International Association for Pattern Recognition

Technical Committee 10
Graphics Recognition

Activity report for the period: June 2003 – May 2004

http://www.iapr-tc10.org/

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1. TC-10 AIMS AND SCOPE

Graphics recognition is a particular topic in the field of computer vision, and more specifically in the domain of document analysis, devoted to the analysis of any kind of graphical information. Along with optical character recognition (OCR) and document layout analysis, graphics recognition forms the broader area of document image analysis and recognition. Examples of graphic documents are maps, plans, tables, diagrams and drawings, graphical symbols in PDAs, pen-based user interfaces, etc. The relevance of research in graphics recognition comes from both scientific contribution and application development.

From the scientific point of view, graphics recognition has significantly contributed to research in computer vision and pattern recognition methods. Many different tasks are involved in the analysis of graphical information, covering all steps of image analysis systems: from low-level techniques, such as binarization, noise removal or vectorization, to pattern recognition methods for symbol recognition and knowledge-based systems for semantic interpretation.

From the application point of view, graphics recognition can be applied to a wide range of problems: raster-to-vector conversion of the huge amount of existing plans and maps, 3D-reconstruction, semantic drawing interpretation, information retrieval and navigation in large sets of graphic documents or development of more friendly user interfaces through input of graphic information with pen-based systems.

IAPR's Technical Committee 10 on Graphics Recognition promotes interaction among researchers working in document image analysis in general, and *graphics recognition* in particular. Topics of primary interest to members of this Technical Committee are:

- raster-to-vector techniques.
- recognition of graphical primitives.
- Recognition of graphic symbols in charts, diagrams, and drawings.
- Interpretation of engineering drawings, maps, charts, tables, diagrams, and other graphical documents.
- 3-D models from multiple 2-D views (line drawing).
- performance evaluation in graphics recognition.
- Systems for graphics recognition.
- Graphics-based information retrieval and browsing.
- Graphics multimedia ad web-based documents.
- Graphics-based user interfaces.

The former TC10 chairs were: R. Kasturi (USA), K. Tombre (France), A. Chhabra (USA), Y.B. Kwon (Korea). Continuing with the work of such chairs, in the current chairmanship the goal is to continue in the direction of promoting activities and the exchange of new ideas and knowledge among active researchers in the field of graphics recognition and also other related fields.

2. TC-10 STRUCTURE AND ORGANIZATION

2.1. Chairmanship

TC10 chair: Dr. Josep Lladós, Computer Vision Center, Universitat Autònoma de Barcelona, Spain.

TC10 vice-chair : Dr. Dorothea Blostein, Kingston University, Canada.

2.2. Membership

Currently, TC-10 has 260 members worldwide. To become a member of TC-10, people is asked to fill out the enrolment form at the TC-10 web site. TC-10 members are periodically informed through the members mailing list about graphics recognition activities and news. Now, the TC10 member list needs to be updated since many members have changed jobs and email addresses. For that reason, a resubscription round is currently open.

2.3. Web site

IAPR-TC10 has a reserved domain http://www.iapr-tc10.org/

The TC10 web site is hosted at the Computer Vision Center, the institution of the TC10 chairman. The web site has been redesigned to be the main forum of interaction between graphics recognition researchers. The web site contains recent information about activities, conferences and news related to the field. In addition, in the redesign of the site, we have put a particular attention in the resources and forum sections. Thus, links to graphics recognition resources are available and also evaluation datasets and performance evaluation protocols can be downloaded from the site. We are also working on an educational section that collects keynote papers, monographs or presentations. On the other hand, in the forum section, researchers have the opportunity to discuss on particular topics on graphics recognition, open new discussion topics, state open problems and give feedback to the TC10 chairmanship with their comments and suggestions.

Figure 1. The IAPR-TC10 home page

The TC-10 web site consists of the following sections:

- Home
- Membership
- Information on activities of TC-10
- Pointers to related conferences
- Archives of TC-10 News
- Forum
- Resources interesting for the TC-10 community at large

2.4. Mailing list

An electronic mailing with news of interest to the research community is sent out periodically to TC10 members. Copies of past issues are available on-line under the link *TC10 News* in the web site. The TC-10 News includes information about upcoming conferences and workshops and other news of interest to members.

3. TC10 START-UP BUDGET

For the period 2002-2004, the treasurer of the IAPR approved the start-up budget of 2000€ for the TC10. This budget, in addition to a budget from the institution of the TC10 chair, aims to cover the following expenses:

- TC10 web server and web domain. The web has been redesigned and new contents have been added. Also, a new domain has been reserved and its fee is approx. 300 euros per year.

