INTERNATIONAL ASSOCIATION FOR PATTERN RECOGNITION

IAPR Newsletter

Volume 34, Number 3
July-August 2012

Calls for Papers on Page 2

In this issue...

Calls for Papers

DGCI 2013
17th IAPR International Conference on Discrete Geometry for Computer Imagery
Sevilla, Spain
Deadline: September 14, 2012
March 20-22, 2013

CCIW 2013
Fourth Computational Color Imaging Workshop
Chiba, Japan
Deadline: October 1, 2012
March 4-5, 2013

MVA 2013
13th IAPR International Conference on Machine Vision Applications
Kyoto, Japan
Deadline: December 14, 2012
May 21-23, 2013

ISMM 2013
11th International Symposium on Mathematical Morphology
Uppsala, Sweden
Deadline: December 9, 2012
May 27-29, 2013

ICB 2013
6th International Conference on Biometrics
Madrid, Spain
Deadline: December 15, 2012
June 4-7, 2013

GREC 2013
10th IAPR International Workshop on Graphics Recognition
USA
Deadline: ?
August, 2013

ICDAR 2013
12th International Conference on Document Analysis and Recognition
Washington, DC, USA
Deadline: February 1, 2013
August 25-28, 2013

CAIP 2013
15th International Conference on Computer Analysis of Images and Patterns
York, UK
Deadline: April 1, 2013
August 27-29, 2013

ACPR 2013
2nd IAPR Asian Conference on Pattern Recognition
Okinawa, Japan
Deadline: June 10, 2013
November 5-8, 2013

Call for Submissions

IAPR Newsletter

Articles, announcements, book reviews, conference and workshop reports

Contact the editor:
Alexandra Branzan Albu, *aalbu@ece.uvic.ca*

Deadline: September 21, 2012

To contact us:

Newsletter Editor-in-Chief:
Alexandra Branzan Albu
aalbu@ece.uvic.ca
www.ece.uvic.ca/faculty/abranzan-albu.shtml

Associate Editor for Book Reviews:
Arjan Kuijper
arjan.kuijper@igd.fraunhofer.de
www.gris.tu-darmstadt.de/~akuijper/

Layout Editor:
Linda J. O'Gorman
logorman@alumni.duke.edu

IAPR Newsletter

Published in association with the IAPR website, *www.iapr.org*

IAPR Newsletter Publication Schedule:
The IAPR Newsletter is published four times per year during the third week of January, April, July, and October.

FEATURE: Getting to know...Masakazu Ejiri, IAPR Fellow

Reminiscences of my Machine Vision Research and IAPR Activities

By Masakazu Ejiri, IAPR Fellow (Japan)

Dr. Masakazu Ejiri, IAPR Fellow

ICPR 1996, Vienna, Austria

For contributions to the development of machine vision technology and for outstanding service to IAPR

I would like to start this article by explaining the footprint of my young days. In 1959, I started my career as an industrial researcher at Hitachi's Central Research Laboratory in Tokyo, Japan. My major field of interest was industrial automation, and soon I was involved in the project of developing automatic assembly machines for transistors. The most difficult problem we faced was position detection of electrodes on the tiny transistors. Our approach to this problem was to scan the transistor surface with two spotlights and detect the reflected lights by photomultipliers. Soon, we noticed that this method did not capture enough information for reliable recognition, and after a two-year struggle, we had to abandon this project. It was in this instant that I learned how superior human vision is, and at the same time, how important machine vision with pattern recognition capability would be. By taking the opportunity of my overseas research at the University of Illinois in 1967, I studied physiological vision systems using cats and dogs at its Biomedical Department in Chicago. During this time, I also had the opportunity to visit MIT, Stanford, and a few other universities where computer vision research had just started and to discuss the future possibility of machine vision technologies with them.

After coming back from Chicago, I started to build a

(Continued on page 4)

Masakazu Ejiri received the B.E. degree in Mechanical Engineering in 1959 and the Dr. Eng. degree in Electrical Engineering in 1967, both from Osaka University, Japan. In 1959, he joined the Central Research Laboratory of Hitachi Ltd., Tokyo, Japan, and remained there until his retirement in 2003 from his position of Senior Chief Research Scientist, Corporate Technology. While at Hitachi, he spent 1967-1968 as a Visiting Professor at the University of Illinois, Chicago, and 1977-1981 as the Vice-president of Hitachi's subsidiary company, HISL Inc., California, USA. He also held visiting positions at several universities in Japan during 1982-2003. He is presently an independent R&D Consultant in Industrial Science.

He has worked primarily in the areas of Control Engineering, Robotics, Pattern Recognition, Machine Vision, and Machine Intelligence, and authored a variety of technical papers, reviews, and books. His pioneering research and developments include various vision-based machines and systems for factory automation and office automation.

Dr. Ejiri served as the IAPR Vice-president for the term 1990-1992, as an IAPR Governing Board Member for the term 1992-2002, and as the General Co-chair of ICPR in Tampa in 2008. He also served as the President of the Robotics Society of Japan for the term 2001-2003, and was designated as the Honorary President of the society in 2008. He received several awards from government and academic/industrial societies, including the Distinguished Researcher Award from the Minister of Science and Technology of Japan in 1976 and the Joseph F. Engelberger Award from the Robotics Industries Association, USA, in 2005. He is a Fellow of IAPR and a Life Fellow of IEEE. One of his recent contributions was the foundation of an allied organization of academic societies in Japan, called the Trans-disciplinary Federation of Science and Technology, and he served as the Vice-president of the Federation for the term 2005-2008.

(Continued from page 3)

prototype intelligent robot that assembled objects from planar drawings, and it was completed and demonstrated in 1970. After a few subsequent developments in practical machine vision systems, I started again to build the transistor assembly machines, based this time on image processing technology, by applying the newly-invented multiple local pattern matching method. This attempt succeeded in 1973, as the result of a ten-year persistent effort since the first failure, and soon expanded its use to ICs and LSIs. These fully-automatic assembly machines were favorably accepted, and the technology spread out to the worldwide semiconductor industry.

Then, my research interests in machine vision quickly expanded to various other industrial applications, and further shifted to office applications and even to social applications. I headed numerous projects including the development of a meteorological satellite image analysis system, a geographic information system, automatic teller machines, and automatic letter sorting machines.

My first connection with the IAPR was the participation in the ICPR-1978 in Kyoto as a panelist for discussing the importance of machine vision technology. Since then, my relation to the IAPR has become closer and closer, and the ICPRs became one of the main stages of my activity. At the ICPR-1984 in Montreal, I served as an invited speaker and presented the newest technologies on map and drawing recognition. At the ICPR-1990 in Atlantic City, I was appointed as a Vice-president of the IAPR, and soon I proposed several plans to improve the interface between IAPR and industries, which was one of the key issues in early 1990s. These plans (as appeared in IAPR Newsletter, Vol.13, No.4, Feb. 1991) included the creation of the Best-Industry Related Paper Award (BIRPA) and the initiation of IAPR Fellowship Program. Increasing the number of member countries was another important concern of the IAPR at that time. Therefore I started to talk with the people of South Korea and invited them to join the IAPR. The Governing Board approved it unanimously at the 1992 meeting (during the ICPR-1992 in The Hague) and welcomed South Korea as a new member. In 1993, I had a chance to discuss IAPR membership with the people of Taiwan when I was invited as a plenary speaker at their national conference. The next year at the ICPR-1994 in Jerusalem, Taiwan became a new member of the IAPR with unanimous welcome. I am now very proud of my contribution in bridging these countries and the IAPR.

Even after finishing my Vice-presidency, I continued to be on Governing Board for the next ten years, and during this period, I was involved in a few committees. As the chair of the Industrial Liaison Committee, I had a chance to give out the BIRPA Award at the ICPR-1994 in Jerusalem. As the chair of Fellow Committee, I engaged in the selection of new Fellows that were awarded at the ICPR-1998 in Brisbane. At the ICPR-2006 in Hong Kong, I was asked to serve as the chair of the IAPR Advisory Committee. As there was a trend of increasing plagiarism and no shows in the journals and conferences of academic societies in general, it was urgent to avoid such behavior in the IAPR-related activities. Therefore, we intensively discussed a statement of ethics and proposed a draft to Executive Committee. The statement was then approved by the IAPR Governing Board, became effective, and is now posted at the IAPR website. At the ICPR-2008 in Tampa, I served as a General Co-chair with Prof. Kasturi and Dr. Sanniti di Baja, which was one of

(Continued on page 5)

(Continued from page 4)

the most exciting experiences to me.

Looking back, I feel my life as an industrial researcher was a succession of new challenges in machine vision applications. My concerns in those challenges were always with high reliability and practicability, and now I am completely satisfied with my achievements. In general, publishing papers is not the first priority for industrial people like me. However, it is true that involvement in academic activities added a comfortable flavor to my research life and enriched it greatly, and thus I would like to thank all my friends and colleagues in the IAPR community for giving me many wonderful and enjoyable opportunities.

Though I am using R&D Consultant as my recent title, I have substantially retired from most of my jobs and duties and am enjoying the rest of my life in the countryside near Tsukuba, Japan. However, one of the exceptions remaining is the role as a member of the Advisory Committee of the ICPR-2012 in Tsukuba. The preparations are progressing well, and I hope we will have an exciting conference with many participants from all over the world. Now, let me conclude this article by saying, “Looking forward to seeing you soon in Tsukuba!”

