INTERNATIONAL ASSOCIATION FOR PATTERN RECOGNITION

IAPR Newsletter

www.iapr.org

Volume 28 Number 4
October 2006

ICPR2006 Special Issue

Calls for Papers on Page 2

Welcome to the ICPR2006 Special Issue of the *IAPR Newsletter*! For those who could not attend the ICPR in Hong Kong in August -- and for those who were there -- this issue conveys some of the highlights. Featured here are summaries of ten invited talks given at the conference. These paint a broad picture of some of the exciting work in our field. The "From the ExCo" article describes some of the society events, appointments, and awards that took place at the ICPR. In addition, this issue is particularly rich in book reviews with three on recent pattern recognition and signal processing texts. And, there are other regular articles relating to recent conferences, TC news, and upcoming Calls for Papers.

Please take a look, and, if you have comments, don't hesitate to send me email.

~L. O'Gorman, ed.

In this issue...

Calls for Papers

ICVS 2007 *International Conference on Computer Vision Systems*
Bielefeld University, Germany
deadline: November 15, 2006
March 21-24, 2007

SCIA 2007 *15th Scandinavian Conference on Image Analysis*
Aalborg, Denmark
deadline: December 1, 2006
June 10-13, 2007

MVA 2007 *10th IAPR International Conference on Machine Vision Applications*
Tokyo, Japan
Deadline: December 15, 2006
May 16-18, 2007

PRIP 2007 *Ninth International Conference on Pattern Recognition and Information Processing*
Minsk, Belarus
Deadline: December 15, 2006
May 22-24, 2007

GbR2007 *6th IAPR-TC15 Workshop on Graph-based Representations*
Alicante, Spain
deadline: December 15, 2007
June 11-13, 2007

MLDM 2007 *5th IAPR International Conference on Machine Learning and Data Mining*
Leipzig, Germany
deadline: January 9, 2007
July 4-6, 2007

ICDAR 2007 *9th International Conference on Document Analysis and Recognition*
Curitiba, Parana, Barzil
Deadline: January 15, 2007
September 23-26, 2007

CIVR 2007 *6th International Conference on Image an dVideo Retrieval*
Amsterdam, Netherlands
Deadline: February 5, 2007
July 18-20, 2007

CAIP 07 *12th International Conference on Computer Analysis of Images and Patterns*
Vienna, Austria
deadline: March 30, 2007
August 27-29, 2007

PRIB 2007 *2007 IAPR International Workshop on Pattern Recognition in Bioinformatics*
Singapore
deadline: April 15, 2007
October 1-2, 2007

ICIAP 2007 14th International Conference on Image Analysis and Processing
Modena, Italy
deadline: February 16, 2007
September 10-14, 2007

ICPR 08 *19th International Conference on Pattern Recognition*
Tampa, Florida
deadline: ?, 2008
December 8-11, 2008

Call for Submissions

IAPR Newsletter

Articles, announcements, book reviews, conference and workshop reports

Contact the editor:
logorman@avaya.com

Deadline: December 11, 2006

Feature Article

ICPR2006 Inviteed Talks

Thank you to all who contributed reviews of the Keynote and Invited Talks presented at ICPR 2006. Without you this Feature would not have been possible.

~L. O'Gorman, ed.

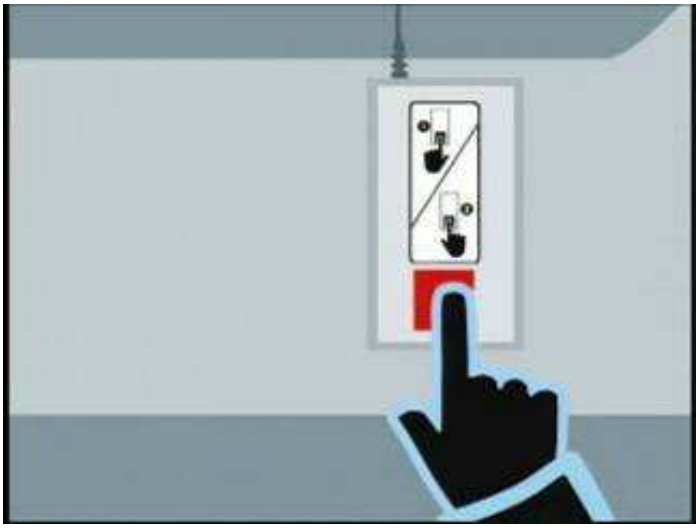
The Keynote and Invited talks at ICPR2006 covered a wide variety of topics relevant to the IAPR Community. The Feature Article in this issue of the *IAPR Newsletter* presents reviews of ten of these talks.