- ICDAR awards. Part of the budget has been used to pay the trophies of the last ICDAR Awards edition.

- Personnel. Students working on the web page, the symbol recognition database, etc.

- Administrative expenses.

4. EVENTS

TC-10 collaborates and promotes the organization of two main events. First, The Graphics Recognition Workshop series, every two years, is the main activity of the Graphics Recognition community. Second, The International Conference on Document Analysis and Recognition (ICDAR), the main activity of the whole document analysis community.

4.1. 7th International Conference on Document Analysis and Recognition

Conference chairs:	Andy Downton University of Essex, UK e-mail: acd@essex.ac.uk
	Mike Fairhurst University of Kent, UK e-mail: M.C.Fairhurst@ukc.ac.uk
Conference home page:	http://www.essex.ac.uk/ese/icdar2003/

The ICDAR conference is an international forum for furthering the state-of-the-art in document recognition, understanding, management and retrieval, including multimedia documents. It brings together both researchers and practitioners from divergent fields such as Computer Vision, Pattern Recognition, Machine Learning and Information Retrieval, to identify important problems, explore novel applications and exchange ideas for developing robust solutions in the field of Document Analysis. ICDAR is co-sponsored by the IAPR Technical Committees TC10 (Graphics Recognition) and TC11 (Reading Systems).

ICDAR2003 took place on 3-6 August in Edinburgh, Scotland, at the Edinburgh Conference Centre. It was organized by Andy Downton and Mike Fairhurst. It was a big success, characterized by: 310 delegates, interesting invited lectures, presentations, posters, nice weather, good food and a perfect organization.

In addition to the high quality papers, the conference featured the following keynote speakers: Henry Baird ("Digital Libraries and Document Image Analysis"), Horst Bunke ("Recognition of Cursive Roman Handwriting – Past, Present and Future"), Andreas Dengel ("Making Documents Work: Challenges for Document Understanding"), David Doermann ("Progress in Camera-Based Document Image Analysis"), Michael Fairhurst ("Document identity, authentication and ownership: The future of biometric verification"), Ching Suen ("Analysis and Recognition of Asian Scripts – the State of the Art"), and Karl Tombre ("Graphics Recognition – from Re-engineering to Retrieval"). Copies of keynote presentations can be found at the ICDAR2003 web site (http://www.essex.ac.uk/ese/icdar2003/).

The technical program was completed by a very nice social program. Conference delegates and accompanying persons had the opportunity to enjoy a Scottish banquet at Murrayfield international rugby football ground. The banquet had good meals (including the typical haggis), Scottish whisky, musical entertainment and dancing. During the banquet, the ICDAR2003 Awards ceremony was held. The awardees were Dr. Henry Baird (senior researcher award) and Dr. Liu Wenyin and Dr. Umapada Pal (young researcher awards). More details and a log of the event written by Lambert Schomaker can be found in the TC10 and TC11 web page.

The next ICDAR Conference will take place in Seoul, Korea. For further information, please visit http://www.ICDAR2005.org. During the TC10-TC11 joint meeting in Edinburgh, a bid for the organization of ICDAR'2007 was presented. After a ballot period among the community members, the ICDAR Advisory Board ratified the proposal that ICDAR 2007 will be held in Curitiba, Brazil.

4.2. 5th International Workshop on Graphics Recognition

Workshop chairs:	Josep Lladós
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	e-mail: josep@cvc.uab.es
	Young-Bin Kwon
	Department of Computer Engineering
	Chung-Ang University, South Korea
	e-mail: ybkwon@visionnet.cse.cau.ac.kr
Workshop home page:	http://www.cvc.uab.es/Grec2003/

The IAPR International Graphics Recognition Workshop (GREC) is the main activity of the IAPR-TC10. The Fifth edition (GREC2003) was held in the Computer Vision Center (Barcelona) the July 30 and 31, 2003 and chaired by Josep Lladós and Young-Bin Kwon. 48 papers were received (43 papers accepted in the final scientific program). The workshop had 45 registered participants.

Following the tradition of the previous workshops in the series, the scientific program was organized in a single-track 2-day workshop. It comprised several sessions dedicated to specific topics. For each session, there was an overview talk, followed by a number of short presentations. Each session was concluded by a panel discussion. Session topics included vectorization and primitive-level processing, symbol recognition, perceptual organization, document retrieval by graphical content, document mining, systems and architectures, technical drawings, maps, charts, on-line processing, user interfaces and performance evaluation. Selected papers of GREC2003 will be published in a book of Springer LNCS series.

