THE INTERNATIONAL ASSOCIATION FOR PATTERN RECOGNITION

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From the Editor's Desk: A deep learned black box?

by Arjan Kuijper
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By the time you read this editorial you'll know if your paper got accepted to ICPR 2016 (see "See you in Cancun!" in this issue). I hope you got positive news! I'm looking forward to seeing many colleagues in Cancun and to getting inspired by all the new ideas presented in the oral and poster sessions. Much work needs to be done in organizing such a big event. Obviously, there are a lot of local arrangements to be made, but also the paper reviewing process requires the time and energy of many, many people. I'd like to thank all of you who have been involved so far!

Since, at the time I am writing this, I do not yet know the outcome of the review process, the contents of the program are not yet known to me. One intriguing question that I now have is how many papers will deal with deep learning. In this newsletter you find a reprinted (with permission) column from LinkedIn by Nikos Paragios, École Central & INRIA in Paris, entitled "Computer Vision Research: The

deep 'depression'". (Pause...click here to read Nikos's column...read on).

Deep learning has become a hot topic in imaging/computer vision and has started dominating the programs of major conferences. Is "deep learning" a synonym for "black box" and do we only use it in increasingly complicated pipeline systems for improving benchmarks and detecting whatever patterns? Or do we contribute to understanding this black box?

The days in which computers had very small computational power are behind us, and so are the days when "I add noise to Lena and my algorithm removes it yielding a PSNR of 42" papers were accepted. Simple methods do not seem to be sufficient anymore. Complicated, perhaps even incomprehensible, algorithms have been made available and do their job very well. Do we accept this and start engineering with deep learning or do we want to understand the underlying mechanisms? One comment on

CALLS for PAPERS

For the most up-to-date information on IAPR-supported conferences, workshops and summer schools, please visit the IAPR web site: *www.iapr.org/conferences/*

icIVPR 2016
2016 International Conference on Imaging, Vision & Pattern Recognition
Dhaka, Bangladesh
Deadline: Jul. 30, 2016
Dates: Sep. 20-21, 2016

MANPU 2016
The First International Workshop on coMics ANalysis, Processing and Understanding
(held in conjunction with ICPR 2016)
Cancun, Mexico
Deadline: Aug. 10, 2016
Dates: Dec. 4, 2016

PRRS 2016
9th International Workshop on Pattern Recognition in Remote Sensing
(held in conjunction with ICPR 2016)
Cancun, Mexico
Deadline: Aug. 15, 2016
Dates: Dec. 4, 2016

RFMI 2016
Sixth International Workshop on Representation, analysis and recognition of shape and motion FroM Imaging data
Tunis, Tunisia
Deadline: Sep. 4, 2016
Dates: Oct. 27-29, 2016

IVCNZ 2016
Image and Vision Computing New Zealand 2016
Palmerston North, New Zealand
Deadline: Sep. 16, 2016
Dates: Nov. 21-22, 2016

MVA 2017
15th IAPR Intl. Conf. on Machine Vision Applications
Nagoya, Japan
Deadline: Dec. 5, 2016
Dates: May 8-12, 2017

ICPRAM 2017
6th International Conference on Pattern Recognition Applications and Methods
Porto, Portugal
Deadline: Dec. 13, 2016
Dates: Feb. 24-26, 2017

ICDAR 2017
14th International Conference on Document Analysis and Recognition
Kyoto, Japan
Deadline: Mar. 15, 2017
Dates: Nov. 10-15, 2017

Call for Bids to Host ICPR 2020
(Also see full page advertisement in this issue)
Deadline: Jul. 31, 2016

LinkedIn read

Hello Nikos. Deep learning can be treated as a black box but this is not very interesting. This is just a stage in CV progress as everyone is playing with it and getting interesting results. I'm old enough to remember the 2nd wave of neural nets in the late 80s, and strangely enough Yann LeCun was already a key player then. Everyone thought AI was solved or nearly so. The interesting thing needed for the next level is understanding how DL works and why it works so well, so that we can improve on it. To do that we'll need math and grad students that are good at it. Keep nurturing them! [HT]

I'm looking forward to your opinions on this.

And, as always, remember to keep writing papers! Your ICPR paper has been submitted, get to work on your next one!

Or, how about organizing an ICPR? You'll find a call for bids in this newsletter. You'll also find articles highlighting an established and an upcoming researcher as well as news from the IAPR's Technical Committees (TCs); it's great that we can get to know these working groups better.

Happy reading!
Arjan

Calls from IAPR Committees

From the IAPR Nominating Committee:

Call for Nominations for the IAPR Executive Committee

At its next meeting at ICPR 2016 in Cancun, the IAPR Governing Board will elect new IAPR Officers. The IAPR Nominating Committee seeks your help in finding candidates suitable for the jobs of President, First Vice President, Second Vice President, Secretary and Treasurer. Please contact President Ingela Nyström *ingela.nystrom@it.uu.se* for information on the procedure."

From the IAPR Executive Committee (ExCo):

Call for Proposals for Summer Schools

Deadline: October 1, 2016 (for schools planned for December 2016-March 2017)

Summer schools are training activities where participants are exposed to the latest trends and techniques in the particular pattern recognition field. They provide a unique opportunity to engage students and junior researchers with senior scientists in a fruitful way .

To be eligible for a grant, the organizers must work through at least one of the IAPR's technical committees as they develop and present the proposal.

Of course, the term "Summer School" is somewhat generic and traditional. There is no requirement that a school be offered during the summer.

How to Submit: Proposals for IAPR funded summer schools should be submitted to IAPR Second Vice President Simone Marinai by email (*simone.marinai@unifi.it*). A PDF attachment containing all the required information is appreciated.

For detailed guidelines on the proposal, see the ExCo Initiative on Summer Schools.

From the IAPR Education Committee:

Call for Applications
IAPR Research Scholarships
http://www.iapr.org/docs/IAPR-EC-RS-Call-2016.pdf

Editor's note: Plesae see related article, "INSIDE the IAPR", for background information on the new IAPR Research Scholarships.

~Arjan Kuijper, EiC

Description: IAPR Research Scholarships, awarded by the IAPR through its Education Committee (IAPR-EC), seek to make possible mobility across institutions and international boundaries for Early Career Researchers working in fields within the scope of the IAPR's interests. Through this program, the IAPR sees an opportunity to make a significant contribution to the development of Early Career Researchers as well as the wider Pattern Recognition community.

Covered expenses, funding and duration:

- The scholarship will cover round trip travel and basic living expenses
- The visits will be no longer than 12 months in duration.

Requirements:

- The candidate must be a full-time researcher (PhD research student who has completed at least one year's study at this level or someone already employed as a full-time researcher who has been active in the field for fewer than eight years and is working at a level equivalent to a post-doctoral researcher.
- The candidate must be member of an IAPR member society.
- The covered travel and housing expenses cannot be funded by another scholarship. If there is a shortfall between the actual costs and the amount covered by the Scholarship, the candidate may seek complementary funding, usually from either the home or the host institution.
- The host institution must be different from the candidate's home institution and should be in a different country.
- The home and host institutions must give explicit approval by a signed letter.
- A successful applicant will be permitted to adopt the title "IAPR International Scholar" for the period of the award.

Click here for the full Call for Applications.

Contact information:

IAPR-EC Chair	IAPR Secretariat
c/o Josep Lladós	c/o Linda O'Gorman
josep.llados@cvc.uab.es	*secretariat@iapr.org*

From the IAPR Conferences & Meetings Committee:

Call for
Bids to Host ICPR 2020

Deadline: July 31, 2016

click here to go the ICPR Proposals page at the IAPR website

The International Conference on Pattern Recognition (ICPR) is the major scientific event organized under the auspices of the International Association for Pattern Recognition (IAPR).

The aim of this conference is to bring together international experts to share their experiences and to promote research and development in Pattern Recognition.

The conference is hosted by an institution under the auspices of an endorsing IAPR member organisation (national association).

Any such organisation interested in making a proposal to host an ICPR must proceed according to the rules outlined in the latest version of the guidelines document.

It is expected that Proposers familiarise themselves with the guidelines for organising ICPR first, to fully plan their bid. The submission of a bid implies full agreement with the guidelines and procedures for organising the conference as well as with the IAPR constitution.

NOTE: the current version of the guidelines includes some changes with respect to previous versions including a new template that must be adopted when submitting bids to host ICPR.

Bids to host ICPR 2020 must be submitted to the IAPR Conferences and Meetings Committee by **July 31st 2016**.

The selection of the conference venue will be made by the IAPR Governing Board (GB) during its meeting at ICPR 2016 in Cancun, Mexico.

Organizations interested in organizing ICPR 2020 should submit the bid to Dan Lopresti (lopresti@cse.lehigh.edu) C&M chair by **July 31st 2016**.

Dan Lopresti
IAPR C&M chair

Guidelines to Organising and Bidding to Host an ICPR (pdf)

Getting to know...Shuicheng Yan, IAPR Fellow

Theory and application bring double satisfaction

Dr. Yan Shuicheng is the chief scientist of Qihoo/360, and also Dean's Chair Associate Professor at National University of Singapore. Dr. Yan's research areas include machine learning, computer vision and multimedia, and he has authored/co-authored hundreds of technical papers over a wide range of research topics, with Google Scholar citation over 26,000 times and an H-index 65. He is ISI Highly-cited Researcher 2014 and 2015, and IAPR Fellow 2014. He received Best Paper Awards from TMM'15 (honorable-mention), ACM MM'13 (both Best Paper and Best Student Paper), ACM MM'12 (Best Demo), PCM'11, ACM MM'10, ICME'10 and ICIMCS'09; the runner-up prize at ILSVRC'13; and winner prizes in the ILSVRC'14 detection task without extra data, the PASCAL VOC 2010-2012 classification task, and the PASCAL VOC 2012 segmentation task.

Shuicheng Yan, IAPR Fellow
ICPR 2014, Stockholm
For contributions to computer vision and pattern recotnition.

by Shuicheng Yan, Chief Scientist, Qihoo/360 and Dean's Chair Associate Professor, National University of Singapore

I originally studied applied mathematics at the beautiful campus of Peking University in China. Unexpectedly, in 2001, I went to Microsoft Research Asia as an intern, and then experienced a very long and happy period of life at "the world's hottest computer lab", as reported in MIT Technology Review in June, 2004. My whole research life thus shifted from mathematics to computer vision and pattern recognition.

