



# INTERNATIONAL ASSOCIATION FOR PATTERN RECOGNITION – TC 11 (READING SYSTEMS)

ANNUAL REPORT TO THE EXECUTIVE COMMITTEE, AUGUST 2014

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<http://www.iapr-tc11.org/>

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## 1 BACKGROUND INFORMATION

### 1.1 TC11 LEADERSHIP TEAM

For the past five years, TC11 has constituted a leadership team, which is in charge of supporting the research community and its activities. The structure of the leadership team comprises the following roles.

Role	Name	Affiliation	Email
<b>Chair</b>	Koichi Kise	Osaka Prefecture University, Japan	kise@cs.osakafu-u.ac.jp
<b>Vice Chair</b>	Dimosthenis Karatzas	Computer Vision Centre, Spain	dimos@cvc.uab.es
<b>Webmaster</b>	Masakazu Iwamura	Osaka Prefecture University, Japan	masa@cs.osakafu-u.ac.jp
<b>Dataset Curators</b>	Marcus Liwicki	German Research Center for Artificial Intelligence (DFKI)	liwicki@dfki.uni-kl.de
	Volkmar Frinken	Kyushu University, Japan / UC Davis, Department of Electrical and Computer Engineering, Davis, California	vfrinken@gmail.com
<b>Newsletter Editor</b>	Gernot Fink	TU Dortmund University, Germany	Gernot.Fink@tu-dortmund.de

Over 2015, Dr Volkmar Frinken has joined the TC11 leadership team, in order to assist with the collection and archiving of TC11 public resources, one of the key activities of the TC.

TC11 has a limited number of activities that require financial support. At the time being we consider that a dedicated treasurer position is not required, and the vice-chair will take on this responsibility.



TC11 in collaboration with TC10, have established a new biannual call for hosting a Summer School around the themes of the technical committees. We consider that TC11 should assign an education officer that will participate in the Summer School Steering Committee and will foster further education activities within the TC. For the time being, and until the first edition of the TC10/11 Summer School, the vice-chair assumes the role of the Education Officer.

## 1.2 TC WEBSITE URL

<http://www.iapr-tc11.org/>

## 1.3 NUMBER OF MEMBERS

As of June 21<sup>st</sup>, 2015, there are 1,057 subscribers to the TC-11 mailing list.

## 2 ACTIVITIES IN THE LAST SIX MONTHS .

### 2.1 WEBSITE UPDATES

We continuously maintain and update the TC11 website. Latest additions include the opening of a dedicated section for managing datasets (see section 2.1.2), as well as making public new guidelines for the TC10/11 Summer School organisation (see section



A screenshot of the IAPR TC11 website. The page title is "IAPR-TC11:Reading Systems". The main content area contains the TC-11 IAPR Reading Systems logo and a paragraph of text: "Within the International Association for Pattern Recognition, Technical Committee 11 is concerned with theory and application of Reading Systems. The goal is to understand and develop systems which are able to analyze media containing character symbols and will return an encoded representation of the text content and structure. This area covers research in the off-line recognition of printed texts and handwritten material, research on the automatic on-line recognition of handwriting as in pen-computing applications, as well as research in the analysis of electronic documents such as web pages. Applications include digital libraries, pen-based computing, check and mail reading, signature verification, web mining and content repurposing, web security using human interactive proofs, textual content analysis in videos, and historical document preservation and archiving. The research topics cover all levels of processing, starting with the image or planar coordinates delivered by sensory technology, the necessary image and signal-processing stages, the subsequent segmentation and normalization stages, to feature extraction and selection, classification methods, statistical and syntactical pattern recognition and machine learning techniques." Below this text is a "Contents [hide]" section with a list of links: 1 What's New?, 2 TC11 Officers (2.1 Chair, 2.2 Vice-Chair, 2.3 Webmaster, 2.4 Dataset curator, 2.5 Newsletter editor), 3 Research Areas, 4 Activities (4.1 Journals, 4.2 Conferences, 4.3 Datasets, 4.4 Softwares, 4.5 Projects). The left sidebar contains navigation links (Main Page, Logo, Random page, Help), a search box, and a toolbox with links like "What links here", "Related changes", "Special pages", "Printable version", "Permanent link", and "Browse properties". The top right corner has a "Log in / create account" link. The page is last updated on 2010-05-19.