The social program consisted in a sightseeing tour visiting the most emblematic places in Barcelona, and afterwards the attendees enjoyed the workshop banquet with musical entertainment held at the Romanesque Monastery in the Poble Espanyol of Montjuic.

After GREC2003, we have ten years of experience in GREC Workshops. During GREC2003 some opinions suggested that it is time to analyze it and "design" the future editions of GREC workshops in terms of the feedback from the community. Issues like the length and format of the Workshop, the relation with ICDAR, the collaboration with other close communities, etc. are stated. In order to define and improve the future editions of GREC workshop a committee will be created. This committee will take into account the feedback from the community. With that purpose, a questionnaire was distributed in Barcelona among participants. People interested in filling in the questionnaire can get it from the TC10 web site.

The Sixth GREC Workshop will be held in Hong-Kong (China) in 2005, and will be organized by Dr. Liu Wenyin.

4.3. International Graphics Recognition Contest

Two contests were held during GREC2003: The second arc segmentation contest, organized by Liu Wenyin, with 2 participants. The first symbol recognition contest, organized by Ernest Valveny and Philippe Dosch, with 4 participants. The contests were a big success, and the inclusion of them has become a key issue in GREC workshops. Contests are useful not only to evaluate the state-of-the-art on algorithms related to different problems of graphics recognition, but also to provide evaluation databases to the community. This time, all the material used in the contests was distributed in a CD among GREC2003 delegates and is available at the TC10 web page.

Arc Segmentation Contest

Arc segmentation is a classical process related to vectorization and line drawing interpretation. In the past GREC'2001, held in Kingston (Canada), an Arc Segmentation Workshop was organized. In GREC'2003 a new edition of such contest was done with the aim of evaluating the progress of the methods presented by the participants in 2001 and also to encourage the scientific community to contribute with new methods. The contest had two participants.

Contest chair: Liu Wenyin
Dept. of Computer Science
City University of Hong Kong,
Hong Kong
e-mail: csliuwy@cityu.edu.hk

Contest home page: http://www.cs.cityu.edu.hk/~liuwy/ArcContest/ArcSegContest.htm

Symbol Recognition Contest

Symbol recognition is one of the central problems of Graphics Recognition. A lot of symbol recognition methods can be found in the literature. However, they are generally very ad-hoc and domain dependent methods. it is necessary to define sound performance evaluation methods to compare them. GREC'2003 was a good framework to start a work on symbol recognition evaluation. The contest had four participants.

Contest chairs: Ernest Valveny
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Barcelona, Spain
e-mail: ernest@cvc.uab.es

Philippe Dosch
LORIA
Nancy, France
e-mail: Philippe.Dosch@loria.fr

Contest home page: http://www.cvc.uab.es/Grec2003/SymRecContest/

5.   EDUCATIONAL ACTIVITIES

5.1. Educational resources at the TC-10 web page

This section in the TC10 web site is devoted to collect keynote papers, literature reviews, monographs, courses, or presentations on different Graphics Recognition topics. From the TC10 we encourage the community at large to submit material. Any format will be welcomed.

5.2. Training impact of the Graphics Recognition Workshops

The conference gathers many qualified experts from all around the world, being the most up-to-date conference in Graphics Recognition currently taking place. The GREC workshops provide an excellent opportunity for researchers at all levels of experience to share insights into graphics recognition methods. Not only the attendance of the most outstanding Scientifics of the field and its active participation in the conference sessions generates a valuable training environment but also the structure of the conference. Thus, the conference consists of a single track that comprises several sessions dedicated to specific topics. For each session, there is a tutorial talk given by a leading scientific describing the state of the art and stating the open questions for the session's topic, followed by a number of short presentations that will contribute to answer the open questions of the leading speaker or presenting results of a particular work on the session topic. Each session is concluded by a panel discussion. Young researchers can take advantage of the tutorial talk describing the state of the art of the topic and they are also encouraged to present its own research advances, participating in short presentations and getting feedback from the audience. The limitation of the attendance to a maximum of 80 people will contributes facilitate young researchers to contact senior researchers and have scientific discussions and exchange of ideas.

With the aim that young researches can attend to the conference and take advantage of it for its own research activity, PC members are asked to perform a soft review of contributions, allowing students to participate in the workshop not only presenting finished work but new ideas and future research aims.