FEATURE: Getting to know...Robert P. W. Duin, IAPR Fellow

Personal Sketch

by Robert P. W. Duin, IAPR Fellow (The Netherlands)

Dr. Robert P. W. Duin, IAPR Fellow

ICPR 2002, Quebec City, Quebec, Canada

For contributions to statistical pattern recognition and for service to IAPR.

As an undergraduate student, I joined the Delft Pattern Recognition Group in The Netherlands before I had any idea what this field was about. In my study of applied physics at the Delft University of Technology, I attended a course by Prof. C.J.D.M. Verhagen on physical measurements. He explained that there are two fundamentally different ways of measuring physical properties: comparing and counting. Comparing is for human beings only, as we have to find relations with other observations on earth, e.g. the standard meter stick. It is relative. In counting (e.g. the number of pendulum swings) however, he explained with a wink, we share the angels. It is absolute. Any other creature in the universe will find the same value. Although he was partially joking, this observation impressed me deeply and stayed with me for the rest of my life.

Verhagen was an impressive person, an inspiring teacher, a great organiser, and a leader who was able to get the best out of his team. As his Ph.D. student I could observe how he contributed to the organisation of the field: he organised the 2nd ICPR in Copenhagen in 1974 and participated in the founding of the IAPR in 1976, together with Herbert Freeman and King Sun Fu. I had, thereby, the privilege of meeting these early workers in the PR field in Delft in the 70's. Other interesting researchers visited Delft as well in that period, e.g. David Cooper, Laveen Kanal, Anil Jain, Godfried Toussaint,

(Continued on page 7)

Robert P.W. Duin studied applied physics at Delft University of Technology and joined the pattern recognition group at the same university in 1970. He stayed there for his entire professional career. In the first years, his research focussed on small sample size problems and the peaking phenomenon, resulting in a Ph.D. thesis on the accuracy of statistical pattern recognizers in 1978. He worked on parallel architectures for image processing, neural networks, combining classifiers, one-class classifiers, and representation. After 2000, his research mainly focussed on dissimilarity representation for pattern recognition as an alternative to the traditional use of features. In 2011, he officially retired, but he has been still involved in further research at the Pattern Recognition Laboratory in Delft. This will continue for some time more.

The study of applications has always been a significant part of his research: machine condition monitoring, medical diagnosis, hyperspectral imaging, chemometrics, and seismics. This was facilitated by the Matlab toolbox PRTools, of which he is the main designer. This software package also played a significant role in the pattern recognition courses he gave on the undergraduate and graduate level as well as for industrial applications.

He was one of the founders of the Dutch Pattern Recognition Society, he participated in the organisation of the 11th ICPR in 1992 in The Hague, and was one of the program chairs of the 19th ICPR in 2008 in Tampa. He served from 2000-2004 as the chair of TC1, was for six years an associated editor of PAMI and for a long time he served as an advisory editor of PRL. He is a fellow of the IAPR and received in 2006 the Pierre Devijver Award for his work in statistical pattern recognition.

Dr. Duin supervised about 20 Ph.D. students and together with them and many other colleagues he co-authored about 300 technical papers and 2 monographs.

(Continued from page 6)

Pierre Devijver, Josef Kittler, and Ted Young. With the majority of them, I have had regular contact for many years. I stayed with Josef Kittler and Anil Jain during my sabbatical leaves. Ted Young later became the successor of Verhagen after his retirement. It felt very good to work in a group with worldwide connections.

I gradually found out what pattern recognition was about: a challenging starting area with great questions. It could be phrased as a natural science, as it tries to understand and simulate the pattern recognition systems around us (human experts). Statistics is a powerful tool for describing how they learn pattern classes. Bayes' rule is very helpful, but at the end the curse of dimensionality is against us and causes a strange paradox. This was the topic of my thesis and I was rather depressed by the conclusion: unrealistic demands with respect to the size of the training sets in comparison with human experts.

After finishing my thesis I left the area of statistical pattern recognition for about 10 years and worked on parallel architectures for image processing. These were needed for pattern recognition in order to obtain large amounts of data fast. Intellectually and technically this topic was interesting, and I still find it a valuable experience that I once debugged computers on the level of micro-code and hardware. From a scientific point however it didn't interest me sufficiently. So, after a 10-year break, it was a time to return to the field.

Around 1990, the upcoming area of neural networks caused a crisis in pattern recognition. Its claims contradicted the established principles in the pattern recognition community with respect to the complexity of learning systems and the customary size of the training sets. I was shocked and wanted to understand what was going on. Although many details in the papers I studied appeared to be wrong, I also discovered that I had to change my mind about the possibilities to train systems with many parameters or to tackle problems represented in high-dimensional spaces. My strong cooperation with Sarunas Raudys was very helpful to making progress.

The publication of the support vector classifier in 1995 gave a beautiful framework for understanding why this is possible. What disturbed me however was the Mercer condition for the kernel: the basis has to live in a Euclidean space. This was a severe restriction. I had the feeling that a much more general concept was needed for real world pattern recognition problems and started to develop the dissimilarity representation together with Elzbieta Pekalska.

It is a generalisation of the Mercer kernel and avoids the underlying feature representation. The resulting dissimilarity space equipped with a support vector classifier became my main toolset in pattern recognition. Horst Bunke made clear to me how this representation is capable of bridging the statistical and structural approaches to pattern recognition. Together with my gradually growing understanding of the insights that Lev Goldfarb already published years before, this encouraged me to make my final steps in approaching pattern recognition problems: it is non-Euclidean and in essence classes don't overlap as they are based on different concepts. In practice they often do, of course, but by replacing the feature representation by a dissimilarity representation this can be postponed or sometimes entirely avoided.

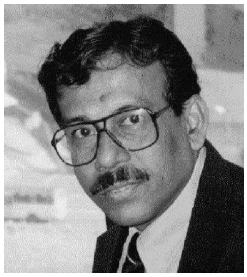
This brought me from Bayes to Occam: the

(Continued on page 8)

(Continued from page 7)
observable statistics as the fundamental generalisation principle for the design of pattern recognition systems should be replaced by human defined distances (or dissimilarities). I started to exploit this in various fields of application like computer vision, medical diagnosis, hyperspectral imaging, seismics and chemometrics.

The study of pattern recognition triggered my interest in consciousness. How do we find good features or an appropriate dissimilarity measure? By asking an expert or by introspection. The errors in the resulting classifier may show that the original answers are wrong or insufficient: we have to do better. The same holds for the more general questions: how do we learn and recognize anyway? Do we really collect and store features? Or do we directly observe object differences? Do we apply some measure for that? And how do we transform and use object differences to discriminate between classes, patterns, or concepts? How is daily consciousness organised? What levels can be distinguished? This is still a large domain waiting for exploration.

My work brought me in contact with Ph.D. students, visitors and colleagues from all continents. I have met many interesting people of whom I have named here just a few. Cooperations brought me to interesting places like the Australian desert, the top of a Colombian volcano, the Verona Arena, and the rural regions of the Korean peninsula. Next to the scientific and technical aspects, this social side of the work has brought me great satisfaction.



Getting to know...
Sankar K. Pal, IAPR Fellow

By Sankar K. Pal, IAPR Fellow (India)

Professor Sankar K. Pal, IAPR Fellow

ICPR 2002, Quebec City, Quebec, Canada

For contributions to pattern recognition and image processing using soft computing.

I was introduced to the subject Pattern Recognition in 1975 when I joined Indian Statistical Institute (ISI), Calcutta, to do my PhD with Prof. D. Dutta Majumder as a CSIR Senior Research Fellow. At that time there was no text book; only a few edited volumes, mostly by Prof. K.S. Fu, were available in our library or in the market. Another edited book that I used to consult often was "Fuzzy sets and their applications to cognitive and decision processes" by Zadeh, Fu, Tanaka and Shimura, published by Academic Press in 1975. Apart from them I studied, though it was extremely difficult to understand, the DSc thesis of G.S. Sebestyen, entitled "Decision-making process in pattern recognition" published as a monograph by Mc Milan Press in 1962. I worked in the area of speech recognition and man-machine communication using fuzzy set theory. Prof. K.S. Fu was the foreign examiner of my PhD thesis. After that I moved to Imperial College, London, in 1979 as a Commonwealth Scholar and did another PhD in image processing using fuzzy sets. Though there had been a possibility to work at Purdue University, USA, as a Post-doc Fellow with Prof Fu, I chose to go to Imperial College. At that time labs with complete software and hardware facilities for working in (gray) image processing were not readily available at many

(Continued on page 10)

Sankar K. Pal (www.isical.ac.in/~sankar) is a *Distinguished Scientist* of the Indian Statistical Institute and a former *Director*. He is also a J.C. Bose Fellow of the Govt. of India. He founded the Machine Intelligence Unit and the Center for Soft Computing Research, A National Facility in the Institute in Calcutta. He received a Ph.D. in Radio Physics and Electronics from the University of Calcutta in 1979, and another Ph.D. in Electrical Engineering along with DIC from Imperial College, University of London, in 1982. He joined his Institute in 1975 as a CSIR Senior Research Fellow and later became a Full Professor in 1987, Distinguished Scientist in 1998, and the Director for the term 2005-10.

He worked at the University of California, Berkeley, and the University of Maryland, College Park, in 1986-87; the NASA Johnson Space Center, Houston, Texas in 1990-92 & 1994; and in the US Naval Research Laboratory, Washington D.C., in 2004. Since 1997, he has been serving as a *Distinguished Visitor* of IEEE Computer Society (USA) for the Asia-Pacific Region, and has held several visiting positions at universities in Italy, Poland, Hong Kong, and Australia.

