthenis Karatzas

Comp15　**ICDAR2017 Robust Reading Challenge on Text Extraction from Biomedical Literature Figures (DeTEXT)**
Chun Yang, Xu-Cheng Yin, Hong Yu, Dimosthenis Karatzas, Yu Cao

Comp16　**ICDAR2017 Robust Reading Challenge on Omnidirectional Video**
Masakazu Iwamura, Naoyuki Morimoto, Keishi Tainaka, Dena Bazazian, Lluis Gomez, Dimosthenis Karatzas

Comp17　**ICDAR2017 Robust Reading Challenge on Multi-lingual Scene Text Detection and Script Identification – RRC-MLT**
Nibal Nayef, Fei Yin, Imen Bizid, Hyunsoo Choi, Yuan Feng, Dimosthenis Karatzas, Zhenbo Luo, Umapada Pal, Christophe Rigaud, Joseph Chazalon, Wafa Khlif, Muhammad Muzzamil Luqman, Jean-Christophe Burie, Cheng-lin Liu, Jean-Marc Ogier

Comp18　**ICDAR2017 Competition on Arabic Text Detection and Recognition in Multi-resolution Video Frames**
Oussama Zayene, Jean Hennebert, Rolf Ingold, Najoua Essoukri BenAmara

Comp19　**ICDAR2017 Competition on Multi-font and Multi-Size Digitally Represented Arabic Text**
Fouad Slimane, Rolf Ingold, Jean Hennebert

Social Program

Welcome Reception

Date and Time: Sunday, November 12, starting at 19:00
Location: TERSSA Hall, West Building

Banquet

Date and Time: Tuesday, November 14, starting at 19:00
Location: Shunju and Suzaku (2nd Floor) at Rihga Royal Hotel Kyoto
 Online map is available at: https://goo.gl/maps/EEtEcym7DAt

Rihga Royal Hotel Kyoto
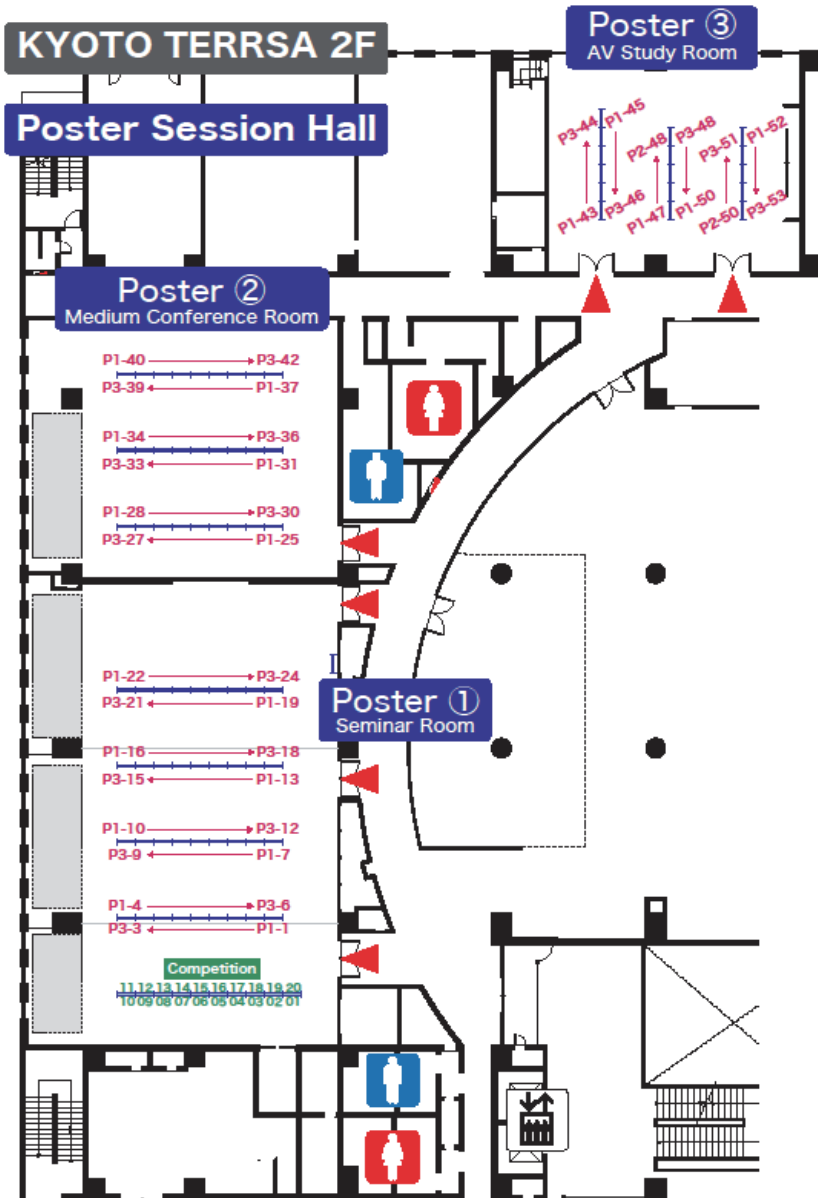**(15 minutes walk from conference venue)**