Finally, an additional remark on the training impact for young researchers is the contest. Each GREC workshop organizes a contest to evaluate the performance of algorithms on a particular topic of graphics recognition. The contest is not proposed as a competitive activity but as a tool for students to get objective evaluations of their work regarding to other similar ones, and promote exchange of ideas between people working in the same problems.

6.   OTHER ACTIVITIES

6.1. ICDAR Steering Committee

The TC10 chair is a member of the ICDAR steering committee. Such committee was installed in 2001 in order to (a) keep track of the organisational process of current and forthcoming ICDAR conferences, and (b) to maintain the organisational and 'cultural' coherence in this conference series. The members of the ICDAR steering committee are: Andreas Dengel (former ICDAR organizer), Josep Lladós (TC10 chair), and Lambert Schomaker (TC-11 chair).

6.2. ICDAR Awards

An ICDAR Award Program has been established to recognize individuals who have made outstanding contributions to the field of Document Analysis and Recognition in one or more of the following areas:

- Research

- Training of students

- Research/Industry interaction

- Service to the profession

Every two years, up to 3 awards are given, one of these being specifically dedicated to a young investigator (less than 40 years old at the time the award is made). Each award consists of a token gift and a suitably inscribed certificate. The organization of the ICDAR Award Program is done by IAPR TC-10 and TC-11. A call for nominations is distributed among ICDAR, TC10 and TC11 mailing lists and also the ICDAR and IAPR web pages. The ICDAR2003 Awards ceremony was held in Edinburgh on August 5, 2004. The awardees were Dr. Henry Baird (senior researcher award) and Dr. Liu Wenyin and Dr. Umapada Pal (young researcher awards). See the section concerning ICDAR2003 for more details.

6.3. LNCS post-GREC2003 volume

Traditionally, after the GREC workshop, a selection of best papers is published in a volume of Lecture Notes in Computer Science (Springer). Edited volumes from the previous workshops in the series are available as *Lecture Notes in Computer Science*: LNCS Volume 1072 (GREC95 in Penn State University, USA), LNCS Volume 1389 (GREC97 in Nancy, France), LNCS Volume 1941 (GREC99 in Jaipur, India), and LNCS Volume 2390 (GREC01 in Kingston, Canada). Now, the review process is finished and the book is in press. More details on the book contents are:

LECTURE NOTES IN COMPUTER SCIENCE - Volume 3088

Graphics Recognition. Recent Advances and Perspectives

5th International Workshop, GREC 2003. Barcelona, Catalonia, Spain 2003
Selected Papers

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6.4. ICDAR 2005 and GREC 2005

The TC10 co-sponsorizes the next ICDAR conference and GREC workshop.

The 8th International Conference on Document Analysis and Recognition (ICDAR'2005) will be held in Seoul (Korea) from August 29 to September 1. More information at http://www.icdar2005.org.

the Sixth International Workshop on Graphics Recognition (GREC'2005), organized by IAPR TC-10, will be held at the City University of Hong Kong, Hong Kong on August 25-26, 2005, just before ICDAR'2005. More information available at http://www.cs.cityu.edu.hk/grec2005.

6.5. Symbol Recognition database

Symbol recognition is one of the main research activities of Graphics Recognition. In the last GREC workshop, the first international symbol recognition contest was held. For the contest, a ground truth was created compiling different symbol images and defining a performance evaluation protocol. The database can be downloaded from the TC10 web page. Currently, promoted from the TC10, a new symbol recognition database is being created. This database will consist of more than 5000 symbol images, taken using a sketchy interface. Therefore, the database will contain a large number of hand-drawn symbol instances, either on-line and off-line. This database will be available at the TC10 homepage in the near future.

7. 2004-2006 WORKPLAN

The main objectives for the next two years are:

- Keep on being involved in the classical activities: GREC workshop, ICDAR conference, ICDAR Awards, LNCS after GREC workshop.

- Improve the web page, mainly focusing on: add contents to the educational section, promote the forum section as a dynamic way to exchange ideas among TC-10 community.

- Special issue on Graphics Recognition in International Journal on Document Analysis and Recognition (IJDAR). From the TC10 we are now promoting the edition of a special issue on graphics recognition covering the state of the art and the relevant advances in the field.

- Collect datasets and performance evaluation algorithms, mainly from the contests held during GREC2003, and create a special section in the TC10 web site in order the scientific community to evaluate the results of their research. It is important to continue with the definition and development of standard databases and benchmarking protocols in different graphics recognition domains in order to compare approaches from different researchers. As we have described in the previous section, we are working on a comprehensive symbol recognition database.