Prof. Pal is a *Fellow* of the IEEE, USA, the Academy of Sciences for the Developing World (TWAS), Italy, the International Association for Pattern recognition, USA, the International Association of Fuzzy Systems, USA, and the four National Academies for Science/Engineering in India. He is a co-author of seventeen books and more than four hundred research publications in the areas of Pattern Recognition and Machine Learning, Image Processing, Data Mining and Web Intelligence, Soft Computing, Neural Nets, Genetic Algorithms, Fuzzy Sets, Rough Sets, and

(Continued on page 10)

(Continued from page 9)

universities/Institutes, even in the developed nations. In 1981, I attended, as a speaker, the workshop on pattern recognition organized at Oxford University, UK, organized by NATO Advanced Studies Institute. I was thrilled as well as proud to be an invited speaker amongst several PR stalwarts including KS FU, K Fugunaga, L Kanal, P Devijver, MG Thomason and J. Kittler.

I returned from England to India in May, 1983. Then during 1986-1987, I visited the University of California, Berkeley, and the University of Maryland, College Park, as a Fulbright Fellow, and had an opportunity to work with two giants, namely, Prof. Lotfi A. Zadeh, father of Fuzzy Sets, and Prof. Azriel Rosenfeld, father of Image Processing. I also spent more than two years at the NASA Johnson Space Center, Houston, during 1990-92, and in 1994 as NRC Associate to work in the Software Technology Branch, Information Technology Division, where I came across and got interested in subjects like genetic algorithms (GA) and rough sets.

Subsequently, my research interests moved towards developing primarily the soft computing approaches comprising fuzzy sets, neural networks, genetic algorithms and rough sets, both individually and in integration. Tasks like classification, rule generation, learning with mislabeled samples, uncertainty analysis, case based reasoning, image segmentation, data mining and knowledge discovery, designing connectionist knowledge based systems, page ranking, and proving convergence were primarily considered. Methodologies with theoretical analysis, and different tools were developed. The theory of probability was also used in the process, wherever required. Real life application domains that I dealt with include speech recognition, remote sensed image analysis, medical imaging, bio-informatics, web

(Continued from page 9)

Bioinformatics.

He has received the *1990 S.S. Bhatnagar Prize* (which is the most coveted award for a scientist in India), and many prestigious awards in India and abroad including the *1999 G.D. Birla Award*, *1998 Om Bhasin Award*, *1993 Jawaharlal Nehru Fellowship*, *2000 Khwarizmi International Award from the Islamic Republic of Iran*, *2000-2001 FICCI Award*, *1993 Vikram Sarabhai Research Award*, *1993 NASA Tech Brief Award (USA)*, *1994 IEEE Trans. Neural Networks Outstanding Paper Award (USA)*, *1995 NASA Patent Application Award (USA)*, *1997 IETE-R.L. Wadhwa Gold Medal*, the *2001 INSA-S.H. Zaheer Medal, 2005-06 Indian Science Congress-P.C. Mahalanobis Birth Centenary Award (Gold Medal)* for Lifetime Achievement, 2007 J.C. Bose Fellowship of the Government of India and *2008 Vigyan Ratna Award from Science & Culture Organization, West Bengal.*

Prof. Pal is/was an *Associate Editor* of IEEE Transactions on Pattern Analysis and Machine Intelligence (2002-06), IEEE Transactions on Neural Networks [1994-98 & 2003-06], Neurocomputing (1995-2005), Pattern Recognition Letters (1993-2011), International Journal of Pattern Recognition & Artificial Intelligence, Applied Intelligence, Information Sciences, Fuzzy Sets and Systems, Fundamenta Informaticae, LNCS Trans. On Rough Sets, International Journal of Computational Intelligence and Applications, IET Image Processing, Journal of Intelligent Information Systems, and Proc. INSA-A; *Editor-in-Chief,* Int. J. Signal Processing, Image Processing and Pattern Recognition; a *Book Series Editor*, Frontiers in Artificial Intelligence and Applications, IOS Press, and Statistical Science and Interdisciplinary Research, World Scientific; a *Member, Executive Advisory Editorial Board*, IEEE Trans. Fuzzy Systems, Int. Journal on Image and Graphics, Int. J. Computational Science & Engineering, and Int. J. Approximate Reasoning; and *Guest Editor,* IEEE Computer, and Theoretical Computer Science - C.

(Continued on page 11)

(Continued from page 10)

intelligence, and social network mining.

Salient features of some of the contributions are as follows:

In the area of image analysis, we have given various definitions of image entropy based on exponential gain function, rough-fuzzy generalized entropy, and other quantitative indices for image processing tasks. The exponential gain function relies on the fact that a better measure of ignorance is $1 - p_i$ rather than $1/p_i$ (as used by Shannon), when p_i is the probability in receiving the ith event. Rough-fuzzy entropy, on the other hand, takes care of the fuzziness involved in the boundaries of both sets and granules in the definition of rough sets, in general. In image processing it reflects the ambiguity resulting from resemblance in nearby gray levels and pixels as well as the ambiguity arising from fuzzy boundaries of regions; thereby providing a stronger paradigm for uncertainty handling. Although we have demonstrated their extensive applications mainly for image segmentation problems, one can use them for other image processing tasks, and for any other data involving uncertainty arising from fuzziness, granularity and randomness.

In neural computation, we have pioneered the synergistic integration of fuzzy sets with artificial neural networks (ANNs), introducing the notion of fuzziness at various levels. We have developed a family of generic models encompassing fuzzy multilayer perceptron (FMLP), fuzzy logical MLP, knowledge-based FMLP, rough-fuzzy MLP, fuzzy decision tree based knowledge-based MLP, and modular evolutionary rough-fuzzy MLP — particularly for classification/clustering and rule mining, under uncertainty. The proposed fusion of fuzzy sets with ANNs has the effect of enhancing the capability of latter for handling classes with overlapping or complex boundaries and accepting non-numeric inputs, and hence their performance and application domains.

In granular computing, my research has shown that rough information granules derived from the data can improve the learning efficacy, dimensionality reduction and classification performance, and reduce significantly the computation time for various tasks, e.g., inferring the architecture of networks, estimating initial value for k-means algorithms, generating cases or prototypes, and retrieving. The symbiotic integration of this concept with other heterogeneous paradigms such as fuzzy-neural networks and genetic algorithms with variable mutation probability results in a highly effective tool for mining structures, patterns and more meaningful rules, and dealing with knowledge discovery aspect in very large and heterogeneous data sets.

Among my other contributions related to data mining, I would like to mention the fast, efficient and powerful data condensation and dimension reduction methods that have been very useful for developing speedy, accurate, and scalable data mining tools.

In web intelligence research, we have defined a new metric that generalizes Kendall's Tau distance for comparing two page rank vectors, or more generally, any pair of score vectors. The metric is found, theoretically and experimentally, to be powerful in determining the stopping time of the power method (thereby saving the computation time massively) and measuring how well ranks represent scores. The probabilistic

(Continued on page 12)

(Continued from page 11)

surfer model, developed maintaining the continuity of topics, can simultaneously rank and categorize web pages, while the fuzzy surfer results in a robust version of PageRank, called FuzzRank.

The aforesaid research in pattern recognition and machine intelligence has led to the emergence of several modern disciplines involving fuzzy sets with other computational paradigms, as evident from the literature. This has also led to the incorporation of rough sets as a component of soft computing; Zadeh's original definition had components like fuzzy logic, neurocomputing, GA, and probabilistic reasoning. This augmentation by rough sets has enhanced the computational intelligence property of soft computing and triggered its multifarious applications.

My current research interest is primarily pivoted on social network mining, video tracking, and computational theory of perceptions involving granular computing, among others.

For furtherance of research in the said topics in a consolidated manner, our Institute created a new unit in March 1993 called Machine Intelligence Unit under my headship. As recognition of my research contributions, the Department of Science and Technology, Govt. of India established the nation's first research center in Soft Computing in October 2004 under my leadership at ISI, Calcutta. The international conference PReMI (Pattern Recognition and Machine Intelligence) is my brain child. The conference is unique in the sense that it provides a platform to exchange ideas regularly between these two communities for mutual benefit. The first edition was in Calcutta in 2005, and the fourth one in Moscow in 2011; and all of them were co-sponsored by IAPR. It will remain incomplete if I do not acknowledge my PhD students and collaborators. Most of my work was done with PhD students and young colleagues/ collaborators. I have learnt a lot from my students who keep me always young. My foreign collaborators where I pay (or used to pay) several visits are in Warsaw University, Poland; Hong Kong Poly University, Hong Kong; and the University of Naples Parthenope, Italy. Through the Warsaw collaboration with Prof. Andrzej Skowron, I met Prof. Z. Pawlak (father of rough sets) in the mid 90s, who unfortunately passed away in 2008.

"Pattern recognition" has not only led me to win several prestigious awards and honors in India and abroad and attain the highest administrative and academic position (namely Director, of my Institute), but also gave me opportunities to visit more than thirty countries for academic purposes and, more importantly, to know the common people and culture there and make new friends. I enjoy my research work very much and love publishing in peer reviewed archival journals. I look into every problem mostly from a PR perspective. I would like to remain active as long as I can, and continue to do what I love to.