My first series of research work focused on subspace learning and manifold learning. The two most representative research papers are the co-authored 2005 IEEE TPAMI paper, "Face Recognition using Laplacianfaces" (cited over 2,800 time), and 2007 IEEE TPAMI paper, "Graph Embedding and Extensions: A General Framework for Dimensionality Reduction" (cited over 1,700 times). A key contribution is that these two areas were studied independently previously, and after these two papers, these two areas are well bridged by different transformations, and a huge pool of papers followed the proposed pipeline to develop new solutions for manifold learning and/or subspace learning.

Then I focused on computer vision tasks on object classification, detection, and segmentation. My team participated in the two most impactful computer vision competitions, PASCAL VOC and ILSVRC, for five years, and received 7 winner or honorable-mentioned prizes. In the year 2010, the winning solution was founded on utilizing one task as context information for another task, as reported in the 2011 IEEE CVPR paper, "Contextualizing object detection and classification". In the year 2011, the winning solution was based on an adaptive pooling method, as reported in the 2012 IEEE CVPR paper, "Hierarchical matching with side information for image classification". In the year 2012, the winning solution was based on mining sub-category diversity, as reported in the 2013 IEEE CVPR paper, "Subcategory-aware object classification". In the year 2014, we proposed a novel deep network structure, called "Network in Network" published in ICLR 2014, which presents the 1x1 convolution concept and fully convolutional network structure. It was the foundation for the team to win the detection task in ILSVRC 2014, and became a common component for many later popular networks, e.g. GoogLeNet and Residue Networks.

Another interesting series of research papers focused on technology towards fashion and beauty search/recommendations. In the 2012 IEEE CVPR paper, "Street-to-Shop: Cross-Scenario Clothing Retrieval via Parts Alignment and Auxiliary Set", we

explore how to search for similar clothes from online shops when seeing appealing clothes on a person on the street. It attracted great interest from both academia and industry. Then, the paper at the 2010 ACM MM conference on the "magic closet" that shows people how to dress properly and elegantly (Fig-1 (a), paper titled
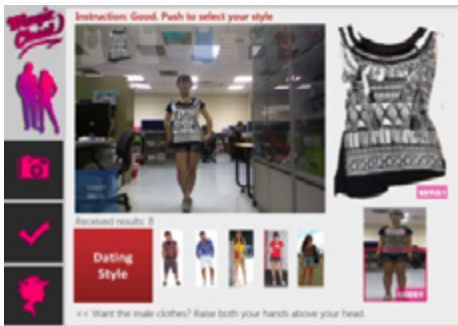

Fig. 1 (a) Magic Closet

"Hi, magic closet, tell me what to wear!") won the best demonstration award. Also, the 2013 ACM MM

Fig. 1 (b) Beauty e-Experts

paper on "Beauty e-Experts" (Fig-1 (b), paper titled "Wow, you are so beautiful today") won the best paper award. These systems attracted attention from many companies. The fashion search technology has been licensed to a top e-commerce company, and its product on "Snap and Buy" is already in market, with 10M peak daily active users.

Late in 2015, I joined the internet security company, Qihoo/360, as chief scientist. The main target is to develop deep learning based solutions for computer vision and big data related tasks. The applications shall be mainly on smart devices, e.g. smart camera, robot and smart vehicle.

Pattern Recognition Letters
Volume 79 , Pages 1-112, 1 August 2016
http://www.sciencedirect.com/science/journal/01678655/79

Survey papers by IAPR Fellows:

- *50 years of biometric research: Accomplishments, challenges, and opportunities* by Anil K. Jain, Karthik Nandakumar, Arun Ross

- *Disruptive developments in document recognition* by George Nagy

Other articles that may be of interest:

- *Initialization of deformable models in 3D magnetic resonance images guided by automatically detected phase congruency point landmarks* by Carlos H. Villa Pinto, Ricardo José Ferrari

- *A new adaptive filtering method for removing salt and pepper noise based on multilayered PCNN* by Xiangyu Deng, Yide Ma, Min Dong

- *Binary tomography reconstruction based on shape orientation* by Tibor Lukić, Péter Balázs

- *Virus image classification using multi-scale completed local binary pattern features extracted from filtered images by multi-scale principal component analysis* by Zhijie Wen, Zhuojun Li, Yaxin Peng, Shihui Ying

- *Initialization of dynamic time warping using tree-based fast Nearest Neighbor* by Stergios Poularakis, Ioannis Katsavounidis

- *On the infinite clipping of handwritten signatures* by Jânio Canuto, Bernadette Dorizzi, Jugurta Montalvão, Leonardo Matos

- *Predicting sex as a soft-biometrics from device interaction swipe gestures* by Oscar Miguel-Hurtado, Sarah V. Stevenage, Chris Bevan, Richard Guest

- *SuMoTED: An intuitive edit distance between rooted unordered uniquely-labelled trees* by Matt McVicar, Benjamin Sach, Cédric Mesnage, Jefrey Lijffijt, Eirini Spyropoulou, Tijl De Bie

- *Geometric divergence based fuzzy clustering with strong resilience to noise features* by Arkajyoti Saha, Swagatam Das

- *On the computation of integrals over fixed-size rectangles of arbitrary dimension* by Omar Ocegueda, Oscar Dalmau, Eleftherios Garyfallidis, Maxime Descoteaux, Mariano Rivera

- *A holistic approach for Off-line handwritten cursive word recognition using directional feature based on Arnold transform* by Jija Dasgupta, Kallol Bhattacharya, Bhabatosh Chanda

IAPR...The Next Generation

In this series of Feature Articles, the IAPR Newsletter asks young researchers to respond to three questions:

- *Briefly: How did you get involved in pattern recognition and what technical work have you done?*
- *In more detail: What is/are your current research interest(s)?*
- *How can the IAPR help young researchers?*

~Arjan Kuijper, Editor -in-Chief

Peter Boyi Zhang

by Peter Boyi Zhang, PhD, TCL Corporate Research, Hong Kong

Briefly: How did you get involved in pattern recognition and what technical work have you done?

During the years of my undergraduate studies in the University of Hong Kong, I was exposed to a wide range of topics in electronic and communications engineering. Despite this, it was not until I was introduced to Non-Rigid Structure from Motion (NRSFM) by my senior in my final year, that I found my interest in the field, and continued to pursue a PhD degree on this topic.

My first contact with computer vision and pattern recognition was in my second year of college, when after a chance to talk with my to-be PhD supervisor Prof. Y. S. Hung, I was recommended to join in the ABU Robot Contest (Robocon), in which I was mainly in charge of implementing a simple vision system for an automatic robot. I adapted the Hough transform to a laser range finder to help the robot detect walls and edges, so as to enable it to identity its location in the field, and to make navigational decisions based on

Editor's note:
Peter Boyi Zhang received the APRS Best Student Paper Prize at [DICTA 2015](#) for the paper entitled "Non-Rigid Structure from Motion through Estimation of Blend Shapes", co-authored with Y. S. Hung.

~ Arjan Kuijper, Editor-in-Chief

I received my B.Eng. in Electronic and Communication Engineering from the University of Hong Kong in 2011 and continued to pursue my PhD degree in the field of Non-Rigid Structure from Motion under the supervision of Prof. Y. S. Hung.

I recently finished my PhD studies and am doing computer vision realted R&D work with TCL Corporate Research, Hong Kong.

that information. I felt very proud of what I was able to achieve with the range finder, and this sense of achievement continued to fuel my interest in pattern recognition all the way till my last year of studies, when I chose my final year project on NRSFM. The aim of the study was to design an algorithm to reconstruct a deforming object in 3D from a series of its 2D images, which I felt had practical potential when applied to fields like design, prototyping, and entertainment. During my PhD studies, I further developed my research, and designed algorithms to be applied specifically to flexible objects fitting to the small deformation model and the articulated model.

In more detail: What is/are your current research interest(s)?

We humans are equipped with a very powerful vision system that helps us understand the 3D world around us. It can perform tasks like observing a deforming object (e.g. a dancing human) and reconstructing it in 3D so effortlessly that we often take it for granted and do not appreciate how delicately it is designed to work instantly with high accuracy and low energy consumption. When it comes to implementing such function in computers, however, it becomes a completely different story. The only inputs are a series of images of the deforming object from which the feature points are extracted and matched across each frame of image. The expected outputs are the 3D coordinates of each feature point in each frame and the camera position of each frame. There are more unknown variables than knowns, therefore additional assumptions have to be made to make this problem solvable.

I made two different assumptions corresponding to two different scenarios. The first is called the small deformation assumption, namely the object's deformation from an average shape is relatively small. With this assumption, the flexible object can be modeled as a linear combination of a series of blend shapes, and the dimension of the problem can be reduced. By first recovering the average shape and then iteratively estimating and adding the blend shapes, the flexible object can be recovered.

The other assumption is the articulated model, where the flexible object is assumed to be composed by linking a few rigid parts with joints. Examples of this type of object are the human body and machines such as the robot arm. The process of reconstruction consists of 4 major steps. First the feature points are segmented into different rigid parts, then the 3D shape of each part is recovered, then the connections among the parts and the location of the joints are estimated, and finally the parts are linked together to form the flexible object. I'm currently working on algorithms to automatically determine the parameters of the segmentation step.

How can the IAPR help young researchers?

For me, PhD study has mostly been a lonely journey. A major proportion of my time is spent facing the computer, and my supervisor is the only one I have been able to share my research interest with. The research goal is hard to achieve, and sometimes I ask myself, "What is the purpose of all these efforts?"

I had a very good time at the DICTA 2015 conference organized by APRS, the IAPR member society in Australia, not only because it had well designed and executed schedule, helpful organizers and volunteers, splendid historical venue, and a surprising organ performance, but also because there I got to meet and talk with researchers sharing similar interest with me. I remember meeting a PhD graduate who is working with an agriculture company, where he applies 3D reconstruction algorithm to build a machine that quickly sorts apples and pears. That inspired me to think of how my studies could be used in the future.

I think it would be very helpful if IAPR could help facilitate such communications that the PhD graduates working in industry can share with the researchers how they have applied what they learned during PhD studies to solve real world problems. I believe that would refuel the young researcher's motivation and give them a stronger sense of purpose.

From the EXCO

News from the Executive Committee of the IAPR

by Alexandra Branzan-Albu (Canada)
IAPR Secretary

IAPR Education Committee
Call for Applications for
IAPR Research Scholarships
www.iapr.org/docs/IAPR-EC-RS-Call-2016.pdf

ICPR 2016

The IAPR Nominating Committee has issued a Call for Nominations for the offices of the IAPR Executive Committee

Call for Bids to Host ICPR 2020

Information about ICPR 2016 Workshops can be found by scrolling down on the PROGRAM AT GLANCE page at the ICPR 2016 web site: *http://www.icpr2016.org/site/at-glance/*

In addition, the names of and links to all ICPR workshops appear in the Meeting Planner in this issue of the *IAPR Newsletter.*

Victoria, July 2016

These months have been very active for the IAPR. Before discussing the preparations for the "main event", it is important to mention the hard work of the IAPR Education Committee (IAPR-EC) that recently finalized its selection of the first IAPR International Scholar through the IAPR-EC Research Scholarship Program and has issued a call for more applications (see INSIDE the IAPR and Call for Applications).