### 2.1.1 EDUCATIONAL INFORMATION

A list of activities related to education is described in length in the sections below.

#### FOCUS ON STUDENT MEMBERS OF THE TC

As part of our responsibility to support the international research community, we strive to ensure that students benefit as much as any other member of the community through attendance at our conferences and workshops. Certain efforts are directed specifically at students to contribute to their training and to the successful development of their careers, as well as to encourage their continued involvement in the field.

At our three major conferences – ICDAR, DAS and ICFHR – as well as in most TC11 endorsed satellite workshops, IAPR Best Student Paper Awards are given to encourage student participation. See, for example, the following websites for more details.

- ICDAR: <http://www.icdar2013.org/program/awards>
- DAS: <http://das2014.sciencesconf.org/resource/page/id/27>
- ICFHR: <http://www.icfhr2014.org/>

Support for lower student registration fees at our conferences

Students are always allowed to have lower registration fees at all conferences. In addition, efforts are also made to arrange for lower-cost student accommodations when possible.

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## TUTORIALS

Over the past year, the following tutorials have been organised in relation to TC11 activities:

**Handwritten Text Recognition: Word-Graphs, Keyword Spotting and Computer Assisted Transcription**, M. Pastor, V. Romero, J.A. Sánchez, A.H. Toselli and E. Vidal, 1-day tutorial in the context of ICFHR 2014

**Automatic signature verification: state of the art and recent trends**, A. Marcelli, G. Pirlo, M. Liwicki, M. Blumenstein, half day tutorial in the context of ICFHR 2015

**Statistical Models for Handwriting Recognition and Retrieval**, G.A. Fink, half day tutorial in the context of ICFHR 2015

**Everything you always wanted to know about Tesseract**, R. Smith, half day tutorial in the context of DAS 2014

**Building Scalable Solutions for Document Retrieval and Recognition**, C.V. Jawahar, P. Kompali, half day tutorial in the context of DAS 2014

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## DESCRIPTION OF APPLICATION AREAS

- document processing: image-to-text
- check reading
- postal automation: envelope reading
- forms reading and parsing
- graphics recognition and beautification (Also see: TC-10)
- musical score reading
- mathematical equation reading
- signature verification
- pen computing
- real scene text reading

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## EXAMPLES OF SUCCESSFUL PROJECTS

There are many examples of successful projects within the research community, but the TC itself does not directly engage in projects beyond those described elsewhere in this report.

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## DEMOS

The TC itself does not directly engage in creating or hosting demos, although certain demo software is indexed in the TC11 Web site (see section 2.1.2)

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### 2.1.2 REFERENCE RESOURCES (DATASETS, EVALUATION TOOLS)

A priority of TC-11 is to encourage and actively promote the open access to research material and resources related to our research field. In this regard the following actions have taken place over the past year.

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## TC-11 OFFERED RESOURCES – EVOLUTION AND OUTLOOK

We have continued collecting new datasets and software. Our strategy over the past years has been to attempt to host material directly on the TC-11 site to ensure a stable repository, rather than provide unstable external links to resources. The majority of datasets on the TC-11 Web site are indeed increasingly hosted by TC-11. We consider this is a major success of TC-11 and an important contribution to the field.

An overview of the current list of resources made available through the TC11 Web site is provided in Table 1.