Kyoto Station

Kyoto TERRSA (Conference Venue)

This map is based on the Digital Map published by Geospatial Information Authority of Japan.

Conference Venue

Kyoto TERRSA (15 minites walk from Kyoto station.)
> 70 Higashikujo Shimotonoda-cho, Minami-ku, Kyoto, Japan
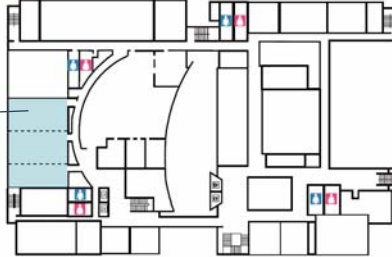> Tel: +81-75-692-3400 Fax: +81-75-692-3402

Pre-Events (November 9-12)

3F

Large Conference Room
Doctoral Consortium (Nov.12)
Special Workshop (Nov.12)

2F

AV Study Room
GREC (Nov. 9-10)
CBDAR (Nov. 11)
IWCDF (Nov. 12)
Tutorial: RTRS (Nov. 12)

Medium Conference Room
HIP (Nov. 10)
ICDAR-WML (Nov. 11)
HDI (Nov. 12)
Tutorial: WS (Nov. 12)

Seminar Room #3
ICDAR-OST (Nov. 10-11)
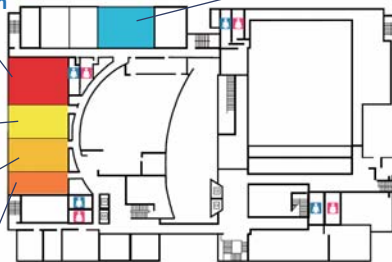Tutorial: GMPRDIA (Nov. 12)

Seminar Room #2
MANPU (Nov. 10)
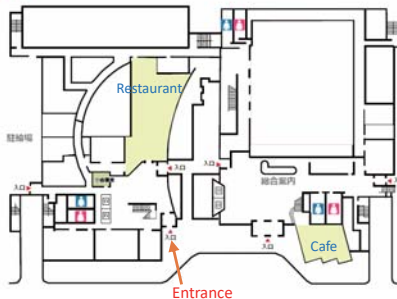MOCR (Nov. 11)
Tutorial: GMPRDIA (Nov. 12)

Seminar Room #1
Registration (Nov. 10-12)

1F

Restaurant

駐輪場

総合案内

Cafe

Entrance

East Building   **West Building**

Conference Venue

Free Wi-Fi   SSID: icdar2017 Password: document
Smoking is not allowed inside the building and in all public places.

Main Conference (November 13-15)

3F

Conference Room D
Meetings

Large Conference Room
Oral 2,4,6,8,10,12
Competition Report 1,2

2F

Study Room Coffee (Nov. 13-15, PM)

AV Study Room
Medium Conference Room
Seminar Room #1, #2, #3
Poster 1,2,3

Terrsa Hall
Reception (Nov. 12)
Keynote 1,2,3
Oral 1,3,5,7,9,11

1F

corridor
Coffee (Nov. 13-15, AM)

Restaurant

駐輪場

総合案内

corridor
Luggage space

front of Terrsa Hall
Registration Desk
(Nov. 12 evening,
 Nov. 13-15)

Cafe

Entrance

East Building   **West Building**

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