The preparations for our main biennial event, the International Conference on Pattern Recognition (ICPR), are in full swing. ICPR 2016 will take place in Cancun, Mexico, from Dec. 4 to 8. The preliminary program-at-a-glance is already posted, displaying a comprehensive assortment of keynote lectures, prize lectures, oral and poster sessions as well as social events. Registration is open!

The first day of the conference is dedicated to workshops, tutorials, and contests. ICPR 2016 will host ten workshops, each of them addressing very specific, emerging research topics in pattern recognition, image analysis, and computer vision. The submission deadlines for each workshop vary, so please make sure that you check *http://www.icpr2016.org/site/at-glance/* frequently for updates.

The biennial meeting of the IAPR Governing Board (GB) will also take place during the ICPR conference, on Tuesday, Dec. 6, 2016 (from late afternoon). This meeting will provide the opportunity to discuss many core topics. All standing and technical committees are requested to submit activity reports. Also, the new IAPR Executive Committee (see Call for Nominations) will be elected and the the location for ICPR 2020 chosen (see Call for Bids to Host ICPR 2020).

The King Sun Fu, J. K. Aggarwal, and Maria Petrou prize committees and the Fellow Committee have been busy. Their recommendations have been submitted and voted on by the Governing Board and the recipients will be announced at ICPR 2016. We are delighted to have received a large number of nominations!

As IAPR Secretary, I am responsible for sending out to and receiving ballots from GB members on all voting matters. I have received many timely responses. I feel, however, that the response rate could be improved. Our society would only benefit from the increased participation of its members!

I hope that you will enjoy your summer, and that you will find time to submit some of your recent research results to one of the ICPR workshops!

INSIDE the IAPR

EiC: *Why did the IAPR start this program?*

IAPR-EC: The IAPR Education Committee (IAPR-EC) was asked to investigate options for using IAPR funds for educational activities. After extensive discussions and taking into account feedback from the IAPR Executive Committee (ExCo) and IAPR members, the IAPR-EC proposed the IAPR Research Scholarship (IAPR RS) initiative to the IAPR Governing Board (GB). We thought that a mobility program would be highly positive for the career progress of young scientists and would also further among the groups.

EiC: *What is the aim?*

IAPR-EC: A program of International Research Scholarships aims specifically at broadening the experience of young scientists and engineers working in the pattern recognition and related fields by facilitating a period of study outside their usual

research environment. This is an opportunity to develop and support an imaginative and valuable scheme which has the potential to make a significant impact both on the career development of Early Career Researchers and on the wider pattern recognition community.

EiC: *What does it bring the IAPR?*

IAPR-EC: The IAPR, and in particular its community of researchers, will have an instrument to facilitate their interactions and establish synergies. It will result in scientific outcomes, both publications or joint projects that indirectly were promoted by the IAPR, which will, in turn, enhance the reputation to the association.

EiC: *I ask this question from the perspective of a student thinking of applying. What does the IAPR Research Scholarship bring to me?*

IAPR-EC: An IAPR RS provides an opportunity to complement your education period in an external environment, different from your usual—and sometimes narrow—perspective. It will bring you not only scientific but also cultural and social benefits. At mid-long term, it will also open opportunities for potential career continuations (such as post-doc or tenure track positions).

EiC: *That same student might then be concerned that only early career researchers who are*

currently working in groups of well-known professors will have a chance at receiving an IAPR RS and will want to know if it is worth putting in the effort to apply.

IAPR-EC: Of course, the well-known professors are good candidates for hosting students under this program. But the program is addressed to all PhD students and early career researchers. The IAPR-EC will take into account the scientific project, and the competencies of the hosting institution in terms of the benefits for the career progress of the student.

The IAPR Education Committee is pleased to announce the first IAPR International Scholar

Moises Diaz, a PhD candidate at the University of Las Palmas de Gran Canaria in Spain, has been selected to receive an IAPR Research Scholarship to work with Prof. Angelo Marcelli at the University of Salerno in Italy.

IAPR ⊚ Technical Committee News

This section of the IAPR Newsletter will publish short, timely items by and about the IAPR's Technical Committees.

There are three main aims:

1. *to give the IAPR's TCs regular access to the broader IAPR community*
2. *to introduce the various TCs to those who are new to the IAPR and*
3. *to keep the rest of the IAPR community interested and informed about TC happenings.*

~Arjan Kuijper, IAPR Newsletter *EiC*

Please see related "Letter to the Editor" on the [Bulletin Board](#) page.

IAPR TC12 Multimedia and Visual Information Systems
http://iapr-tc12.info

[Henning Müller](#), Chair
[Sergio Escalera](#) and [Martha Larson](#), Vice Chairs

IAPR TC12 concentrates its effort around a LinkedIn group to share content (*https://www.linkedin.com/groups/8109409*) and three benchmarks in the field of multimedia retrieval and data analysis (ChaLearn, Mediaeval, ImageCLEF).

ImageCLEF had four tasks on medical image classification, photo information extraction and retrieval from handwritten historical documents (*http://www.imageclef.org/*) and a workshop will be organized in Portugal in September.

The **ChaLearn** Face analysis competition results will be presented at the Computer Vision and Pattern Recognition 2016 ([CVPR 2016](#)) workshop on face analysis. ChaLearn Looking at People is also running an international competition on apparent personality traits recognition from audio-visual data, with an associated workshop at the European Conference on Computer Vision 2016 ([ECCV 2016](#)), Amsterdam. ChaLearn looking at People event details can be found at *http://www.gesture.chalearn.org*.

MediaEval (*http://multimediaeval.org/mediaeval2016*) offers shared-tasks in multimedia retrieval and analysis. Successful approaches make use of multiple modalities and go beyond visual content to also exploit audio, text, and other contextual information. For each task, participants receive a task definition, task data, and accompanying resources (dependent on the task) such as key frames, visual features, and social metadata.

At the [ICPR 2016](#) a common evaluation challenge is planned where participants will be given several evaluation scenarios and a workshop. Watch for information here: *http://www.icpr2016.org/site/at-glance/*.
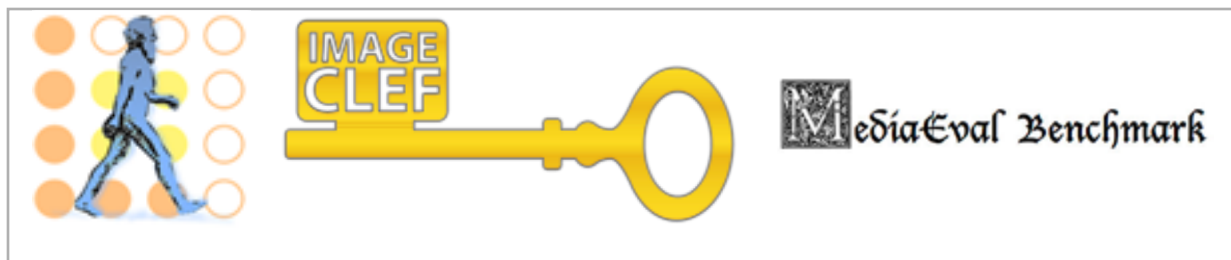
More IAPR ⬡ Technical Committee News

IAPR TC18 Discrete Geomerty
http://www.tc18.org

IAPR - TC18 Discrete Geometry
Geometry for digital image analysis.

Isabelle Sivignon, Chair
Partha Bhowmick and Rocío González Díaz, Vice Chairs

The goal of IAPR-TC18 (www.tc18.org) is to promote interactions and collaboration between researchers working on Discrete Geometry (geometry for digital image analysis). Discrete (or Digital) geometry is a research field that aims at defining a geometric and topological paradigm dedicated to shapes, objects issued from image analysis, getting the most out of the regular structure of the data.

It is related to fundamental computer science and mathematics topics like graph theory, computational geometry, topology, and it finds its best expression in applicative fields like image analysis, computer vision or shape representation. It also has close connections with mathematical morphology.

One of the main activities in which our TC is involved is the Discrete Geometry for Computer Imagery (DGCI) series of conferences of which the first was held in 1991 in Strasbourg, and the most recent one, the 19th DGCI edition, successfully organized by the Image and Video Communication team of Polytech Nantes (University of Nantes), was held in Nantes (France) in April, 2016 (see report on DGCI 2016 in this issue). The proceedings of the conference were published in volume LNCS 9647 of the Lecture Notes in Computer Science series by Springer. Following a session on Open Problems during DGCI 2016, the list of open problems has been relocated and updated on the TC18 website: *www.tc18.org/OpenProblems.php*.

Upcoming events in Discrete Geometry in the next few months:

- Workshop on Discrete Geometry and Mathematical Morphology for Computer Vision (DGMM4CV), in conjunction with ACCV 2016, Taipei, Taiwan, November 20-24. Submission deadline: August 5th, 2016.

- Special issue of the Journal of Mathematical Imaging and Vision with extended versions of DGCI 2016 papers.

- Special issue of the Journal of Computer and System Sciences (Elsevier) for extended versions of IWCIA 2015 and CTIC 2016 papers has been arranged. Open call. Submission deadline: August 31, 2016.

IAPR Then and Now…
A new IAPR Technical Committee TC 18 on DISCRETE GEOMETRY
Armick Montanvert and Stina Svensson
IAPR Newsletter, **Autumn 2002, Vol. 24 No. 4**

Discrete geometry plays an essential role in the field of image analysis, computer graphics, pattern recognition, shape modelling, computer vision, and document analysis. The main reason is, of course, that all data in the computer is unavoidably discrete. Discrete geometry is not a new discipline, but has appeared as a main field of computer imagery since more than 40 years. The foundations of discrete geometry are from the need of definitions and transformations based on the discrete space, rather than application of continuous and Euclidean notions. Discrete geometry provides both a theoretical and a computational framework for digital images. It has some well known and used concepts, new results regularly appear, and useful theorems and developments have still to be proposed. Moreover, the development of efficient devices for image or video acquisition and processing, the increasing number of application for both specific domains (medicine and biology, remote sensing, control, design) and common uses (DVD, Internet, HDTV, etc) are important motivations and reasons to develop new results for the discrete space. Consequently, dealing with images implies developing discrete models to be used in the above mentioned fields. Several more precise topics of research dealing directly with discrete spaces can be given such as topology, digitized objects, shape representation and understanding, geometrical transforms, metrics, coding and compression, curves, surfaces and volumes, shape recovery, image reconstruction, visualization, and feature extraction.