Table 1. List of resources made available online through the TC11 Web site (compiled July 2015)

Resource Name	Submission Date	Status
<b>Complex Text Containers</b>		
<a href="#">MSRA Text Detection 500 Database (MSRA-TD500)</a>	Oct 2012	Archived
<a href="#">The Street View Text Dataset</a>	Oct 2012	Archived
<a href="#">The Street View House Numbers (SVHN) Dataset</a>	Jan 2012	Archived
<a href="#">NEOCR: Natural Environment OCR Dataset</a>	Oct 2011	Archived
<a href="#">KAIST Scene Text Database</a>	Jan 2011	Archived
<a href="#">ICDAR 2003 Robust Reading Competitions</a>	Jun 2011	Archived
<a href="#">ICDAR 2005 Robust Reading Competitions</a>	Jun 2011	Archived
<b>Machine-printed Documents</b>		
<a href="#">Table Ground Truth for the UW3 and UNLV datasets</a>	May 2010	Archived
<a href="#">The DocLab Dataset for Evaluating Table Interpretation Methods</a>	Aug 2010	Archived
<a href="#">PRImA Layout Analysis Dataset</a>	Jan 2011	Linked
<a href="#">DFKI Dewarping Contest Dataset (CBDAR 2007)</a>	Mar 2011	Linked
<a href="#">APTI: Arabic Printed Text Image Database</a>	Nov 2009	Linked
<a href="#">LRDE Document Binarization Dataset</a>	May 2013	Archived
<a href="#">RETAS OCR Evaluation Dataset</a>	May 2013	Linked
IIIT 5K - Word	Feb 2015	Archived
<b>Graphical Documents</b>		
<a href="#">Chem-Infty Dataset</a>	Jun 2010	Archived
<a href="#">Braille Dataset - Shiraz University</a>	Jul 2011	Archived
<a href="#">TradeMarks Image Database</a>	Sep 2012	Archived

Resource Name	Submission Date	Status
Mixed Content Documents		
<a href="#">Tobacco800 Document Image Database</a>	Jan 2011	Linked
Handwritten Documents		
<a href="#">ICDAR 2009 Signature Verification Competition</a>	Jan 2012	Archived
<a href="#">ICFHR 2010 Signature Verification Competition</a>	Jun 2012	Archived
<a href="#">ICDAR 2011 Signature Verification Competition</a>	Jan 2012	Archived
<a href="#">ICFHR 2012 Signature Verification Competition</a>	Jun 2012	Archived
<a href="#">CASIA Online and Offline Chinese Handwriting Databases</a>	Mar 2011	Linked
Persian Heritage Image Binarization Dataset (PHIBD 2012)	May 2013	Archived
<a href="#">CROHME: Online Handwritten Mathematical Expressions</a>	Oct 2012	Archived
<a href="#">Devanagari Character Dataset</a>	Nov 2010	Archived
<a href="#">HIT-OR3C</a>	Apr 2012	Archived
<a href="#">IAM Online Document Database (IAMonDo-database)</a>	Jun 2010	Archived
<a href="#">IAM On-Line Handwriting Database</a>	Mar 2010	Linked
<a href="#">UNIPEN database</a>	Aug 2009	Linked
<a href="#">Nakagawa Lab Online Handwriting Database</a>	Aug 2009	Linked
<a href="#">The Informal Competition of Recognizing On-line Words (ICROW)</a>	Aug 2009	Linked
<a href="#">The Rimes Database</a>	May 2013	Linked
<a href="#">IBN SINA: Arabic manuscripts images</a>	May 2010	Archived
<a href="#">CEDAR Off-line Handwriting CDROM1</a>	Aug 2009	Linked
<a href="#">IAM Database</a>	Aug 2009	Linked
<a href="#">The GERMANA Dataset</a>	Feb 2011	Linked