News from the
IAPR Executive Committee

by Ingela Nyström **(Sweden)**

Uppsala August 12, 2012

The IAPR community continues to prepare for the 21st International Conference on Pattern Recognition (ICPR), to be held in Tsukuba, Japan, on November 11-15, 2012. The ICPR conference series is IAPR's main event. Please, visit the ICPR 2012 web site *www.icpr2012.org* for current information. The Technical Program will be available in due time as well as other news on the event.

By the deadline for the ICPR 2012 early registration on July 15, there were already more than 1000 registrations for the conference, and this number is increasing every day. The organisers recommend that you arrange for accommodation as soon as possible.

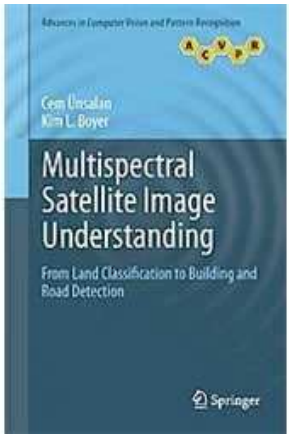
The ExCo has announced availability of a limited number of IAPR Travel Stipends of US$700 to authors of accepted ICPR papers. By the deadline, we had received as many as 265 stipend applications. Since we can fund only 40 stipends, we entered a difficult ranking process. Our strategy this year was to give high priority to PhD students. We also favoured authors presenting multiple papers who are members of an IAPR member society, in addition to other criteria. We regret that only a small percentage of the applications could be granted, but believe that we identified 40 recipients for whom the stipend will make a big difference in the ICPR 2012 participation.

It is our pleasure to announce that the recipient of the King-Sun Fu Prize, the most prestigious IAPR award, in 2012 is Professor Rama Chellappa, University of Maryland, USA. Professor Chellappa will receive his prize for his outstanding contributions to our field at the ICPR 2012. The K.-S. Fu ceremony and lecture is traditionally presented during the opening ceremony. On behalf of the IAPR Executive Committe, I congratulate Professor Chellappa on this achievement.

Currently, there is an IAPR Governing Board ballot on the recipient of the J. K. Aggarwal Prize in 2012. This prize will also be awarded at the ICPR 2012 to a young scientist in our field who has brought substantial contribution and whose research work has already had a major impact.

In this edition of the *IAPR Newsletter*, we are fortunate to "get to know" three IAPR Fellows: Professors Masakazu Ejiri, Robert Duin, and Sankar Pal. As usual, we can also read a number of book reviews and meeting reports thanks to our contributors.

I am looking forward to meeting old and new colleagues in Tsukuba in November. See you there!



Multispectral Satellite Image Understanding

by
Cem Ünsalan and Kim L. Boyer

Series: Advances in Computer Vision and Pattern Recognition
Springer, 2011

Reviewed by
Primo Zingaretti (Italy)

The book is divided into six parts. The first part (Chapter 2) analyses information about remote sensing satellites; the second part (Chapters 3 and 4) analyses vegetation and shadow-water indices; the third part (Chapters 5-8) is the most consistent and proposes features for land use classification based on structural, multispectral, hybrid, and graph theoretical methods; the fourth part (Chapters 9 and 10) addresses the problem of detecting residential regions exploiting measures of spatial coherence; the fifth part (Chapters 11 and 12) deals with building and road detection in residential regions by means of a complex approach based on a graph theoretical representation of the balloons extracted from the binary image obtained from a clustering algorithm; the sixth part summarizes the overall performance of their system. In my opinion the review questions at the end of each chapter are very useful, particularly if this book will be used for teaching.

In Chapter 1 (Introduction) the authors write that their aims were the proposal of a novel automated end-to-end system to analyze multispectral satellite images and to emphasize how many research problems in remote sensing applications are waiting to be solved by the computer vision community. Well, the book satisfies both these goals.

Chapter 5 (*Review on Land Use Classification*) is absolutely the most interesting chapter of the book, primarily because it seems a new part, not found in previous works. Particularly interesting is the taxonomy of the feature extraction methods illustrated Fig. 5.1. In fact, to identify trends in feature extraction methods the authors grouped the over 90 influential papers that they had reviewed, all published in refereed journals, according to this taxonomy. Despite the fact that the authors were unable to compare the performances of these methods directly, because the results given in most of the papers reviewed are based on just one (or a very few) images and it is rare that two papers evaluate the same images, they report the performances of each method to give the reader some idea of their relative classification rate. However, this review presents the following two strong limitations, reported by the authors themselves: 1) the review investigates trends in land use classification between years 1967 and 2002 only; 2) they did not attempt to cover the whole literature but focused on feature extraction methods using passive sensors and excluded works on

(Continued on page 15)

(Continued from page 14)

classifiers, neural networks, and fuzzy logic.

This brings me to more critical comments. My reading of this book was less exciting than I expected. First, because, as a specialist in (aerial and) satellite multispectral image understanding (up to the point of founding a university spin-off company for the technological transfer of a software developed for the automated land cover, land use mapping), I already knew all the journal papers of the authors of this book, who are among the leading experts in the field. My second disappointment in reading this book was that I did not receive any help in overcoming what I consider a great difficulty for researchers in remote sensing applications, that is to retrieve results coming from many different scientific communities.

References in this book deserve two special comments. First, all references, with the exception of authors' ones, are at least ten years old, so that the book can be considered out of date under this point of view. Second, I do not know why Springer accepted the publication of a book without reporting in the References the titles of papers cited, but this is a very strong limitation in my opinion, especially in review-chapters like 5 and 11 in this book.

In conclusion, the book is not suitable for experts in the field (who should already know the techniques here described), nevertheless it represents a good reference book, even a milestone, for teaching multispectral image understanding to students and/or young researchers. The worst aspect, considering the rapid development of remote sensing technology in recent years, remains the delay of at least five years in the publication date, with a very negative impact on References.

[postscriptum: Chapters and their journal versions]

Chapter 3 (*Linearized Vegetation Indices*) is a reprint of "Linearized vegetation indices based on a formal statistical framework"; Ünsalan, C.; Boyer, K.L.; IEEE Trans. on Geoscience and Remote Sensing, 42(7), 2004, 1575 – 1585. Chapter 4 (*Linearized Shadow and Water Indices*) is also derived from the above journal publication (Section VI), but in this case the content is partially rewritten, due to the use of regions from Indiana and Florida instead of New Mexico and Minnesota, in addition to Maryland and Oregon.

Chapter 6 (*Land Use Classification using Structural Features*) is the reprint of part of "Classifying land development in high-resolution panchromatic satellite images using straight-line statistics"; Ünsalan, C.; Boyer, K.L.; IEEE Trans. on Geoscience and Remote Sensing, 42(4), 2004, 907 – 919 (indeed, the references to their previous works at the beginning of the Chapter 3 and 6 must be reversed). While the rest of the above journal paper is reprinted in Chapter 9 (*Feature Based Grouping to Detect Suburbia*): all its six figures and paragraphs 9.1 and 9.2 of the book are derived from Section IV and V.C of the paper, respectively.

Chapter 7 (*Land Use Classification via Multispectral Information*) is a reprint, starting from section IV of the paper to its end, of "Classifying land development in high-resolution Satellite imagery using hybrid structural-

(Continued on page 16)

(Continued from page 15)

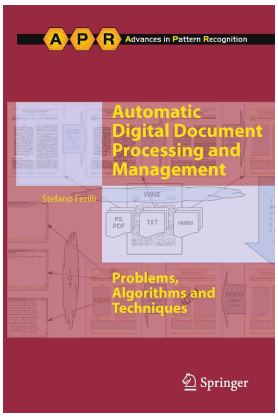
multispectral features"; Ünsalan, C.; Boyer, K.L.; IEEE Trans. on Geoscience and Remote Sensing, 42(12), 2004, 2840 – 2850.

Chapter 8 (*Graph Theoretical Measures for Land Development*) is a reprint of a subset of "A theoretical and experimental investigation of graph theoretical measures for land development in satellite imagery"; Ünsalan, C.; Boyer, K.L.; IEEE Trans. on PAMI, 27(4), 2005, 575 – 589. While the rest of the above journal paper is reprinted in Chapter 10 (*Detecting Residential Regions by Graph-Theoretical Measures*): all its tables and paragraphs 10.1 and 10.2 of the book are derived from Section 6.4.1 and 6.4.2 of the paper, respectively. There are not References in Chapter 10.

Chapter 11 (*Review on Building and Road Detection*) is a brief (5 pages) literature review on building and road detection. The authors cite 43 papers, including the paper "State of the art on automatic road extraction for GIS update: a novel classification", J.B. Mena, Pattern Recognition Letters 24 (2003) 3037–3058, which reports nearly 250 references related to this topic but (obviously) only till 2003.

Chapter 12 (*House and Street Network Detection in Residential Regions*) is a reprint, starting from section 2 of the paper to its end, of "A system to detect houses and residential street networks in multispectral satellite images"; Ünsalan, C.; Boyer, K.L.; Computer Vision and Image Understanding, 98(3), 2005, 423–461.

BOOKSBOOKSBOOKS



Automatic Digital Document Processing and Management: Problems, Algorithms, and Techniques

by
Stefano Ferilli

Series: Advances in Computer Vision and Pattern Recognition
Springer, 2011

Reviewed by
Jeremy Svendsen (Canada)

This book provides a background in the area of document image analysis. It has general information on image analysis, information on document image analysis, and then information specific to the application of word and phrase recognition within document images.