There exists a large community working on Discrete Geometry and the main aim for TC 18 is to promote interactions and collaboration between researchers working in the field. A TC 18 web page and electronic newletters will, in combination with TC meetings, facilitate this.

IAPR TC19 Computer Vision for Cultural Heritage Applications
http://www.cvl.iis.u-tokyo.ac.jp/IAPR-TC19/

Takeshi Oishi, Chair
Katsushi Ikeuchi, Vice Chair

The TC19 aims to bring together the expertise and resources of technologists and heritage professionals who are concerned with the effective and sustainable application of computer vision technology to cultural heritage research.

The TC has organized annual workshops on e-heritage (electric cultural heritage) in conjunction with Asian Conference on Computer Vision (ACCV) since 2010. In this workshop, we strongly encourage interdisciplinary papers and would like to keep a wide scope.

The 4th ACCV Workshop on e-Heritage 2016 will be held in Nov. in Taipei. Please see more details at the following website. http://www.eheritage-ws.org/

ACCV '16
November 20 - 24, 2016
Taipei, Taiwan

IAPR Then and Now...Excerpt from "From the ExCo"
IAPR Newsletter Vol. 26 No. 1, January 2004

[...]

The Governing Board has also approved the creation of a new technical committee, TC-19 on computer vision for cultural heritage applications. You will find presentations of this new TC and of the new member society in one of the next issues of the newsletter.

[...]

Computer Vision Research: The deep "depression"
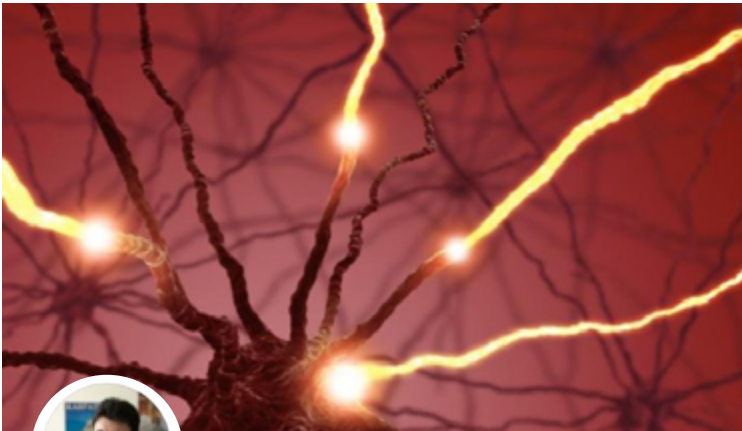
https://www.linkedin.com/pulse/computer-vision-research-my-deep-depression-nikos-paragios

Nikos Paragios
Professor@CentraleSupelec, Scientific Leader@Inria, EiC@CVIU@Elsevier, President & CTO @TheraPanacea

June 5, 2016

Well, I am not that old, but I have been involved with computer vision for almost two decades now. I have started publishing papers when about 250 papers were submitted per year to the major and most selective conferences in computer vision (ICCV, CVPR, ECCV). At that time the conference boards were approx 60-80 people and there were 300-400 participants.

Computer vision conferences (even up to 2010) were organized in a number of thematic areas reasonably well represented both in terms of content as well as in terms of approaches. Early vision, grouping/segmentation, motion analysis/tracking, recognition & 3D vision are some examples. Statistics, geometry, optimization were there in almost all of these areas, and one could get a grasp/ global view of the field through his participation to such a conference. Coming to the vision field required a reasonable understanding of physics, math, statistics and geometry. Participating to the conference was giving you an exposure to computer vision challenges as well as to approaches.

There were always trends and dominant topics in the field. I guess eighties were all about stereo, nineties were all about continuous methods and segmentation grouping, while the change of the century brought in discrete methods and the refocus of the community to recognition and descriptors. In parallel, machine learning community has stepped in and its recent developments made it to the computer vision field. Having said the above, despite the presence of dominant topics still the field was quite diverse and still alternative ideas could sneak in in almost all sub-domains of computer vision.

Well, I have the impression that this is far from being the case anymore. Research now focusing on using deep learning complex engineering pipelines to address computer vision tasks. 80-90% of the papers that are published in conferences and almost all oral papers do come from this area. There is absolutely nothing wrong on having such papers, and their performance justify definitely their value, however one can question what is the "added" scientific value. Other than a handful number of people doing some fundamental research towards understanding the theoretical concepts of these methods, almost all the community now seems to target the development of more complex pipelines (that most likely cannot be reproduced based on the elements presented in the paper) which in most of the cases have almost no theoretical reasoning behind that can add 0,1% of performance on a given benchmark. Is this the objective of academic research? Putting in place highly complex engineering models that simply explore computing power and massive annotated data? The community (and I guess all communities) was running after benchmarks and low hanging fruits also in the past but at that time there was an alternative for other directions as well which doesn't seem to be the case anymore. This is not the case only for conferences but also for funding as well which has as direct consequence the rapid decrease of the research "theoretical depth" in the field or I could state instead
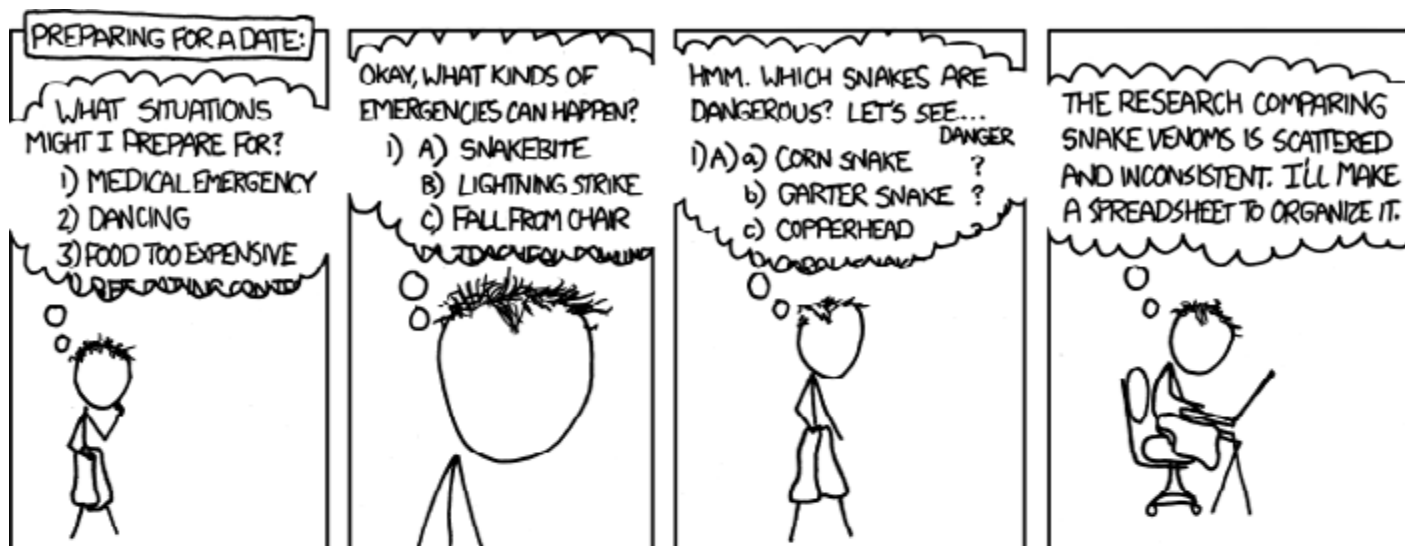
research diversity.

It might be simply because deep learning on highly complex, hugely determined in terms of degrees of freedom graphs once endowed with massive amount of annotated data and unthinkable - until very recently - computing power can solve all computer vision problems. If this is the case, well it is simply a matter of time that industry (which seems to be already the case) takes over, research in computer vision becomes a marginal academic objective and the field follows the path of computer graphics (in terms of activity and volume of academic research).

If not though, one can question how computer vision will move to the next level? How from a community where all fresh incoming PhD students have never and most likely will never hear about statistical learning, pattern recognition, euclidean geometry, continuous and discrete optimization, etc. new ideas will emerge. I am a believer of "broad" and rich scientific culture, and I have the impression that this is in the process of disappearing from the field. One can envision two possible interpretations: a highly positive one (we do converge towards the famous David Marr's theory that assumes that a single computational framework can address visual perception). This will be a great accomplishment since a field that was at 5% accomplishment in 1995 (recall Pr. Thomas Huang presentation at ICPR'95 conference). There is a less positive interpretation though where we are putting all our efforts - while excluding alternatives - on an area that shows great promises, but still will not be able address on its own the rich variety of problems in computer vision.

A very good friend mentioned to me once that there are three deep learning stages: denial, doubt, and acceptance/adoption! I guess I navigate on the ocean between the last two stages without a compass.

A WEBCOMIC OF ROMANCE, SARCASM, MATH, AND LANGUAGE.

About the source: xkcd.com
This and other comics: *http://xkcd.com/761/*

Meeting Reports

Conferences, Workshops & Summer Schools

http://www.cvip2016.org

Patron:
Pradipta Banerji, Director of IIT Roorkee

Chair:
Manoj Misra, IIT Roorkee

Conveners:
Balasubramanian Raman, IIT Roorkee
Sanjeev Kumar, IIT Roorkee
Partha P. Roy, IIT Roorkee
Debashis Sen, IIT Kharagpur

by the Conveners

The first International Conference on Computer Vision and Image Processing (CVIP-2016) was organized at Indian Institute of Technology—Roorkee (IITR) in Roorkee, a beautiful town at the foothills of Himalayas. The conference was endorsed by International Association of Pattern Recognition (IAPR) and the Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI), and was primarily sponsored by the Department of Science and Technology (DST) and Defense Research and Development Organization (DRDO) of the Government of India.

The conference brought together delegates from around the globe in the focused area of computer vision and image processing. CVIP 2016 received a total of 253 paper submissions from which 119 high quality articles were selected for presentation based on reviews provided by the members of the technical program committee from 10 different countries. The presentations were made in a carefully categorized technical program consisting of 8 oral sessions and 3 poster sessions. The overall acceptance rate was around 47% and the oral acceptance rate was about 19%. Interactions on several of the latest advances in vision technology, such as deep learning in vision, non-continuous long-term tracking, security in multimedia systems, egocentric object perception, sparse representations in vision and 3D content generation were facilitated.

The works presented were of very high quality, and three prizes were awarded to encourage the recipients.