Resource Name	Submission Date	Status
<a href="#">The RODRIGO Dataset</a>	Feb 2011	Linked
<a href="#">MARG- Medical Article Records Groundtruth</a>	Aug 2009	Linked
<a href="#">Hindi font samples</a>	Aug 2009	Linked
Signature Verification (SigWiComp2013)	Feb 2015	Archived
ICFHR 2014 CROME competition, for mathematical symbols	Feb 2015	Archived
ICFHR 2013 Gender Identification Competition Dataset	Jan 2015	Archived
Software and Tools		
<a href="#">GEDI: Groundtruthing Environment for Document Images</a>	Feb 2011	Linked
<a href="#">PixLabeler</a>	Jun 2012	Linked
<a href="#">OCROPUS(tm)</a>	Jun 2012	Linked
<a href="#">The Hidden Markov Model Toolkit (HTK)</a>	Jun 2012	Linked
<a href="#">Bidirectional Long-Short Term Memory Networks</a>	Jun 2012	Linked
<a href="#">SRILM - The SRI Language Modeling Toolkit</a>	Jun 2012	Linked
<a href="#">Torch 5</a>	Jun 2012	Linked
<a href="#">PRTools</a>	Jun 2012	Linked
<a href="#">Europeana API</a>	July 2014	Linked
<a href="#">Tools from the IMPACT Centre of Competence</a>	July 2014	Linked
Ground Truths		
Ground Truth for tables in dataset UNLV	Jun 2014	Archived
Ground Truth for tables in dataset UNLV	Jun 2014	Archived

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## POLICIES AND DATASET SOURCING ACTIVITIES

One of the priorities defined at the start of our term was to maintain an active attitude in soliciting datasets and increase the visibility of the TC-11 Web site as the prime place to host datasets and other resources relevant to the field. One way to increase visibility has been to announce new material archived through the TC-11 newsletter, giving thus further incentives for authors to submit resources to the TC-11.

On the other hand, we actively invite authors who present new datasets or other relevant material at TC-11 conferences to provide such materials to TC-11 for archiving. This seems to work, by creating good responses especially after TC-11 conferences. As an indication, following this practice over the past years we have archived on the TC-11 site relevant material originally published in the conferences listed below. It can be appreciated that while only TC-11 events were covered until 2009, over the past years the reach of TC-11 has expanded over and above our own events, sourcing relevant resources to the field from an increasing number of leading conferences.

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## RESOURCES WEB PORTAL

We have recently released an improved Web interface for submitting material to TC-11 that allows among others:

- Online submission of material, including direct uploading of related files
- Unique identifiers for submitted datasets for easy referencing
- Easy versioning
- User ranking
- Downloads counts (which provides an indirect measure of relevance / quality)
- User comments

The new Web portal can be found at <http://tc11.cvc.uab.es/>

The development of the Web portal has been funded through profits from IAPR related activities (\$ 1297 from the RNN/LSTM tutorial in ICDAR 2013) as well as financial support at the level of 2520 EUR from the IAPR ExCo. It is our intention to continue the development of this platform, and make it available to other IAPR TCs.

## Introduction

To verify results and create novel research, it is extremely important for the Document Image Analysis and Recognition (DIAR) community to be able to cross check and reproduce results described in published papers in the field. In order to achieve this, any datasets used as the basis for publications should be publicly available, as is the norm in many other disciplines.

Authors are actively encouraged to submit the datasets they used to train and/or evaluate their algorithms to their TC(s) in order for them to be published on the corresponding Web sites.

This initiative is not restricted to datasets. We are interested in archiving online any piece of data (ground-truth data, software, etc.) which would allow to easily reproduce results, set new targets, foster healthy competition, encourage collaboration and generally advance the DIAR field as a whole.

### News

- 01/13/2013  
[The new TC11 Online Resources site is open for testing](#)

The hosting of datasets and other resources is currently taken care of through infrastructure provided by members of the TC11 leadership team. We consider that hosting of Web pages, including hosting space for datasets, should eventually be tackled centrally for all TCs at the IAPR level.