Chapter 1 outlines some of the reasons documents are created as well as a bit of history behind document creation. It discusses the different types of documents and the needs that each satisfies.

Chapter 2 discusses a collection of digital file formats, including vector based formats and image formats. It discusses different compression techniques, character encoding, and digital image container formats as well as a few common file formats like the portable document format. A description of the benefits and disadvantages of each format is presented, which is very useful for anyone in the area of document analysis and recognition since document images are built using these formats.

Chapter 3 provides details on message cryptography, verification, and legal aspects of document transfer. This is useful for readers in the area of digital communications, with little relevance for document analysis and recognition performed offline.

Chapters 4 and 5 are the core of the discussion on document analysis and recognition. Chapter 4 goes into detail about a selection of image processing algorithms used in document analysis and recognition. This provides a good start for readers who are interested in document analysis and recognition but have no previous computer vision experience. It also provides specific information on some preprocessing algorithms for document image analysis. Chapter 5 starts by discussing methods of representing the document image, including the document object model (DOM). The chapter then describes more preprocessing techniques useful for scanned documents. Next, it provides a comparative review of the most common segmentation techniques in literature, stating their advantages and disadvantages.

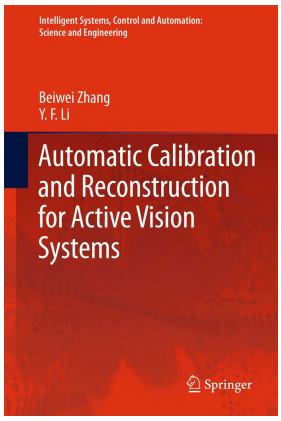
Chapters 6 and 7 focus on processing text information extracted from the document image. The chapters describe methods from the area of

(Continued on page 18)

(Continued from page 17)
automated text understanding. Chapter 6 describes methods for processing natural language, including parsing and sentence meaning. Chapter 7 focuses on gathering specific information from the extracted text. This includes searching for specific words as well as classifying the text.

The book ends with two appendices, the first of which describes the Document Management Intelligent Universal System (DOMINUS). This is a document image library system, which the author helped create. The design of the system influenced the writing of the book. The second appendix describes a few machine learning algorithms, including artificial neural networks, decision trees, k-nearest neighbor, inductive logic programming, naive Bayes, and Hidden Markov Models.

For those working on document image analysis and recognition, chapters 4 and 5 are the most informative, along with Chapter 2. I would definitely recommend this book to novice researchers in document analysis and recognition, especially to those new to computer vision as well.



Automatic Calibration and Reconstruction for Active Vision Systems

by
Beiwei Zhang and Y. F. Li

Intelligent Systems, Control and Automation: Science and Engineering
Springer, 2012

Reviewed by
M. Zeeshan Zia (Switzerland)

Structured light systems are an important tool for reconstructing 3D geometric details of objects lacking in texture, where finding correspondences between images using passive stereo is difficult. Catadioptric vision systems employ curved mirrors and different types of lenses to broaden the field of view as compared to a conventional camera lens, allowing a larger portion of the overall scene to be imaged in every shot. Although there have been some research papers published in these areas in the recent years (mostly by the industrial automation community), almost no other recent book focusing specifically on this subject can be found.

This is a small book (155 pages) providing a good literature review and discussing the work of the authors on some problems in active vision systems and catadioptric systems. These problems include static internal calibration of a camera, relative orientation estimation of the camera with respect to the projector when it is allowed to move, 3D reconstruction using an image-to-world transformation when certain geometric properties about the scene are known, and modeling, calibration, even mechanical alignment of different catadioptric systems.

Although it is easy to follow, I have not fully checked the mathematics for technical correctness, however, given that this is mostly based on work published in different journals, I am assuming that the techniques have already been independently checked and found to be correct.

The first chapter provides a very useful and detailed literature survey on work done in different problems of geometric computer vision including calibrated and uncalibrated 3D reconstruction, giving special attention to structured light systems. This literature survey can be very helpful for any practitioner or student interested in finding out what the problems in geometric vision have been, and how progress in those problems has been made over the previous few decades.

The second chapter defines important fundamental concepts in structured light systems and catadioptric systems. The purpose of this chapter is to make the book self-contained, so that all the concepts used in the next four chapters, which form the ‘meat’ of the book, are

(Continued on page 20)

(Continued from page 19)
available. I don't think the chapter succeeds in meeting this objective, because on one hand, it describes some basic concepts like fundamental matrices, planar homographies, cross-ratios, but on the other hand, it does not discuss other equally fundamental ideas like vanishing lines, conics, line at infinity, etc. that are also used in the coming chapters. Thus, if a reader is not aware of basic ideas in geometric vision, they will need to refer to a standard textbook, which, for students, reduces the advantage of reading this book instead of going through the published papers.

The third chapter describes the determination of internal camera parameters based on three different planar patterns as well as a method for nonlinear distortion correction. These patterns include a polygon whose vertices lie on a circle, on two intersecting circles, and on two concentric circles. Although the pros and cons of these planar patterns have been discussed individually, no experimental comparison between them is performed, and experimental validation (numerical simulations and limited real experiments) is only given for the last method, which seems comparable to state-of-the-art. In addition, another planar pattern based method for distortion correction is discussed. However, no experimental evaluation or comments on how this method compares to other methods in the literature is provided.

Estimation of relative orientation if the camera is allowed to move with respect to the projector is discussed in the fourth chapter. This approach requires that an arbitrary planar object be present in the scene so a homography can be computed between the original and the projected pattern. The method of the authors assumes that the internal calibration parameters of the camera are known, and does not guarantee a unique solution for the relative orientation. The chapter also performs error analysis and shows results of experiments on simulated and real-world settings. It is well-written and the mathematics is easy to follow.

The fifth chapter describes an interesting approach to 3D Euclidean reconstruction by estimating an image-to-world transformation matrix given that there are one or two known planes in the scene. The projected colored pattern is treated as a collection of light planes each comprising a line in the pattern together with the projector center. The intersection of these light planes with the scene is used to estimate the 3D geometry. However, the system is based on colored patterns, and its performance with objects that are also colored (thus causing a wavelength shift when the light falls on them) and well-textured is unreliable.

Catadioptric vision using central projection is considered in the sixth chapter, discussing in detail three different systems: a hyperbolic mirror and fisheye lens camera, a parabolic mirror and an orthographic camera, and another comprising a hyperbolic mirror with a perspective camera. The chapter begins with a nice overview of different techniques used for extending field-of-view and then moves on to discuss fine details relating to the mechanical installation of the components in such systems as well as system modeling, different calibration procedures, and 3D reconstruction. It also discusses comparative pros and cons of these systems. Overall, the chapter provides interesting insights and can be recommended.

The last chapter gives a brief conclusion of the whole book and then discusses ideas for future

(Continued on page 21)

(Continued from page 20)

work in the problem domains covered previously. Specifically, these include suggestions for image-to-world transformation based 3D reconstruction when nothing about the scene structure is known apriori, integrating structured light techniques with shape from shading, enabling color-encoded light patterns to work in strongly colored scenes, and catadioptric structured light systems.

Overall, the literature survey provided by the book on different problems is a valuable one, and also the example methods for different problems related to reconstruction using active and catadioptric vision systems give a good outlook into the field. It can be worth collecting for practitioners as well as for students studying active or catadioptric vision systems.

Workshop Report: SIMBAD 2011

1st IAPR International Workshop on Similarity-Based Pattern Analysis and Recognition

September 2830, 2011
Venice, Italy

General Chairs:

Marcello Pelillo, IAPR Fellow (Italy)
Edwin Hancock, IAPR Fellow (UK)

Report prepared by Luca Rossi

Traditional pattern recognition techniques commonly rely on feature-based, vectorial representation of data. However, this approach suffers from several limitations, in particular when the objects being analysed are naturally described in terms of relations between parts, rather than by a fixed number of features.

The SIMBAD workshop series aims at bringing together researchers and practitioners interested in the field of similarity-based pattern recognition and machine learning. The 1st SIMBAD workshop was held in Venice, in the beautiful context of the historical Dolfin Palace of Ca' Foscari University. It was organized by Marcello Pelillo (University of Venice, Italy) and Edwin Hancock (University of York, UK) and marked the end of the EU FP7 Projects SIMBAD (*simbad-fp7.eu*). The workshop was intended to be an informal forum where nearly 50 participants would meet to discuss fundamental questions that arise when abandoning the standard vectorial framework. In particular: 1) how can one obtain suitable similarity information from data representations that are more powerful than, or simply different from, the vectorial? 2) how can one use similarity information in order to perform learning and classification tasks? A wide range of problems and perspectives were covered, from supervised to unsupervised learning, from generative to discriminative models, and from theoretical issues to real-world practical applications.

During the meeting, three invited speakers contributed to the debate.

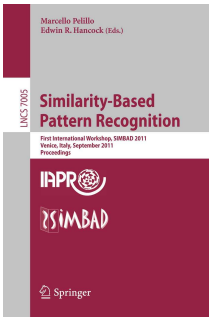
Marco Gori, University of Siena (Italy), gave a talk on the theory of support constraint machines, an extension of the classical kernel machines.

Ulrike Hahn, Cardiff University (UK), overviewed the psychological theories of similarity and key behavioural data.

John Shawe-Taylor, University College London (UK), gave a lecture on the imitations of kernel and multiple kernel learning.