- The IAPR Best Paper Prize was awarded to "A Novel Visual Word Assignment Model for Content Based Image Retrieval" by Anindita Mukherjee, Soman Chakraborty, Jaya Sil and Ananda S. Chowdhury of Jadavpur University, India.

- The IAPR Best Student Paper Prize was awarded to "An Improved Contextual Information Based Approach for Anomaly Detection via Adaptive Inference for Surveillance Application" by T. J. Narendra Rao, G. N. Girish and Jeny Rajan of the National Institute of Technology—Karnataka, India.

- The Best Poster Prize was awarded to "Template-based Automatic High-speed Relighting of Faces" by Ankit Jalan, Mynepalli Siva Chaitanya, Arko Sabui, Abhijeet Singh, Viswanath Veera and Shankar M Venkatesan of Samsung, India.

The program also comprised of five keynote talks by eminent researchers in computer vision and image processing. We are very grateful to the keynote speakers:

- Prof. P. K. Biswas of the Indian Institute of Technology—Kharagpur in India gave an overview of creation and processing of 3-D Images.

- Dr. Christian Micheloni of the University of Udine in Italy gave us an overview on filling the gap for non-continuous long term tracking.

- Prof. B. B. Chaudhuri of the Indian Statistical Institute—Kolkata in India discussed a Kalman filtering based data clustering approach and the evaluation of clustering methods.

- Prof. Santanu Chaudhury

of the Indian Institute of Technology—Delhi in India gave an overview of 3D content generation using uncalibrated views.

- Dr. Pradeep Atrey of the State University of New York at Albany in the USA gave us vivid picture of security and privacy issues in multimedia systems.

The proceedings of the conference will be published by Springer as Volumes 459 and 460 in their prestigious Advances in Intelligent Systems and Computing (ASIC) series. In the proceedings, the articles have been thematically divided based on their relation to operations at the lower, middle and higher levels of vision systems, and their applications.

The organization of the conference was due to synergistic contributions of various individuals and groups including the International Advisory Ccommittee (with members from seven different countries) with their invaluable suggestions, the Technical Program Committee with their timely and high quality reviews, the keynote speakers

with informative lectures, the local organizing committee members with their unconditional help, and our sponsors and endorsers with their timely support. We owe a big thanks to the IAPR for endorsing the conference and for their financial assistance with the two best paper prizes.

From the feedback received, we believe that CVIP 2016 was a successful conference both scientifically and socially. The favorable response to CVIP 2016 has encouraged us to begin the organization of the next CVIP in 2017, which will include a workshop on multimedia aimed at spreading the research area to Indian researchers.

Proceedings with be published in Springer's Series Advances in Intelligent Systems and Compuing as Volumes 459 and 460 entitled:

Proceedings of the International Conference on Computer Vision and Image Processing, CVIP 2016, Volume 1 and Volume 2

IWBF'16

The 4th International Workshop on Biometrics and Forensics

Limassol, Cyprus,
March 3-4, 2016
http://www.easyconferences.eu/iwbf2016/

General Chairs:
Nicolas Tsapatsoulis and Andreas Lanitis
Cyprus University of Technology, Cyrpus

by Nicolas Tsapatsoulis

Preliminaries
The International Workshop on Biometrics and Forensics (IWBF) is organized by COST Action IC1106—Integrating Biometrics and Forensics for the Digital Age, and is technically co-sponsored by the Institute of Electrical and Electronics Engineers (IEEE), the International Association of Pattern Recognition (IAPR), the Institution of Engineering and Technology (IET), the European Association for Signal Processing (EURASIP) and the European Association for Biometrics (EAB). It is an international forum devoted specifically to the development of synergies between the biometrics and forensic science research areas.

The organization of the 4th edition of the workshop was assigned to the Cyprus University of Technology during the MC meeting of COST Action IC 1106 in Gjovik in March 2015.

Organization
IWBF'16 was organized by the Social Computing Research Center of the Cyprus University of Technology with the assistance of the IEEE Cyprus Section and the IET Cyprus Section while the local arrangements were assigned to the "Easy Conferences" company.

The General Chairs (GCs) of IWBF'16 were Dr. Andreas Lanitis and Dr. Nicolas Tsapatsoulis. Both of them are members of the Cyprus University of Technology and the Social Computing Research Center. The Advisory Chair was Dr. Massimo Tistarelli, the chair of IC 1106, and the Program Chair was Dr. Paulo Lobato Correia. The Program Committee (PC) chair was assisted by the following PC co-Chairs:

- Albert Ali Salah, Bogazici University, Turkey
- Patrizio Campisi, University Roma3, Italy
- Yosi Keller, Bar-Ilan University, Israel
- Constantine Kotropoulos, Aristotle University of Thessaloniki, Greece

Paper Submission and Review
38 papers were submitted to IWBF'16 of which 26 papers were selected and included in the technical program. 12 papers were accepted for oral and 14 for poster presentations. The acceptance rate was 68.4%. The PC Chair and co-Chairs agreed on a distribution of the submitted papers to 41 reviewers according to their expertise. The whole process was conducted double blind in Microsoft Conference Management Tool (CMT) with three reviewers per paper. The PC Chair along with co-Chairs made the review assignment and final decision by selecting the papers that were included in the workshop's program based on the reviewer's reports. Papers judged not to be novel or of high quality were rejected.

Venue and Participants
IWBF'16 was held at "Crowne Plaza" Hotel, Limassol. The workshop was opened by the Director of the Social Computing Research Center, Prof. Panayiotis Zaphiris, and was closed by the Rector of the Cyprus University of Technology, Prof. Andreas Anayiotos, who awarded the prizes for the winner and finalists of the "Best Paper Award Session".

48 participants were registered for the IWBF'16 while student

The Rector of the Cyprus University of Technology, Prof. Andreas Anayiotos, gives the Best Paper Award to Rita Singh

and research volunteers were also allowed to attend some parts of workshop. In total more than 60 participants from at least 25 different countries attended IWBF'16

The IWBF'16 Program

The IWBF'16 program was organized in three invited talks, four oral presentation sessions, one oral session highlighting the poster papers, one poster and demo session and one panel session. The first of the four oral presentation sessions was the Best Paper Session. The remaining three oral sessions focused on Eye Biometrics, Behavioural Biometrics for Forensic Investigation, and Fingerprints and Multi-modal Biometrics. In the poster and demo highlights session the presenters had the opportunity to introduce the work that they later showed in the dedicated demo and poster session.

In addition the main IWBF'16 program, a number of live showcases and posters showing work carried out as part of the COST 1106 action were
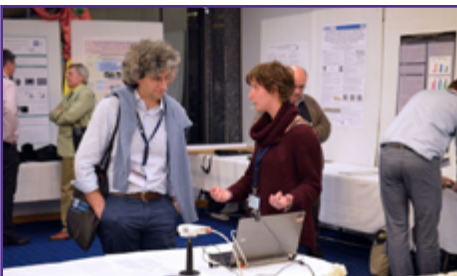
Live demonstration of gender recognition from face and body.

demonstrated. In the demos session, carefully designed live demonstrations were presented, including: (i) latent fingerprints capturing, at crime scenes, with optical, contact-less sensory, (ii) gender recognition from face and body, (iii) semi-automatic tools for forensic assessment of dynamic handwriting, (iv) software platform (BioFoV) designed to include tools that help a forensic researcher to handle video contents, and several other.

Keynote talks

Three keynote talks were given during the IWBF'16. Emilio Mordini (Responsible Technology SAS, France) delivered an excellent talk on "Ethical Issues in Current Forensic Biometrics".

Emilio Mordini during his talk on "Ethical Issues in Current Forensic Biometrics"

He emphasized that probabilistic identification, notably identification based on online biometrics, is hardly consistent with the main ethical principle that rules the western legal system: the principle of presumption of innocence. He argued that if a biometric system is tuned in order to meet law enforcement requirements, its results could not be transferred, as they stand, into the judicial system, which has different, even opposite, user requirements.

Dr. P. Jonathon Phillips (National Institute of Standards and Technology, US) gave an impressive speech on "Fused Human Performance as a Benchmark for the General

Prof. Andrzej Drygajlo chairing the session of the invited talk of Dr. P. Jonathon Philips

Face Recognition Problem" with the aid of highly interactive teleconferencing equipment used within IWBF'16. Dr. Philips made the case that the grand challenge for algorithms is to outperform humans on the general face recognition problem. The benchmark for algorithm performance should be fused human performance. The key is establishing the correct human performance benchmark. In this framework he proposed that the imagery should consist of a basket of experiments. The basket will represent classes of images that are challenging in different ways,, spanning a wide spread of face recognition contexts.

Dr. Peter Claes (Medical Imaging Research Center, KU Leuven, Belgium), during his highly-motivating talk on "Facial Biometrics from DNA", explained that various sources of evidence support the fact that facial appearance is under strong genetic control, such as identical twins, family resemblance, population similarities as well as differences and dysmorphology. Therefore it should be theoretically possible to establish the link between both our facial appearance on the one hand and our DNA on the other hand and to match and/or predict one

Proceedings have been published in IEEE*Xplore*

Dr. Peter Claes while presenting the challenges that need to overcome so as to establish a link between facial appearance and DNA.

with and/or from the other. During his talk he guided the audience through the science and the complexities of facial genetics and elaborated on a new computational framework that is able to match given faces to probe DNA.

The Best Paper Award Session
Based on the results of the review process four papers were shortlisted and put together in a special session for oral presentation. The authors were given 25 minutes to present

Javier Galbally presenting his work on "Variable-Length Template Protection Based on Homomorphic Encryption with Application To Signature Biometrics"

Rudolf Haraksim presenting his work on "Altered fingerprint detection - Algorithm performance evaluation"

their work and answer questions from the audience. At the end of all presentations, all registered attendees (excluding the GCs and the PC chair, and co-chairs) were given ballots and asked to rank the papers in order of preference. The GCs and the PC Chair and co-Chairs voted separately without knowing the results of the attendees' choices. The votes of attendees and chairs were equally weighted (50% each) to compute the final score; nevertheless, in both groups the paper entitled "Formant Manipulations in Voice Disguise by Mimicry", authored by Rita Singh, Deniz Gencaga and Bhiksha Raj was clearly ranked first and awarded the Best Paper Prize.

It should be noted here that at a later time Rita Singh used her technique to show that the US presidential candidate Donald Trump has been lying about his appearance as John Miller in an

Luca Debiasi while presenting his paper "Comparison of PRNU Enhancement Techniques to generate PRNU Fingerprints for Biometric Source Sensor Attribution"

Rita Singh presenting her work on "Formant Manipulations in Voice Disguise by Mimicry"

old interview[1] .