## 2.2 ACTIVITIES

### 2.2.1 EVENTS

TC11 has the following three key events held biennially:

Event	Frequency	Topic area
<b>ICDAR</b> International Conference on Document Analysis and Recognition	biennial, odd years	all fields on document analysis and recognition
<b>ICFHR</b> International Conference on Frontiers in Handwriting Recognition	biennial, even years	handwriting recognition and its related areas
<b>DAS</b> International Workshop on Document Analysis Systems	biennial, even years	document analysis methods and systems

In addition, TC11 and its members are involved in the following workshops which are held in conjunction with major events such as ICDAR and ACCV:

Event	Frequency	Topic area
<b>CBDAR</b>	International Workshop on Camera-Based Document Analysis and Recognition	biennial, odd years camera-based analysis of documents
<b>MOCR</b>	International Workshop on Multilingual OCR	biennial, odd years methodologies for multilingual document analysis systems with particular focus on OCR
<b>HIP</b>	Historical Document Imaging and Processing	Biennial, odd years imaging, collection, and processing of historical documents
<b>AFHA</b>	Workshop on Automated Forensic Handwriting Analysis	Biennial, odd years Signature and HW verification / identification, intra- and inter-writer variations
<b>IWRR</b>	International Workshop on Robust Reading	First organized in 2014 Scene text localisation, segmentation, and recognition, born-digital and video text

#### CONFERENCES AND WORKSHOPS DURING THE REPORTING PERIOD

During the period covered by the report, the following events were organized by TC11 or are planned to take place in the near future. All events are active as shown in the statistics of the number of presented papers as well as participants.

Event	Dates	Venue	Stats & URL
<b>ICDAR2015</b>	August 23-26, 2015	Nancy, France	# submitted papers: 401 # accepted papers: 230 (89 oral, 141 poster) <a href="http://2015.icdar.org/">http://2015.icdar.org/</a>

<b>ICFHR2014</b>	September 18-20, 2012	Bari, Italy	# submitted papers: 158 # accepted papers: 132 # participants: over 150 <a href="http://www.icfhr2012.uniba.it/">http://www.icfhr2012.uniba.it/</a>
<b>DAS 2014</b>	April 7-10, 2014	Tours, Loire Valley, France	# submitted papers: 138 # accepted papers: 73 (27 oral, 46 poster) # participants: 145 <a href="http://das2014.sciencesconf.org/">http://das2014.sciencesconf.org/</a>

In addition to the above key events, the TC is also involved in several other events, some of which are endorsed by IAPR.

Event	Dates	Venue	URL, etc.
<b>MOCR2015</b>	August 22, 2015	Nancy, France	<a href="http://www.cubs.buffalo.edu/MOCR2015/">http://www.cubs.buffalo.edu/MOCR2015/</a> in conjunction with ICDAR2015
<b>HIP2015</b>	August 22, 2015	Nancy, France	<a href="http://hip2015.irisa.fr/">http://hip2015.irisa.fr/</a> in conjunction with ICDAR2015
<b>CBDAR2015</b>	August 22 2015	Nancy, France	<a href="http://www.cvc.uab.es/cbdar2015/">http://www.cvc.uab.es/cbdar2015/</a> in conjunction with ICDAR2015
<b>AFHA2015</b>	August 22, 2015	Nancy, France	<a href="http://www.dfki.uni-kl.de/afha2015/index.html">http://www.dfki.uni-kl.de/afha2015/index.html</a> in conjunction with ICDAR 2015
<b>IWRR 2014</b>	Nov. 2, 2014	Singapore	<a href="http://imlab.jp/iwrr2014/">http://imlab.jp/iwrr2014/</a> in conjunction with ACCV 2014

### 3RD INT. DOCUMENT IMAGE PROCESSING SCHOOL

Apart from conferences and workshops, TC11 has endorsed the organisation of the 3rd Int. School on Document Image Processing, which took place in Kefalonia, Greece, in 24-27 June



2015. It was attended by seven students, and comprised 10 two-hour lectures, four case study presentations, and a poster session. Student feedback has been overly positive, with suggestions for including hands-on sessions in possible future editions. The Web site of the event is: <http://samosweb.aegean.gr/idips2015/>

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### 3RD ICDAR DOCTORAL CONSORTIUM

TC11, in collaboration with TC10, is organizing once more the ICDAR Doctoral Consortium, in the context of the 2015 edition of the conference.