All the oral presentations were filmed by Videolectures and are freely available online at *videolectures.net/simbad2011_venice*.

The next SIMBAD workshop will be held in York, UK, in July, 2013, and will be organized by Edwin Hancock and Marcello Pelillo.



Proceedings of the workshop have been published by Springer in the series Lecture Notes in Computer Science (Volume 7005)

Workshop Report: DAS 2012

10th IAPR International Workshop on Document Analysis Systems

March 27-29, 2012
Gold Coast, Queensland, Australia

General Chairs:
Michael Blumenstein (Australia)

Program Co-Chairs:
Umapada Pal (India)
Seiichi Uchida (Japan)

Report prepared by Michael Blumenstein, General Chair

The IAPR Workshop on Document Analysis Systems (DAS) is one of the most popular meetings in the area of Document Analysis and is held every alternate year. DAS is a single-track, peer-reviewed, 100% participation workshop that brings together industrialists and academics as well as practitioners and theoreticians from numerous related disciplines involved in document analysis systems research and provides an opportunity for interactions among them.

The 2012 iteration of DAS was held on the beautiful Gold Coast in Australia and was organised by the Institute for Integrated and Intelligent Systems (IIIS) at Griffith University, in conjunction with the Science, Environment, Engineering, and Technology Group (SEET) at Griffith. The Gold Coast City Council and Gold Coast Tourism also extended their support in organising the workshop to a great extent. DAS 2012 was also sponsored by the IAPR, Griffith University, BusinessGC, and Hitachi Japan. The DAS 2012 organisers are very grateful to the workshop sponsors and supporters for their generous assistance. Details about DAS 2012 can be obtained at: *www.ict.griffith.edu.au/das2012/*.

DAS 2012 attracted a record number of document analysis researchers from all over the world. In fact,

(Continued on page 24)

(Continued from page 23)

131 paper submissions were received from researchers representing 32 countries, which is indicative of the popularity of DAS, especially at the Gold Coast. The Program Committee Chairs invited 126 international referees to review the papers received. Finally, 91 papers were accepted for publication by the IEEE Conference Publishing Services (CPS). Out of the 91 papers accepted, 36 were selected for oral presentation, and 55 for poster presentation, along with 13 short papers and 2 demo sessions. These accepted papers covered diverse areas of pre-processing, feature extraction, segmentation, recognition, signature verification, text classification, image retrieval techniques, video document processing, document image decoding, graphical document processing, performance evaluation, historical and handwritten documents, and various other systems and applications for document analysis. The final program consisted of seven oral sessions, two poster sessions, and one discussion session.

In addition, the keynote lecture was delivered by the distinguished speaker, Dr. Samy Bengio, Research Scientist in the Machine Learning group at Google Inc. California, USA. His keynote address was on “Learning a Semantic Space: from Image Annotation to Music Similarity”. Two pre-workshop tutorial sessions were also organised and were delivered by Prof. Gernot Fink of Technische Universität Dortmund, Germany, and Professor Koichi Kise of Osaka Prefecture University, Japan. Prof. Fink delivered a tutorial on “Markov Models for Handwriting Recognition”, and Prof. Kise discussed “Large-Scale Document Image Retrieval and Character Recognition with Approximate Nearest Neighbor Techniques”.

The slides of the keynote lecture and the tutorials are available online at the following DAS 2012 webpages:

www.ict.griffith.edu.au/das2012/keynote.html
www.ict.griffith.edu.au/das2012/tutorial.html

The social programs organised during the workshop were very much appreciated by the delegates. An authentic Aboriginal music performance was organised at the welcome reception. The banquet dinner was held at “The Australian Outback Spectacular” and was followed by the Awards ceremony. The IAPR Nakano Best Paper Award went to Albert Gordo, Florent Perronnin, and Ernest Valveny,for their paper titled “Document Classification Using Multiple Views”. The IAPR Best Student Paper award was given to Sheikh Faisal Rashid, Faisal Shafait, and Thomas M. Breuel for their paper “Scanning Neural Network for Text Line Recognition”. And, “An Efficient Framework for Searching Text in Noisy Documents Images” by Ismet Zeki Yalniz and R. Manmatha received Honorable Mention. See photos of the presentations at: *www.ict.griffith.edu.au/das2012/awards.html*

Proceedings of the workshop have been published by the IEEE CPS (ISBN-13: 978-0-7695-4661-2) and is now available through the IEEE Xplore Digital Library.

The proceedings will also be made available on the DAS 2012 website.

Conference Report: ICB 2012

5th IAPR International Conference on Biometrics

March 29-April 1, 2012
New Delhi, India

General Chair:
Anil K. Jain (USA)

Co-General Chairs:
Salil Prabhakar (USA)
Jean-Christophe Fondeur (France)
Tieniu Tan, IAPR Fellow (China)

Report prepared by Ajay Kumar (Hong Kong)

The 5th IAPR International Conference on Biometrics (ICB 2012) was held in New Delhi, India. This IAPR flagship conference was co-sponsored by the IEEE and hosted by the IIIT Delhi. The ICB conference series is one of the premier forums for presenting new research findings in the field of biometrics. In 2006, two highly reputed conferences, the Audio and Video–based Personal Authentication (AVBPA) series running since 1997 and the International Conference on Biometric Authentication (ICBA) series running since 2004, merged to launch the new ICB series, which is now considered one of the best gatherings of biometric researchers. This is not only a platform for presenting the foremost biometric research papers but it gives an opportunity for the best of biometric minds to mingle and share ideas. It was especially exciting to host the 2012 conference in India, the first in the history of this series (and its predecessors).

This year the conference received 240 paper submissions. Based on the reviews and recommendations of the reviewers, 82 papers were accepted for presentation at the conference: 36 papers were presented in 6 oral sessions while the remaining 46 papers were presented in 2 poster sessions. Further, the poster presenters had the opportunity to provide a two-minute oral overview of their papers to the audience prior to the poster session.

The ICB 2012 program schedule encompassed a broad range of topics from various research groups around the world. Besides advancing the state-of-the-art of traditional biometric modalities such as face, fingerprint, and iris recognition, the papers addressed important problems in template security, biometric fusion, data privacy, performance evaluation, forensic analysis, quality assessment, multispectral recognition, template aging, and soft biometrics. The paper presentations were complemented with four invited tutorial talks offered by distinguished researchers. The tutorial topics were chosen to emphasize the most mature and widely deployed biometrics technologies and best practices. The tutorial speakers included Prof. Stan Z. Li (face recognition), Prof. Davide Maltoni (fingerprint recognition), Prof. John Daugman (iris recognition), and Prof. James L. Wayman (biometric best practices and applications).

ICB 2012 also featured a distinguished set of keynote speakers: Nandan Nilekani, Chairman of UIDAI (Unique Identification Authority of India), Ming Hsieh, President of 3M Cogent, and John

(Continued on page 26)

(Continued from page 25)

Daugman, a pioneer of iris recognition technology. These three individuals have made outstanding and long-lasting contributions to biometrics in different ways: Nandan Nilekani for his role in deploying biometrics for governance and for leading the world's largest biometrics identification program (Aadhaar) for Indian residents, Ming Hsieh as a prominent entrepreneur in biometrics, and John Daugman, who delivered the 2012 IAPR Biometrics Lecture at ICB2012, as an academician and pioneer of iris technology. Moreover, Ram Sewak Sharma Director General of UIDAI welcomed the participants at the opening session. A panel discussion on "UIDAI System, from its concept, design, implementation, and current state" led by head of technology for UIDAI, Srikanth Nadhamuni provided a systems' view of a very large scale biometric implementation.

ICB 2012 received the generous support of several organizations without which this conference would not have been possible. In particular, support from 4G Identity Solutions, Broadcom, Validity Sensors, Cogent 3M, Crossmatch, SmartID, IIIT Delhi, Lumidigm, Neurotechnology, SafranMorpho, Suprema, CMC, Cognitec, Geodesic, and NEC is appreciated and acknowledged.

The financial support from the biometric industry and the IAPR enabled the ICB organizers to offer several students travel fellowships and best paper/poster awards. IAPR travel fellowships were provided to 12 students from different parts of the world to present their papers. The **3M Cogent Best Paper Award (1st Place)** was given to Oleg V. Komogortsev, Alex Karpov, Larry R. Price (all from Texas State University) and Cecilia Aragon (University of Washington) for their paper titled "Biometric Authentication via Oculomotor Plant Characteristics. The **CMC Best Paper Award (2nd Place)** was given to Martin

John Daugman delivering the IAPR Keynote Talk '*Iris Recognition at 20 Years: From Zero to 100 Trillion Iris Comparisons per Day*'.

IAPR Best Biometrics Student Paper Award was given to Soweon Yoon, Qijun Zhao, and Anil K. Jain (all from Michigan State University) for their paper *"On Matching Altered Fingerprints"*.

(Continued on page 27)

(Continued from page 26)

Hofmann, Stephan M. Schmidt, AN. Rajagopalan, and Gerhard Rigoll (all from Technische Universitat Munchen) for their paper on "Combined Face and Gait Recognition using Alpha Matte Preprocessing". The **IAPR Best Biometrics Student Paper Award** was given to Soweon Yoon, Qijun Zhao, and Anil K. Jain (all from Michigan State University) for their paper "On Matching Altered Fingerprints". The **Cognitec Best Student Paper Award (2nd Place)** was given to Finnian Kelly (Trinity College Dublin), Andrzej Drygajlo (Swiss Federal Institute of Technology Lausanne), and Naomi Harte (Trinity College Dublin) for their paper on "Speaker Verification with Long-Term Ageing Data". The two poster awards, **Lumidigm Best Poster Award (1st Place) and Geodesic Best Poster Award (2nd Place)** were given to "Lef3a: Pupil Segmentation Using Viterbi Search Algorithm" by Emine Krichen (Morpho) and "Faster Secure Computation for Biometric Identification Using Filtering" by Julien Bringer, Melanie Favre, Herve Chabanne, and Alain Patey (all from Morpho), respectively.