Publication
All accepted and presented papers were included in the IEEEXplore Digital Library. Booklets of the paper summaries and electronic proceedings in USB were given to all registrants. The authors of the papers in the "Best Paper Award Session" were invited to submit an extended and updated version of their work to be considered for publication in a special issue of the IET Biometrics journal. Based on recommendations of the PC some other authors were also invited to submit extended papers.

Conclusion
The General Chairs of the Action consider that the IWBF'16 was highly successful. Many outstanding researchers of the communities of biometrics and forensics, as well as practitioners and students, actively participated and reported high-quality and innovative results. The keynote talks given were impressive, with an excellent balance between theory and practice. The invited speakers challenged the experienced researchers by introducing new research directions while establishing a strong theoretical background for new researchers. The presentations in the Best Paper Award Session were at a very high level and any could have won the prize.

The workshop concluded in the best way for the COST Action IC 1106—the last four years, formed a basic international forum through which researchers and practitioners working in the areas of biometrics and forensics developed synergies. IWBF'16 supported these synergies and posed new challenges for future research.

[1]see details here: *http://www.factcheck. org/2016/06/expert-voice-analyst-its-trump/*

19th IAPR International Conference on Discrete Geometry for Computer Imagery (DGCI 2016)
http://dgci2016.univ-nantes.fr

Nantes, France   April 18-20, 2016

General Chairs:

Nicolas Normand, University of Nantes, France
Jeanpierre Guédon, University of Nantes, France
Florent Autrusseau, University of Nantes, France

by the General Chairs

The 19th IAPR International Conference on Discrete Geometry for Computer Imagery, DGCI 2016 was organized by the Image and Video Communication Team (IVC, IRCCyN UMR CNRS 6597) of Polytech Nantes (University of Nantes).

The aim of the DGCI conference series is to gather researchers in discrete geometry and topology, and discrete models, with applications in image analysis and image synthesis. Discrete geometry plays an expanding role in the fields of shape modeling, image synthesis, and image analysis. It deals with topological and geometrical definitions of digitized objects or digitized images and provides both a theoretical and computational framework for computer imaging.

The Conference attracted 75 researchers from 14 countries, attesting the international relevance of the event. The conference was held in La Cité Nantes Events Center conveniently located in the city center, at a few minutes walking distance from the railway station and airport shuttle bus.

After an extensive reviewing process including a rebuttal phase, 32 papers were accepted out of 51 submissions. The review process was coordinated by the Chairs, the members of the Steering and Program Committees.

The program consisted of 22 papers scheduled in a single-track of oral presentations that were organized in topical sections on

- Combinatorial Tools (2 papers),
- Discrete and Combinatorial Topology (2 papers),
- Geometric Transforms (2 papers),
- Discretization (2 papers),
- Discrete Tomography (2 papers),
- Shape descriptors (3 papers),
- Morphological Analysis (2 papers),
- Discrete Shape Representation, Recognition and Analysis (3 papers),
- Models for Discrete Geometry (4 papers).

The remaining 10 papers on these same topics were orally introduced in a single fast track session and presented during two poster sessions. During a stimulating IAPR TC18 "brainstorming session on Open Problems", participants exposed current open problems on discrete geometry, in an informal atmosphere.

Three internationally well-known researchers provided invited lectures:

- Prof. Matthias Beck, Distinguished IAPR Speaker, San Francisco State University, gave a talk entitled "Discrete Volume Computations for Polyhedra".
- Prof. Jacques-Olivier Lachaud, LAMA (University Savoie Mont Blanc), presented "Convergent Geometric Estimators with Digital Volume and Surface Integrals".
- Prof. Hugues Talbot, Université Paris Est - ESIEE, gave a talk called "Discrete Calculus, Optimisation and Inverse Problems in Imaging".

On the second day, during the Gala Dinner, the Best Student Paper Award was awarded to Imane Youkana, from Université Paris-Est and Université de Biskra, for the paper entitled "Parallelization Strategy for Elementary Morphological Operators on Graphs". Her co-authors are Jean Cousty, Rachida Saouli and Mohamed Akil. The paper was presented during the session "Morphological Analysis"

on the last day of the conference. The winner was selected from among papers written solely or primarily by a student.

The DGCI 2016 Conference was been supported by the International Association of Pattern Recognition (IAPR), and it constitutes the main event associated with the IAPR Technical Committee on Discrete Geometry IAPR-TC18 (see News from IAPR-TC18 in the TC News section of this issue of the Newsletter)..

We would like to thank our institutional sponsors, the city Nantes Métropole, the Region Pays-de-la-Loire, the University of Nantes and the school Polytech Nantes. For the first time, DGCI was also supported by private companies, Rozo Systems and Keosys.

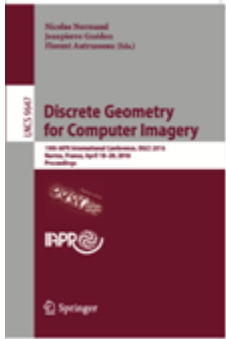The proceedings of the meeting have been published by Springer, in the Lecture Notes in Computer Science series, Vol. 9647, Nicolas Normand, Jeanpierre Guédon, Florent Autrusseau (Eds.)

A special issue of the Journal of Mathematical Imaging and Vision devoted to the topics of DGCI 2016 is in preparation. It will contain about ten substantially extended versions of selected papers presented during DGCI.

The DGCI 2016 edition was successfully carried out, and this has to be credited to the contribution of many people: we are deeply grateful to the members of the Steering Committee for their valuable support and inspiring discussions, and to the local Organizing Committee for its tireless work. Special thanks to the authors of the submitted papers whose research confirmed the high level standard of the Conference, to the Program Committee and to all the reviewers for their accurate and proficient work, and to all the participants attending the conference, who mainly contributed to make this event a success.

Workshop proceedings

Click on the image to go the publisher's web site for this volume.

IAPR - TC18 Discrete Geometry

Geometry for digital image analysis.

ICISP 2016

http://www.icisp-conf.org

7th International Conference on Image and Signal Processing

May 30-June 1, 2016, Trois-Rivières, Québec, Canada

General co-Chairs:

Alain Chalifour (Université du Québec à Trois-Rivières, Canada)
Fathallah Nouboud (Université du Québec à Trois-Rivières, Canada)

Program Chair:

Alamin Mansouri (Université de Bourgogne, France)

Program co-Chairs:

Driss Mammass (Université Ibn Zohr, Morocco)
Jean Meunier (Université de Montréal, Québec, Canada)
Abderrahim Elmoataz (Université de Caen Basse-Normandie, France)

by the General Chairs

The 7th International Conference on Image and Signal Processing (ICISP 2016) brought together about 50 researchers from 20 countries at the beautiful city of Trois-Rivières, Québec, Canada. Historically, ICISP is a conference resulting from the actions of researchers from Morocco, France, and Canada. The first and second editions of ICISP were held in Agadir, Morocco in 2001 and in 2003.The third edition was held in Cherbourg, in Normandy, France in 2008. The fourth edition was held in Trois-Rivières, Québec, Canada in 2010. The fifth edition was held in Agadir, Morocco in 2012. The seventh edition was held in Cherbourg, France in 2014. ICISP 2016 was sponsored by EURASIP (European Association for Image and Signal Processing), IAPR (International Association

for Pattern Recognition), and CRM (Centre de Recherches mathématiques).

The Program Committee members carried out the review process. Each paper was reviewed by at least two reviewers, and also checked by the conference co-chairs. From 83 recorded submissions, 40 papers were finally accepted.

We were very pleased to be able to include in the conference program keynote talks by three world-renowned experts: Jocelyn Chanussot (University of Grenoble, France and currently Guest Researcher at UCLA, USA), Roland Memisevic (University of Montreal, Canada) and Robert Laganiere (University of Ottawa, Canada).

The conference hosted the 18th International Symposium on Multispectral Color Science (MCS

The proceedings of the conference have been published by Springer in the Lecture Notes in Computer Science (LNCS) Series, Vol. 9680

Click on the image to go the publisher's web site for this volume.

2016) as part of ICISP 2016.

The best papers were selected from a short list of papers that received the highest scores during the review process. The best papers were awarded to

- Rina Akaho for her paper on "Nonlinear Estimation of Chromphore Concentrations and Shading from Hyperspectral Images" and

- Stefan Becker for his paper on "On the benefit of state separation for tracking in image space with an Interacting Multiple Model Filter".

The awards were handed out at the conference banquet.

ICISP 2018 will be held in Agadir, Morocco.

9th IAPR International Conference on Biometrics

June 13-16, 2016
Halmstad, Sweden
http://icb2016.hh.se/Welcome

General Chairs:

Fernando Alonso-Fernandez, Halmstad University, Sweden
Josef Bigun, Halstad University, Sweden

by the General Chairs

Nearly 100 participants from 27 countries attended ICB 2016.

The conference was technically co-sponsored by the IAPR TC4 (Technical Committee on Biometrics) and the IEEE Biometrics Council, and it also had the support of the European Association for Biometrics (EAB), and the Center for Applied Intelligent Systems Research (CAISR) of Halmstad University.

ICB 2016 received 151 submissions, of which 22 were selected for oral presentation and 30 for poster presentation. The review process was managed

by four Program Committee Chairs, with the assitance of 31 Area Chairs and 120 Program Commitee Members. The whole process was conducted double blind in Microsoft CMT with at least three reviewers per paper. The papers accepted cover a wide range of topics—from optical coherence tomography for fingerprint sensing to deep learning for iris segmentation. "Face Recognition" attracted the highest number of submissions followed by "Other Biometrics and Fusion". Traditionally, "Fingerprint and Palmprint" has attracted the second highest number of submissions, but not so in 2016.

This indicates the growing interest in other modalities like vein patterns, signature, gait, and novel traits based on electrophysiological signals. The papers will be made available in IEEE*Xplore*.

The program was enriched by four invited talks by eminent speakers from industry and academia. The invited keynote speakers included David Burnett, VP for Global Ecosystem Development at Fingerprint Cards AB. While the last two years have seen significant adoption of biometrics in mobile devices, much work remains to realize their benefits and firmly cement their convenience and security benefits

into every-day consumer use. In his talk ([pdf presentation here](#)), Mr. Burnett shared his unique insights and experience from an industry perspective, explaining the adoption pattern for biometric solutions at internet-scale, outlining the missing pieces of infrastructure needed to make biometric authentication truly pervasive, and providing a multi-year forward look into biometric adoption trends for a wide range of device types, ecosystems and major milestones/industry turning points.