The ICDAR Doctoral Consortium it is considered a core activity of the ICDAR conference series. The goal of the Doctoral Consortium is to create an opportunity for Ph.D. students to test their research ideas, present their current progress and future plans, and receive constructive criticism and insights related to their future work and career perspectives. A mentor (a senior researcher who is active in the field) is assigned to each student to provide individual feedback. In addition, students have the opportunity to present an overview of their research plan during a special poster session.

Through an open call for participation, 18 Ph.D. students have registered for the third edition of the ICDAR Doctoral Consortium. For every PhD student a dedicated mentor was assigned who were called upon among mentors from previous DCs and senior members of the research community. There are no registration fees for the Ph.D. students or their assigned mentors. The event is planned to take place the day before the main ICDAR conference, on the afternoon of Sunday, Aug. 23. The tentative schedule is as follows:

- 1:30 pm – 2:00 pm: Welcome and short talk: “Advice for a Successful Ph.D. Experience”
- 2:00 pm – 3:00 pm: Brief oral introductions to student research plans (poster teasers)
- 3:00 pm – 3:20 pm: Coffee break
- 3:20 pm – 5:00 pm: Student poster session with discussion and feedback

Further details regarding the 2015 ICDAR Doctoral Consortium can be found on the conference website: <http://2015.icdar.org/doctoral-consortium/>



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### 2.2.2 PUBLICITY

Over the past years, we continued to employ two types of communication: our Web site and a monthly email newsletter.

The TC11 newsletter, which is published every month, distributes the following information to its readership:

- regular content:
  - overview of most important conference-related dates (especially paper submission deadlines)
  - overview of new and recently published Datasets (introduced 10/2012), which is intended to increase the general awareness of publicly available datasets and to promote their use for benchmarking in future research efforts and related publications
- on-demand content:
  - new/updated calls-for-papers for TC-11 related conferences and workshops as well as journal special issues and books
  - detailed announcements of new datasets available via the TC-11 website (in addition to the new overview section on "New and Recently Published Datasets")
  - job opportunities
  - event reports (conferences, workshops)

The TC-11 Web site provides visitors an up-to-date calendar of upcoming and past events of TC11 interests, newsletter archives, and related datasets. With the support of IAPR we have created a Web portal that facilitates the collection and archiving of new resources (see section 2.1.2)

Past newsletters are archived online on our website:

[http://www.iapr-tc11.org/mediawiki/index.php/Newsletter\\_Archive](http://www.iapr-tc11.org/mediawiki/index.php/Newsletter_Archive).

### 3 PLANS (TIMELINE UNTIL ICPR 2016 AND BEYOND)

We have the following plan for the period 2015-2016.

#### 3.1.1 WEB SITE

The following upgrades are planned.

- (1) Sourcing and archiving educational materials such as tutorials at ICDAR and DAS.
- (2) Collecting video messages of prominent figures of the community. We call it “living history” project proposed by Prof. Dan Lopresti.

#### 3.1.2 SOCIAL MEDIA

In addition to the monthly newsletter, we will investigate the option of using social media such as twitter and LinkedIn for supporting TC11 members. The introduction of an assistant from the TC11 community would be planned to support the management of such platforms.

#### 3.1.3 FIRST TC10/11 SUMMER SCHOOL

We are currently in the process of inviting bids for hosting the first TC10/11 Summer School in the summer of 2016.

#### 3.1.4 IMPROVING THE QUALITY OF THE ICDAR CONFERENCE

In cooperation with the TC10 team, we aim to make ICDAR, our main conference series, more attractive to the research community.

In ICDAR2013, we introduced the “rebuttal process” to make the reviewing process more reasonable and transparent to authors. In ICDAR2015, we introduced “area chairs” to evaluate reviews and rebuttals at a higher detail. We expect that with a reasonable control of the acceptance rate along with the above new trials, the conference will be more attractive and meaningful for many researchers.