Over 200 participants from 28 different countries attended the conference. A cultural program was also organized during banquet that was enjoyed by the participants. The conference ended with a vote of thanks to all the participants by Prof. Anil Jain.

The next ICB will be organized in Madrid, Spain from June 5 – 7, 2013.

Proceedings of the conference is now available through the IEEE Xplore Digital Library.

Workshop Report: CIP 2012

3rd International Workshop on Cognitive Information Processing

May 28-30, 2012
Parador de Baiona, Spain

General Chair:
Aníbal R. Figueiras-Vidal (Spain)

Technical Committee:
Miguel A. Lagunas (Spain)
Ana Pérez-Neira (Spain)
Enric Monte (Spain)

Special Sessions:
Jan Larsen (Denmark)
Jerónimo Arenas (Spain)

Report prepared by Aníbal R. Figueiras-Vidal, General Chair

Following the orientation of the first CIP (2008, Santorini, Greece; General Chair, Prof. Sergios Theodoridis) and its second edition (2010, Elba Island, Italy; General Chair, Prof. Fulvio Gini), the third workshop on Cognitive Information Processing was held in Baiona, Spain, from May 28 to 30, 2012. Sixty-five researchers in inference algorithms which include cognitive components, from the knowledge fields of Signal Processing, Machine Learning, Communications, Psychology, and Neuroscience, joined at Parador Conde de Gondomar, a Middle Age fortress at the border of the sea which has been transformed into a splendid hotel, to present and discuss methods to design these algorithms and their applications.

The worshop was technically sponsored by EUSIPCO, IAPR, IEEE, and IET. Eight distinguished invited speakers lectured their key addresses at plenary sessions.

Prof. Jose M. F. Moura (CMU, USA) offered the IAPR Invited Lecture “Distributed vs. Centralized: The Role of Network”, a vision of recent advances in distributed signal processing with a high tutorial value.

The other seven invited speakers –Prof. Shigeru Katagiri (Doshisha Univ., Japan), Prof. Massimiliano Pontil (Univ. College London, UK), Drs. Susana Martínez-Conde and Stephen L. Macknik (Barrow Neurological Inst., USA), Prof. Lars-Kai Hansen (DTU, Denmark), Dr. Lior Rokach (Ben Gurion Univ. at the Neguev, Israel) and Prof. Mario A.T. Figueiredo (IST Lisbon, Portugal) presented deep perspectives on highly relevant topics that also originated very active discussions. All these contributions, as well as the papers corresponding to special and regular sessions, are available at IEEE Xplore.

Three special sessions, with a total of 14 contributions, were dedicated to:

- **Collaborative and Distributed Signal Processing for Wireless Networks**, Organizer: Carlos Anton-Haro (CTTC, Spain)

(Continued on page 29)

(Continued from page 28)

- **Cognitive Radio**, Organizers: Fernando Pérez-González and Carlos Mosquera (U. Vigo, Spain)

- **Cognitive Audio Modeling and Crowd Sourcing,** Organizers: Jan Larsen (DTU, Denmark) and Jerónimo Arenas-Garcia (UC3M, Spain)

Additionally, 32 more papers were presented at six regular sessions:

- **Advanced Machine Learning**

- **Distributed and Cooperative Processing**

- **Applications of Cognitive Signal Processing**

- **Cognitive Modeling, Processing, Decision Making, and Human- Machine Interaction**

- **Cognitive Communications, Radar, Surveillance and Navigation**

- **Information Mining**

It is worth mentioning that the authors of the different classes of papers come from 16 different countries.

Several organizations provided financial support for CIP'2012: Amper, Cosound, Ericsson, the IEEE Spain Section, Gradiant, the Spain Real Academia de Ingeniería, Telefónica, the Telefónica-UC3M Chair, and the Universities Carlos III de Madrid and of Vigo: They merit the gratitude of the organizers and participants for their generous help.

In particular, the IEEE Spain Section sponsored the Best Student Paper Award, which was selected by an "ad hoc" committee from among the student contributions that received the best marks from the reviewers (one hundred of recognized experts who carried out this critical work with remarkable rigor and without delays). Pablo García-Moreno, a Ph. D. student at UC3M, received this award for his paper "A Hold-Out Method to Correct PCA Variance Inflation" (coauthored by Antonio Artés-Rodríguez and Lars-Kai Hansen).

Prof. Lars-Kai Hansen (DTU, Denmark) will be the General Chair of CIP'2014, which will be one additional important step towards extending the interest and the applications of these techniques.

Proceedings of the workshop have been published by IEEE

Click here for to go to the
IEEEXplore
web page for the
CIP 2012 Proceedings

Please check the ICPR 2012 web site *www.icpr2012.org* frequently.

Online registration has begun.

The Advance Registration deadline is October 31, 2012.

ICPR

The 21st International Conference on Pattern Recognition

2012

November

11-15,2012

Tsukuba International Congress Center
Tsukuba Science City, JAPAN

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.

General chairs

Jan-Olof Eklundh (Sweden), Yuichi Ohta (Japan), Steven Tanimoto (USA)

Program chairs

Alberto Del Bimbo (Italy), Kim L. Boyer (USA), Katsushi Ikeuchi (Japan)

Track chairs

Computer & Robot Vision
Richard Bowden (UK)
Sing Bing Kang (USA)
Long Quan (China)

Signal, Speech, and Video Processing
Tsuhan Chen (USA)
Touradj Ebrahimi(Switzerland)
Kyoung Mu Lee (Korea)

Virtual Reality & Medical Applications
Tobias Höllerer (USA)
Gudrun Klinker (Germany)
Naokazu Yokoya (Japan)

Document Analysis
Bidyut B. Chaudhuri (India)
Koichi Kise (Japan)
Daniel P. Lopresti (USA)

Pattern Recognition & Applications
Noboru Babaguchi (Japan)
Rita Cucchiara (Italy)
Qiang Ji (USA)

Advisory committee

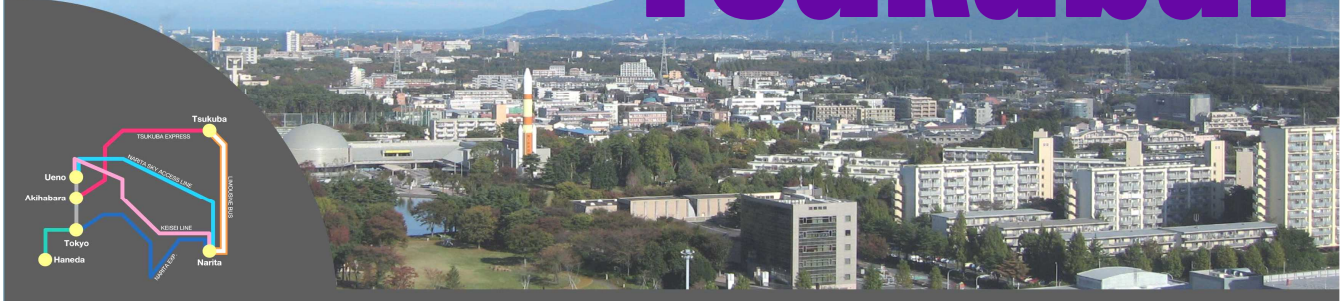
Horst Bunke (Switzerland), Masakazu Ejiri (Japan), Ranga Kasturi (USA), Josef Kittler (UK), Takashi Matsuyama (Japan), Gabriella Sanniti di Baja (Itary), Yoshiaki Shirai (Japan), Ching Y. Suen (Canada), Johji Tajima (Japan)

Workshop Co-Chairs	Yoichi Sato (Japan), Rahul Sukthankar (USA)
Tutorial Co-Chairs	Andreas Dengel (Germany), Eisaku Maeda (Japan)
Demos, Exhibits and Contests Co-Chairs	Robert Fisher (UK), Yasuyo Kita (Japan)
Publication Co-Chairs	Hideo Saito (Japan), Yoshimitsu Aoki (Japan)
Finance Co-Chairs	Hiroshi Sako (Japan), Keiji Yamada (Japan)
Publicity and Sponsorship Co-Chairs	Atsushi Imiya (Japan), Kazuhiro Fukui(Japan)
Award Chair	Ken-ichi Maeda (Japan)
Web Chair	Kenji Suzuki (Japan)
Local Arangement Co-Chairs	Itaru Kitahara (Japan), Takeshi Kurata (Japan)

Important Dates

Deadline for paper submission	March 31, 2012
Notification of paper acceptance	June 15, 2012
Camera ready papers and author registration	July 15, 2012
Deadline for workshop proposal	January 6, 2012
Deadline for tutorial proposal	April 30, 2012
Deadline for contests proposal	July 15, 2011

See you in Tsukuba!



3 Position Postings

National Laboratory of Pattern Recognition Director Position Open

The National Laboratory of Pattern Recognition (NLPR), affiliated with the Chinese Academy of Sciences' Institute of Automation (CASIA), Beijing, China, is looking for a full-time researcher serving as director for five-year term (2013-2017, extendible for a second term or as a researcher). The director is expected to lead the laboratory toward research soundness and visibility, through making development strategy, organizing research teams and activities.