FEATURE: ICPR2006 Keynote1

Fingerprints: Proving Ground for Pattern Recognition

By Anil Jain
(University Distinguished Professor, Michigan State University, USA)

Review by:
Pranab Mohanty
University of South Florida



Two fingerprints and a portrait photo have been captured for over 60 million visitors to the US through the US-VISIT program; 1,100 criminals have been denied entry.

Anil K. Jain first enlightened the audience with a rich history of fingerprints and fingerprint matching systems. He illustrated the history of fingerprints with the quote from Galton in Nature, 1888—"Perhaps the most beautiful and characteristic of all superficial marks are the small furrows with intervening ridges and pores that are disposed in a singularly complex yet even order on the under surfaces of the hands and the feet"—and then highlighted the wide usage of fingerprint systems, such as AFIS (Automated Fingerprint Identification System) by law enforcement agencies over last 40 years.

Since a fingerprint is believed to be unique to each person, Jain emphasized that the biometric recognition market is expected to be dominated by reliable and highly accurate fingerprint based personal identification systems. With such a high expectation of matching accuracy and demand for an automated fingerprint matching system, Jain suggested that detailed and extensive research needs to be done to achieve the objective of a fully automatic, fingerprint-based person identification system.

In this talk, Jain pointed out various research areas for the scientists and engineers who are interested in designing fingerprint recognition systems. Some of these areas are sensor, spoof detection, extended feature set, uniqueness of fingerprints, multi-biometrics, template security etc. According to Jain a new set of fingerprint sensors such as 3D fingerprint imagery and high resolution sensors will have much impact on fingerprint matching technologies. Jain also provided some insight into the widely used minutiae based features for fingerprint matching and suggested that the extended set of level 3 feature sets, such as location of pores will be helpful in detecting live fingers and will reduce the fake fingerprint threats. Jain also pointed out that, although fingerprints are assumed to be unique for each living person, a detailed test of this hypothesis is necessary and the error rate should be quantified. In the same context, Jain also raised his concerns on template security and highlighted his work on developing a secured database for fingerprint systems known as Fingerprint Fuzzy Vault system.

In future work, Jain is confident in developing automated fingerprint systems for latent matching, i.e., matching complete fingerprints to the partial fingerprints that commonly appear at crime scenes.

In conclusion to his talk, Jain provided various grounds of challenging tasks for developing a highly accurate fingerprint matching system. More on this talk can be found at Anil K Jain's website, http://www.cse.msu.edu/~jain/

(Continued on Page 5)

(Continued from Page 4)

Review by:
Daniel Zuwala
LORIA-INPL-Université de Nancy, France

Dr. Jain began with some background on fingerprints. Fingerprints are composed of ridges, that prevent slipping while grasping. There are different types of ridges that may be used for indexing: whorl, loop and arch. We know that the ridge formation starts at 1 or 2 focal points and spreads. Fingerprints are interesting because they are unique, permanent, can be classified, and denote genotype and phenotype characteristics.

Currently, the FBI has a database of 50 million fingerprints. Each day, about 50,000 searches are performed, each taking about 2 hours. Only 15% of the matches are reliable. There is a great demand for fingerprints recognition technologies in several domains including border security, financial fraud, and user convenience. These require inexpensive and compact sensor, and fully automated matching.

Local ridge characteristics or minutiae, ridge endings and bifurcations, can be extracted from the fingerprints. Singular points like core and delta can also be extracted. The matching is done by estimating the rotation, translation and distortion. Due to a large intra-class variation, the matching techniques are unlikely to be error-free. For instance, fingerprints collected after last year's bombing in Madrid led to the arrest of a man. However, the suspect was released after proving he was in the US when the bomging took place. This show us not to put complete faith in fingerprints. Current systems have a false reject rate of 0.1%, meaning that with 100,000 passengers per day at the Hong Kong airport, 100 "good" passengers would be stopped daily.

There are many research directions. The detection of artificial finger (spoof detection) is one of them. One example of spoof detection is by multi-spectral imaging (MSI) sensors that can capture both the surface and the subsurface ridges, something difficult to construct on a spoof fingerprint. Another research direction is in minutia storage. Because spoof fingerprints can be reconstructed with minutiae stolen from a database, a secure way to save these data is needed. One very interesting research direction is in fingerprint capture technologies. Instead of using rolled inked impressions, a 3D image sensors can be used to collect fingerprints in a faster and more reliable manner.