The second keynote by [James Loudermilk](#), Senior Level Technologist at the FBI Science and Technology Branch, USA, explained the four successive technology insertion programs conducted over the decades by the FBI Fingerprint Program ([pdf presentation here](#)). Since 1924, the FBI has been the United States national repository for fingerprints and related criminal history data, and today the FBI's master criminal fingerprint file contains the records of about 71.2 million individuals, while the civil file represents about an additional 39.5 million individuals. An average of 220+ thousand tenprints is processed daily, with an average response time of 8 minutes for criminal answer required transactions—during FY2015, 91 minutes for civil transactions, and 9 seconds for rapid fingerprint searches.

The third keynote speaker was [Didier Meuwly](#), Principal Scientist of the Netherlands Forensic Institute and Chair of Forensic Biometrics, University of Twente, The Netherlands. In his talk ([pdf presentation here](#)), Prof. Meuwly concentrated on the definition of forensic biometrics and the description of the informative value of the different biometric modalities in a forensic context, and he covered the different forensic applications of biometric technology using operational examples. The validation of forensic evaluation methods used to assess the strength of evidence was also presented in detail.

ICB 2016 also featured a distinguished talk by the recipient of the 2016 IAPR Senior Biometrics Investigator Award (SBIA). With the first edition presented in 2014, this award is given once every two years to outstanding scientists in the biometrics field. In this second edition, the prize was awarded to Prof. [John Daugman](#), University of Cambridge, UK, who delighted the audience with the talk ["Biometric Entropy: searching for Doppelgängers and the rare Entropod Uniquorns"](#). Prof. Daugman explored the biometric entropy within the face and iris modalities, meeting along the way Doppelgängers and the rare, newly discovered creatures, Entropod Uniquorns.

A panel session "Relation/Implications of Forensic Biometrics and Multimedia Forensics" sponsored by the EU-Horizon 2020 Project IDENTITY was chaired by Massimo Tistarelli (University di Sassari). Panelists included Chang-Tsun Li (University of Warwick), James Loudermilk (FBI Science and Technology) and Didier Meuwly (Netherlands Forensic Institute and University of Twente). The panel was successful in extending the discussion to actively involve the audience such that a productive brainstorming could take place.

During the first day, the conference offered four invited [tutorials](#) on timely topics that represent promising research directions in biometrics, and resulted in useful discussions between tutors and participants. Five highly motivated PhD students also participated in the [Doctoral Consortium](#), where they presented their research during a regular poster session at the conference, together with a luncheon where ten participants from industry and academia met and provided career advise in an interactive session with the students. The conference supported too the organization of four [biometric competitions](#), with papers reporting their results spread throughout different sessions of the conference.

ICB is an annual conference that once in every three years is celebrated in the USA, merging for such occassions with the BTAS conference (Biometrics: Theory, Applications, Systems) into the International Joint Conference on Biometrics (IJCB). As announced during the gala dinner, next year, [IJCB 2017](#) will take place in Denver, Colorado.

See you in Cancun!
Registration is open!

http://www.icpr2016.org/site/tickets/

Register by September 5, 2016, to get the early-bird discount!

And, submit a paper to one of these ICPR 2016 Workshops!

Pattern Recognition for Healthcare Analytics (PRHA 2016), Organizers: F. Farooq, S. Olav, R. Abreu De Paula, J. Hu

4th International Workshop on Multimodal pattern recognition for social signal processing in human computer interaction (MPRSS-4-2016), Organizers: F. Schwenker and S. Scherer

Visual observation and analysis of Vertebrate And Insect Behavior (VAIB 2016), Organizers: R. Fisher, J. Hallam, D. Armstrong and C. Spampinato

9th Workshop on Pattern Recognition in Remote Sensing (PRRS-9-2016), Organizers: E. Michaelsen and J. Shan

First International Workshop on coMics ANalysis, Processing and Understanding (MANPU 2016), Organizers: J.-M. Ogier, K. Aizawa and K. Kise

2nd International Workshop on Understanding Human Activities through 3D Sensors (UHA3DS'16), Organizers: M. Daoudi, F. Flórez, P. Pala and H. Wannous

2nd International Workshop on Face and Facial Expression Recognition (FFER) from Real World Videos, Organizers: Kamal Nasrollahi, Gang Hua, Thomas Moeslund, Qiang Ji,

ICPR workshop on deep learning for pattern Recognition (DLPR 2016), Organizers: Xiang Bai, Zhaoxiang Zhang, Shiguang Shan, Chunhua Shen, Yi Fang, Jingdong Wang, Yangqing Jia, Shuicheng Yan

2nd Workshop on Computer Vision for Analysis of Underwater Imagery (CVAUI 2016), Organizers: Alexandra Branzan Albu and Maia Hoeberechts

Workshop on Mathematical Models for Image Sciences (MMIS 2016) Organizers: Mariano Rivera, Zhixun Su, Ryszard Kozera, Domingo Mery,Reinhard Klette.

Workshop on Reproducible Research in Pattern Recognition (RRPR 2016), Organizers: Miguel Colom, Bertrand Kerautret, Pascal Monasse, Jean-Michel Morel.

BOOKSBOOKSBOOKS

Concise Computer Vision: An Introduction to Theory and Algorithms
by Reinhard Klette

Springer, 2014

Reviewed by Tayyab Naseer
(Ph.D. Candidate, Freiburg University, Germany)

This book covers the fundamental concepts of computer vision necessary for students who intend to pursue their postgraduate studies in this area. The word 'concise' might be misleading from the title, as the book does cover the topics in detail and with mathematical derivations. It provides a good overview and understanding of the essential algorithms. The book discusses fundamental algorithms and scientific references to papers and journals, gives short introductions to scientists, and notes the origins of the methods in 'inserts' throughout the text.

Chapter 1 Image Data:
Tthe basics of image data and its mathematical descriptions are discussed. The author has nicely spun the image basics by describing the image data in the spatial domain. After describing images as a 2D grid of pixels, the author explains multiple-channeled images e.g RGB images. The author nicely builds up on these definitions and explains different properties of the images. One nice thing about the book is that the author first defines the generic mathematical formulation and definitions of various terms and then shows how it relates to image processing.

The first sections of the chapter discuss different statistics of the images, e.g variance, mean and spatio-temporal data measures. The derivations of useful image characteristics like edge information are nicely illustrated and explained to show how to get the gradient information of images, which is useful for a number of image processing algorithms. The author then describes the transformation of images from spatial to frequency domain. The subsection is nicely illustrated for intuitive explanations and the short historical descriptions of the algorithms makes the reading more captivating. After discussing the image operations in 2D, the book explains color images and connects the fundamentals of color image processing with human vision and perception. It also encapsulates different color spaces for representing 3 channeled images, e.g HSI and RGB. Along with the mathematical explanations of the color spaces, elegant descriptions are provided in the chapter for a lucid understanding of the topic.

Chapter 2 Image Processing:
The image processing algorithms map images to enhanced images or extract useful features that can be further used to make inferences, learning and taking actions based on this visual inputs. The second chapter explains local and global image operators, which are important for certain feature detections e.g corners and edges. The vulnerability of various approaches to certain assumptions like constant illumination is also addressed. As the book contains programming exercises, I think it could benefit from including some

Click above to go the publisher's web site for this volume.
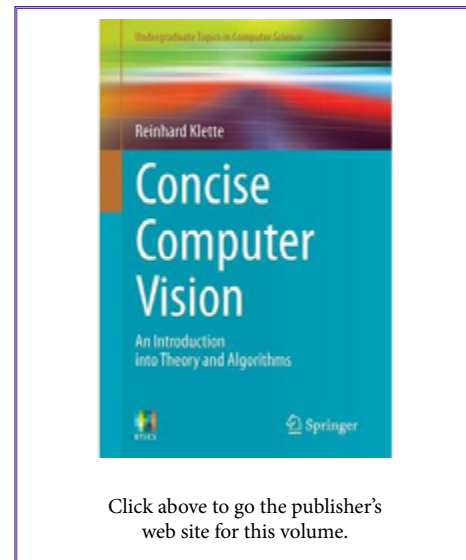
simple pseudo code in it to give students a better understanding of the algorithms.

Chapter 3 Image Analysis:
Image geometry is vital for various image processing algorithms that define certain image characteristics. Here properties for 2D shape analysis of an image are discussed. The definitions of geometric properties like curvature and lengths are linked to popular algorithms like distance transforms. The explanations do assume a sound mathematical background. The explanations not only provide the algorithmic understanding of the concepts like many other image processing and computer vision books, but also provide complete mathematical formulations. Window-based image analysis, which is important for defining image properties like moments, is also covered. Every chapter of the book contains 'observations' that draw an important take-home message from an algorithm or an explanation. In this chapter, the author mentions pattern matching for detecting lines and circles.

Chapter 4 Dense Motion Analysis:

Understanding the dynamics of our surroundings is of paramount importance. For this, image-based motion analysis plays a vital role in various computer vision applications. The author explains some important algorithms for calculating pixel wise motion vectors. Although the mentioned algorithms are not state-of-the-art for calculating the optical flow, the are of fundamental value for the core concepts, and they are still used for various vision-based tracking applications. I think this chapter could benefit from some more algorithms or methods for optical flow calculation. As the book mentions Lucas Kanade and Horn-Schunck algorithms, it will be interesting for readers to read about the approaches that combine these local and global optical flow methods.

Chapter 5 Image Segmentation:

Image and video segmentation is one of the most important applications of image processing and computer vision algorithms. The chapter discusses the most basic approach of seed-growing for image segmentation and builds the rest of the concepts later in the chapter. Then Mean Shift algorithm along with its different variants is explained. The readers are provided with both algorithmic and mathematical discussions of the method. Then segmentation is explained when posed as an optimization problem. The former is mainly used in image processing applications, whereas the latter has been predominant in computer vision applications. The concepts of video segmentation are briefly discussed at the end of the chapter.

Chapter 6 Cameras, Coordinates and Calibration:

Calibrated sensors are of paramount importance for distortion-free data collection and multi-sensor setups. This chapter explains the intrinsic calibration of monocular cameras. The concept is extended to stereo and panoramic cameras. This chapter is fairly simple and very easy to follow. Though it could benefit from the addition of various projections methods. In multi-sensor setups, extrinsic calibrations are also important and are briefly described in the chapter.

Chapter 7 3D Shape Reconstruction:

As we know, images are 2D projections of our 3D surroundings. Full 3D modelling of the environment has a vast range of applications for computer vision and other communities, e.g. robotics. The book explains three major methods to reconstruct 3D shapes. Firstly, the author explains how a 3D model of our environment can be retrieved using structured lighting. The very same concept is the main working principle of the Kinect depth sensor that is widely used for gaming consoles and other applications. Second is the stereo-based approach. Human vision is the main intuition behind this method. As our eyes work as the two cameras separated by a small and fixed baseline, epipolar geometry can be applied to recover the depth information in such a setup. Third, the alternative approach to using multiple cameras, the photometric stereo method, which makes use of multiple light sources instead, is explained.