The NLPR was founded in 1987 to become one of the first state key laboratories in China. Its research fields include the fundamentals of pattern recognition, image processing and computer vision, speech and language processing, and various applications. More information can be found at www.nlpr.ia.ac.cn/

Qualifications

PhD in pattern recognition or related fields

Well established and renowned in the international community

Experience of conducting key research projects and skills of team management

Professional dedication, willing to work at the laboratory in full time

Application Materials

CV including education and experience, research achievements, publications in the past 10 years

Thoughts of laboratory development and management

NLPR, China (Continued on page 32)

Boise State University Neuromorphic Computing Group Graduate Student Opportunities

Neuromorphic Systems Group at Boise State University has funding opportunities for doctoral students to conduct research on next-generation computing systems based on neural learning. The multidisciplinary research involves synergistic development of nanoscale memristive (synaptic) devices, mixed-signal circuits and novel neural learning architectures. This research program will lead to development of pathbreaking computing architectures which can mimic learning in a mammalian brain and revolutionalize the way we compute, communicate and perform signal processing.

We seek talented and motivated graduate students in all the following areas:

- Nanoscale memristive device design, fabrication and modeling
- Mixed-Signal integrated circuit design
- Neural learning and pattern recognition system architectures

Descriptions of the projects planned and the skills necessary are listed below. If you are interested in one of these positions, please contact the designated person with: a current CV, sample thesis, journal or conference paper, unofficial transcript, GRE/ TOEFL scores and a carefully worded description of what you bring to the project and why the project is of interest to you.

Boise State, USA (Continued on page 32)

Open Position for a Chair Professor in Signal (and Image) Processing - Sweden

Luleå University of Technology is in an expansionary phase and is strengthening the information and communications technology field. One part of this effort is the recruitment of a professor in the research field of signal processing, with the task to lead the research subject and build a strong team.

Current research in signal processing is focused on measurement techniques, image analysis and telecommunications.

Deadline for application:

September 30 2012, ref. nr 1492-12

Contact:

Jonas Ekman, Head of department
Tel: +46 920-49 28 28
Email: jonas.ekman@ltu.se

More information here.

www.ltu.se/ltu/Lediga-jobb/signalprocessing?l=en

If you have any questions about living and working in Luleå and emigrating to Sweden please feel free to contact Matthew Thurley (matthew.thurley@ltu.se) who leads the industrial image analysis group within signal processing.

Matthew grew up in Australia and moved to Luleå six years ago with his young family. "I have found excellent opportunities to build research projects, enjoy a relaxed lifestyle close to nature, and be part of a very family friendly society with excellent opportunities for my children."

3 Position Postings (continued)

NLPR, China (Continued from page 31)

Copies of certificates of degree, awards and other support documents if any

Contact addresses of three referees

Important Dates

Application Submission: by August 31, 2012

Interview and Notification: by September 30, 2012

Taking position: no later than December 31, 2012

Contact

Human Resource Department,
Institute of Automation of CAS
95 Zhongguan East Road, Beijing
100190, China
Tel: +86-10-82614480
Email: hr@ia.ac.cn

Boise State, USA (Continued from page 31)

PhD Candidate 1: Mixed-Signal IC Design

Contact: VishalSaxena@BoiseState.edu

- Neuromorphic custom circuit design for reconfigurable digital computing using memristive devices all integrated on a chip. Interfacing with FPGAs for read-out and test.
- Mixed-signal circuit implementation of artificial neural networks (ANNs) using memristive devices, all integrated on a chip.
- Involves translation of neural learning algorithms into chip hardware design.
- Required skills include signal processing; analog and digital circuit design, the ability to develop proficiency in new fields, and expertise in technical writing.

PhD Candidate 2: FPGA prototyping for neural training

Contact: VishalSaxena@BoiseState.edu

- Utilize FPGA to implement training algorithms for synaptic arrays and neurons fabricated on a chip.
- Skill set required same as position #1

PhD Candidate 3: Machine and biometric learning algorithms for silicon neurons

Contact: EBarneySmith@BoiseState.edu

- Develop silicon biometric learning algorithm based on Hodgkin-Huxley conductance based model of a neuronal membrane
- Develop machine learning algorithms for neuromorphic computing
- Develop learning algorithms that do not require external training
- Required skills include programming, machine learning, basic circuit analysis, the ability to develop proficiency in new fields, and expertise in technical writing.

PhD Candidate 4: Neuromorphic hardware development

Contact: VishalSaxena@BoiseState.edu

- Design of embedded systems using neural learning chips and FPGAs.
- Required skills include expertise with FPGA, Verilog, hardware design skills, the ability to develop proficiency in new fields, and expertise in technical writing.

More information on the graduate programs in ECE at Boise State University is available at the link:

coen.boisestate.edu/ece/students/graduate/

Free Book!

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*.

Arjan Kuijper, IAPR Newsletter *Associate Editor for Book Reviews*

The following title is available to be reviewed:

An Interdisciplinary Introduction to Image Processing Pixels, Numbers, and Programs
Steven L. Tanimoto
MIT Press, April 2012, 534 pp., 38 color illus., 137 b&w illus., Hardcover and eBook
mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12814

Meeting and Education Planner

*NOTE: This is not an exhaustive list of workshops, conferences, and summer schools. It is a list of meetings supported by IAPR plus additional meetings that have been brought to the attention of the editor (these non-IAPR meetings are denoted with an *). The IAPR web site has more up-to-date information about IAPR workshops, conferences and summer schools. Additional meetings that may be of interest to the IAPR Community can be found at USC's Institute for Robotics and Intelligent Systems list of Computer Vision Conferences.*

(A. Branzan Albu, ed.)

Highlighting indicates that paper submission deadline has not yet passed. An asterisk * denotes a non-IAPR event.			
2012			
Summer School *	Building Trust in the Information Age: Summer School in Computer Security & Privacy *	Cagliari, Italy	27-31 Aug 12
CIARP 2012	17th Iberoamerican Congress on Pattern Recognition	Buenos Aires, Argentina	3-6 Sep 12
ANNPR 2012	5th Workshop on Artificial Neural Networks for Pattern Recognition	Trento, Italy	17-19 Sep 12
ICFHR 2012	13th International Conference on Frontiers in Handwriting Recognition	Bari, Italy	18-20 Sep 12
BTAS 2012 *	The IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems *	Washington, D.C., USA	23-27 Sep 12
PRIB 2012	7th IAPR International Conference on Pattern Recognition in Bioinformatics	Tokyo, Japan	8-10 Nov 12
WDIA 2012	International Workshop on Depth Image Analysis	Tsukuba Science City, Japan	11 Nov 12
MPRSS12	1st International Workshop on Multimodal Pattern Recognition of Social Signals in Human Computer Interaction	Tsukuba Science City, Japan	11 Nov 12
PRHA12	International Workshop on Pattern Recognition for Healthcare Analytics	Tsukuba, Science City, Japan	11 Nov 12
PRRS12	Pattern Recognition in Remote Sensing	Tsukuba, Science City, Japan	11 Nov 12
VAIB12 *	Visual observation and analysis of animal and insect behavior	Tsukuba, Science City, Japan	11 Nov 12
IWCF12 *	5th International Workshop on Computational Forensics	Tsukuba, Science City, Japan	11 Nov 12
PRCA12 *	First International Workshop on Pattern Recognition and Crowd Analysis	Tsukuba, Science City, Japan	11 Nov 12
TrakMark 2012 *	The 3rd International Workshop on Benchmark Test Schemes for AR/MR Geometric Registration and Tracking Method	Tsukuba, Science City, Japan	11 Nov 12
ICPR 2012	21st International Conference on Pattern Recognition	Tsukuba, Science City, Japan	11-15 Nov 12
S+SSPR2012	Joint IAPR International Workshops on Structural and Syntactic Pattern Recognition (SSPR) and Statistical Techniques in Pattern Recognition (SPR)	Tsukuba, Science City, Japan	11-15 Nov 12
DICTA 2012	Digital Image Computing Techniques and Applications	Fremantle, Western Australia	3-5 Dec 12

Meeting and Education Planner (continued)

Highlighting indicates that paper submission deadline has not yet passed. An asterisk * denotes a non-IAPR event.			
2013			
CCIW 2013	Fourth Computational Color Imaging Workshop	Chiba, Japan	4-5 Mar 13
DGCI 2013	17th IAPR International Conference on Discrete Geometry for Computer Imagery	Sevilla, Spain	20-22 Mar 13
MVA 2013	13th IAPR International Conference on Machine Vision Applications	Kyoto, Japan	21-23 May 13
ISMM 2013	*11th International Symposium on Mathematical Morphology*	Uppsala, Sweden	27-29 May 13
ICB 2013	6th International Conference on Biometrics	Madrid, Spain	4-7 Jun 13
GREC 2013	10th IAPR International Workshop on Graphics Recognition	USA	Aug 13
ICDAR 2013	12th International Conference on Document Analysis and Recognition	Washington, DC, USA	25-28 Aug 13
CAIP 2013	15th International Conference on Computer Analysis of Images and Patterns	York, UK	27-29 Aug 13
ACPR 2013	2nd IAPR Asian Conference on Pattern Recognition	Okinawa, Japan	5-8 Nov 13