To conclude, fingerprints are the earliest and the largest deployed application of pattern recognition. However, even today, fingerprint systems have non-zero error rates. More robust, accurate and cost-effective fingerprint matching systems are still needed.

FEATURE: ICPR2006 Keynote2

Ensembles of Classifiers

By Lawrence O. Hall
(Professor, University of South Florida, USA)

Review by:
Georg Langs
Vienna University of Technology

Simulation of a can being crushed.

On the left is ground truth, on the right are two attempts at predicting the crush zone. The region is correctly identified, which is most important for simulation designers/evaluators.

This is an example of large-scale data which could be distributed in ways that don't allow collection of all data in one place.

Professor Lawrence O. Hall is with the AI lab at the University of South Florida. His interests are in machine learning, data mining and the integration of AI into medical imaging. In his talk, he explored the advantages and the often subtle details of using classifier ensembles.

Ensembles of classifiers can be built in a distributed manner and can deal with extremely large data sets. Weighting schemes may provide an approach to deal with heavily skewed data. Applications range from biology where classifiers have to deal with huge protein data banks, to security where instances of cell phone fraud can be indicated by this technique.

The two main approaches to ensemble learning are bagging and boosting. Bagging is a method to improve unstable classifiers, by drawing examples from the training data in a bootstrap manner, thereby decreasing the variance of the predictor. Boosting successively focuses on examples misclassified by previous weak learners, decreasing the model bias. In his talk Hall gave various examples for what should influence the decision for a specific method, or training configuration. In a large study, 5 methods were compared on 57 data sets. The classifier results were assessed by the Friedman-Holmes test based on ranks. Among the conclusions from this study were that boosting and random forests can improve on the accuracy of bagging for approximately 10% of the data sets, and boosting appears to benefit from larger ensemble sizes.

Many questions remain. How big should the ensemble be? What is the best way to vote? How to decide how much minority class data is enough? For now, Hall concluded that distributed learning and classifier ensembles make large and complex data sets manageable, it improves the classification accuracy, and that the Friedman-Holmes test is well suited for comparing them. The very close results in the comparison study triggered two questions from the audience: How relevant is the individual adjustment of the algorithms to different problems if a comparison is performed? How do the results, and the fact that the classifiers were applied to all data sets without further 'tuning' relate to the *No free lunch theorem*?

FEATURE: ICPR2006 Track 1 Invited Talk

Variations on Variational Principles for Vision

By Olivier Faugeras
(Research Director, INRIA, France)

Review by:
Georg Langs
Vienna University of Technology

Dr. Olivier Faugeras is leading the INRIA ODYSEE laboratory studying biological and computer vision. A focus lies in the understanding of natural perception mechanisms, in order to take advantage of their structure in the design of computer vision algorithms. Topics range from applications like medical imaging where, for example, non-rigid multi-modal registration is a challenging but highly relevant problem, to the theory of variational approaches and partial differential equations in computer vision.

Olivier Faugeras' introduction *Nature is thrifty in its resources* gave the leading topic to his talk. He explored 3 examples where variational principles which are closely related to physics can contribute to elegant solutions of computer vision problems.

In **shape theory,** the idea of viewing curves as points on a manifold of all possible shapes enables one to handle deformations as journeys along paths on the manifold which minimize a certain energy criterion. Shapes can be compared by the Hausdorff distance or extensions like rigidified Hausdorff distance. Thereby, the trajectory on the shape manifold can be controlled in order to deal with correct correspondences of points on the curves. It allows for the computation of empirical mean and covariance of sets of shapes or combined shape and texture information without the explicit use of landmarks. It also opens the possibility to define shape priors for image or volume segmentation. However, manually annotated landmarks remain important in improving the quality of correspondences on curves since semantic context still eludes criteria formulated purely on shapes.

In **multi modal image matching,** the correlation ratio and the mutual information are popular similarity measures. In a variational framework approaches for mono modal registration can be generalized to more complex multi-modal cases.

Multi-image stereo can be formulated as an energy minimization problem, too. In a variational framework dense depth recovery and even the integration of time are tackled by back projecting the texture onto a suitable surface.