Chapter 8 Stereo Matching:

To recover depth from a stereo image pair holds great importance for a variety of computer vision applications. The matching methods are mainly categorized into local and global methods. The local methods are window-based or area-based methods as the disparity is calculated for every pixel. In global methods, the problem is formulated as an optimization problem. Although, in general, there is an image preprocessing pipeline before the calculation of the matching cost. The chapter does not mention any such preprocessing techniques to alleviate sensor noise or photometric distortions. The chapter starts directly with the matching cost and assumes that the preprocessing step has already been carried out. The chapter also discusses the time complexities of the local methods. Later, the chapter discusses in detail the two main global methods to solve the optimization problem, which are dynamic programming matching and belief-propagation matching. It might be interesting for the readers to read about one more method known as Graph-Cuts.

Chapter 9,10 Feature Detection and Tracking and Object Detection:

Keypoint-based features are widely used for numerous computer vision applications. Image recognition under various image rotations, scales, and viewpoints use these point feature descriptors. This chapter explains in detail state-of-the-art keypoint-based descriptors (SURF, ORB, SIFT, BRIEF , FAST). The algorithms are nicely illustrated with graphical examples of the matched features using these descriptors. Later in this chapter, tracking of these features is explained in detail using KLT tracker, Particle filter and Kalman filter. The first is mainly used in vision applications whereas the latter two are widely used in robotics. It will be interesting for the readers to read about another application of tracking these features, e.g., feature-point trajectories. These are generally used to smooth the

camera motion and remove shaky effects from a video. In the final chapter of the book, the author discusses approaches from the machine learning domain for object detection, classification and localization. Binary classifiers are briefly discussed along with supervised and unsupervised learning approaches. Then 3 popular object detectors (HOG, Haar, Viola-Jones) are discussed along with their applications, e.g. HOG is mainly used for pedestrian detection and Viola-Jones for face detection. Adaboost a well-known procedure for learning a strong classifier from an initial weak classifier is explained in detail. It is notable that the algorithm of the classifier is not just stated with the parameters but the intuition behind the choice of these parameters is also mentioned. Finally, how Random Decision forests can be used to detect objects is explained.

Overall, the book provides a good explanation of the theoretical concepts and algorithms that are widely used in computer vision. Readers of this book would be able to grasp more complex theories and understand state-of-the-art algorithms in the field of computer vision.

FREE BOOKS

The *IAPR Newsletter* is looking for reviewers for the books listed below. If you have interest and some knowledge in the topic, email us with your mailing address. We will send you a copy of the book—which you may keep—and will expect in return a review for the Newsletter. ~*Zeeshan Zia,* Associate Editor for Book Reviews

We are offering the following titles for review.

These have been published in the "Advances in Computer Vision and Pattern Recognition" series from Springer.

* ***Knowledge Transfer between Computer Vision and Text Mining*** by Radu Tudor Ionescu: *http://www.springer.com/us/book/9783319303659* (published in 2016)

* ***Context-Enhanced Information Fusion*** by Lauro Snidaro et al.: *http://www.springer.com/us/book/9783319289694* (published in 2016)

* ***Large-Scale Visual Geo-Localization*** by Amit R. Zamir et al.: *http://www.springer.com/us/book/9783319257792* (published in 2016)

* ***Structural Pattern Recognition with Graph Edit Distance*** by Kaspar Riesen: *http://www.springer.com/us/book/9783319272511* (published in 2015)

* ***Integrated Imaging and Vision Techniques for Industrial Inspection*** by Zheng Liu et al. (Eds.): *http://www.springer.com/us/book/9781447167402* (published in 2015)

* ***Sparse Representation, Modeling and Learning in Visual Recognition*** by Hong Cheng: *http://www.springer.com/us/book/9781447167136* (published in 2015)

Other recently published Springer titles include:

* ***Handbook of Iris Recognition (Second Edition)*** by Kevin W. Bowyer: *http://www.springer.com/us/book/9781447167822* (published in 2016)

* ***Digital Image Processing (Second Edition)*** by Wilhelm Burger and Mark J. Burge: *http://www.springer.com/us/book/9781447166832* (published in 2016)

* ***Guide to Signals and Patterns in Image Processing*** by Apurba Das: *http://www.springer.com/us/book/9783319141718* (published in 2015)

* ***Practical Biometrics (Second edition)*** by Julian Ashbourn: *http://www.springer.com/us/book/9781447167167* (published in 2015)

* ***Computer Vision for X-Ray Testing*** by Domingo Mery: *http://www.springer.com/us/book/9783319207469* (published in 2015)

IAPR

This bulletin board contains items of interest to the IAPR Community

Letter to the Editor

Editor's Note:
We received this Letter to the Editor from Larry O'Gorman (NOKIA Bell Labs, USA), who was IAPR Newsletter EiC from 2002-2008.
We'd love to hear from you, too. Please with your thoughts and suggestions.

~Arjan Kuijper, EiC
~Linda O'Gorman, Layout Editor

Arjan, Linda,

Just a note to say that the new TC News items in the Newsletter are an excellent addition. I especially liked how concise they were—a short paragraph is an easy way for me to catch up. Nice graphics, too.

On a personal note, when I was Newsletter editor long ago, it was like pulling teeth to get articles from the TC chairs. The new format is good for both reader and TC chair.

--Larry

A new issue of **Pattern Recognition Letters** (PRL) has survey papers written by IAPR Fellows Anil Jain and George Nagy.

Pattern Recognition Letters
Volume 79 , 1 August 2016
http://www.sciencedirect.com/science/journal/01678655/79

Clink on underlined text so you don't miss these important items in this issue:

IAPR Nominating Committee needs your help finding candidates for the next ExCo

IAPR Conferences & Meetings Committee Call for Bids to Host ICPR 2020

ICPR 2016 Registration is open and Workshop paper deadlines are, too!

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2 Ph. D. Positions in the Image Processing Laboratory (IPLab) at University of Catania, Italy

IPLab is part of the Department of Mathematics. IPLab's research focuses on areas of Image Processing, Computer Vision, Machine Learning and Computer Graphics.

- Position A: Ambient Assisted Living with focus on Fall Detection
- Position B: Learning Architectures for Multimedia Representation and Understanding

Contact:
Prof. Sebastiano Battiato *battiato@dmi.unict.it*
Dr. Giovanni Maria Farinella *gfarinella@dmi.unict.it*

http://iplab.dmi.unict.it/PhD

Meeting and Education Planner

The IAPR web site has the most up-to-date information on IAPR events. Click here.
NOTE: Highlighting indicates that the paper submission deadline has not yet passed.
* Asterisks denote non-IAPR events *

		Meeting	Report on previous edition	Venue
2016	SEP	* EMVA 2016: 1st European Machine Vision Forum *		Germany
		icIVPR 2016: 2016 Intl. Conference on Imaging, Vision & Pattern Recognition		Bangladesh
		ANNPR 2016: 7th Workshop on Artificial Neural Networks in Pattern ecognition	ANNPR 2014	Germany
	OCT	PRIP 2016: 13th Intl. Conf. on Pattern Recognition and Information Processing		Belarus
		ICFHR 2016: 15th Intl. Conference on Frontiers in Handwriting Recognition	ICFHR 2014	China
		RFMI 2016: Sixth International Workshop on Representation, analysis and recognition of shape and motion FroM Imaging data		Tunisia
		CIARP 2016: 21st Iberoamerican Congress on Pattern Recognition		Peru
	NOV	IVCNZ 2016: Image and Vision Computing New Zealand 2016	IVCNZ 2015	New Zealand
		MedPRAI 2016: The Meditarranean Conference on Pattern Recognition and Artificial Intelligence		Algeria
		S+SSPR 2016: IAPR Joint International Workshops on Statistical Techniques in Pattern Recognition (SPR 2016) and Structural and Syntactic Pattern Recognition (SSPR 2016)	S+SSPR 2014	Mexico
		DICTA 2016: 2016 Digital Image Computing, Techniques and Applications	DICTA 2015	Australia
	DEC	* PRHA 2016: 3rd Intl. Workshop on Pattern Rec. for Healthcare Analytics * (in conjunction with ICPR 2016)		Mexico
		* MRPRSS 2016: 4th Intl. Workshop on Multimodal pattern recognition of social signals in human computer interaction * (in conjunction with ICPR 2016)		Mexico
		* VAIB 2016: Visual observation and analysis of Vertibrate And Insect Behavior 2016 * (in conjunction with ICPR 2016)	VAIB 2014	Mexico
		PRRS 2016: 9th International Workshop on Pattern Recognition in Remote Sensing (in conjunction with ICPR 2016)	PRRS 2014	Mexico
		MANPU 2016: The First International Workshop on coMics ANalysis, Processing and Understanding (in conjunction with ICPR 2016)		Mexico
		* UHA3DS'16: 2nd International Workshop on Understanding Human Activities through 3D Sensors * (in conjunction with ICPR 2016)		Mexico
		* FFER 2016: 2nd International Workshop on Face and Facial Expression Recognition from Real World Videos * (in conjunction with ICPR 2016)	FFER 2014	Mexico
		* DLPR 2016: ICPR workshop on Deep Learning for pattern Recognition * (in conjunction with ICPR 2016)		Mexico
		* CVAUI 2016: 2nd Workshop on Computer Vision for Analysis of Underwater Imagery * (in conjunction with ICPR 2016)	CVAUI 2014	Mexico
		* MMIS 2016: Workshop on Mathematical Models for Image Sciences * (in conjunction with ICPR 2016)		Mexico
		* RRPR 2016: Workshop on Reproducible Research in Pattern Recognition * (in conjunction with ICPR 2016)		Mexico
		ICPR 2016: 23rd International Conference on Pattern Recognition	ICPR 2014	Mexico

Meeting and Education Planner

The IAPR web site has the most up-to-date information on IAPR events. Click here.
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		Meeting	Report on previous edition	Venue
2017	FEB	ICPRAM 2017: 6th International Conference on Pattern Recognition Applications and Methods		**Portugal**
	MAY	MVA 2017: 15th IAPR Intl. Conf. on Machine Vision Applications	MVA 2015	**Japan**
	NOV	ICDAR 2017: 14th International Conference on Document Analysis and Recognition		**Japan**

23RD INTERNATIONAL CONFERENCE ON
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REGISTRATION IS NOW OPEN!!!

Thoughts on articles you've read in this issue of the IAPR Newsletter?

Send your comments to:

Arjan Kuijper, Editor-in-Chief
arjan.kuijper@igd.fraunhofer.de