Faugeras concluded that the Euler-Lagrange equations are the fundamental equations in computer vision. Question were concerned with the choice of the right distance function or the problem of similarities on curves. Faugeras answered that the appropriate distance function depends on the complexity, although local minima seem to be relatively independent from the choice. Singularities on curves pose a problem that has to be addressed by the careful design of a set of possible shapes.

FEATURE: ICPR2006 Track 2 Invited Talk

Invariants for 2d and 3d Pattern Recognition Problems

By Hans Burkhardt
(Professor, Albert-Ludwigs-University, Germany)

Review by:
Jean-Pierre Salmon
LORIA, France

Example from image retrieval system using invariant features.

New results for a classical problem
Professor Burkhardt presented general principles for the extraction of invariant features from images and described new results obtained. The aim is to classify images independently of the current position and orientation of the pattern to recognize.

Burkhardt began his talk by showing the drawbacks (for computation time, among others) of comparing a measured pattern in all possible locations against the prototypes. The solution proposed is to extract position-invariant and intrinsic features and to classify the objects in the feature space. Mathematically speaking, patterns form an equivalence class with respect to a geometric coordinate transform describing the motion. Invariant transforms are able to map such equivalence classes into one point of an appropriate feature space.

Burkhardt used Haar integrals, Lie-Theory and normalization techniques to extract the invariant features. He especially investigated Haar Integrals for the extraction of invariants based on monomial and relational kernel functions. The nonlinear transforms are able to map the object space of image representation into a canonical frame with invariants and geometrical parameters. Integration over the transformation group is based on Haar Integrals. The Haar Integrals are estimated by Monte-Carlo Methods to reduce the complexity (sublinear or even constant complexity).

Burkhardt explained the advantages of this method: 1)robustness against topological deformations, 2) robustness to scaling by using multi-scale kernels, 3) using functions of local support allows the recognition of articulated objects, 4) additivity in the Haar Integral for separate data regions allows the recognition of two objects in one scene without segmentation.

Finally, he showed that this method works on numerous problems in 2D and 3D through examples and applications, namely applications in content-based image and object retrieval and classification tasks (classification and retrieval of biological objects and structures).

More information on Burkhardt's work can be found at, http://lmb.informatik.uni-freiburg.de/

FEATURE: ICPR2006 Track 3 Invited Talk[1]

Computers in the Human Interaction Loop

By Alexander Waibel
(Carnegie Mellon University; University of Karlsruhe)

Review by:
Himanshu Vajaria
University of South Florida

In today's electronic world, most of us are well connected via computers, cell phones and PDAs. Yet the quality of our communication—with other humans and with our own electronic devices—leaves much to be desired. For example, consider our irritation when someone's cell phone rings in the middle of an important meeting. Wouldn't it be nice if our devices were more aware of our surroundings and could modify their behavior accordingly?

The CHIL project aims to facilitate just that: to put "Computers in the Human Interaction Loop". Professor Alexander Waibel, the coordinator of CHIL described ongoing efforts for automatic analysis of human behavior. Characterizing human behavior and understanding the social context involves solving many sub-problems, such as determining identities of the people involved; determining who is speaking to whom and what they are saying; and analyzing non-verbal communication, such as pointing gestures, raising of hands, etc.

Dr. Waibel suggests that these problems can be solved by the effective integration of various perceptual technologies. Face and speaker recognition are used to determine a person's identity. Source localization and gaze detection help identify the current speaker and the intended audience. Speech recognition enables topical classification of meetings Acoustic event classification determines the current social environment of the participants— lecture/meeting etc. Emotion and activity recognition analyze verbal and non-verbal communication.

Dr. Waibel also pointed out that, in addition to integration, more research is needed to make the basic technologies more robust for real scenarios. Real world scenarios require placing sensors at a distance, and this poses problems for both audio and video algorithms. Speech recognition suffers due to noise from cross talk and because, by its very nature, conversational speech is harder to recognize than real speech. Similarly problems are faced in video processing—face recognition suffers because of non-frontal poses and uncontrolled illumination conditions.

The CHIL project aims to provide a platform to help various researchers collaborate in a competitive environment to solve such problems. By conducting technological evaluations using a large database, standardized metrics, and benchmark performances, it intends to provide researchers valuable feedback about their algorithms. Currently, CHIL has 15 partners from 9 countries and has now joined forces with NIST (National Institute of Science and Technology) from the USA to hold joint workshops. More on this research can be found at http://chil.server.de

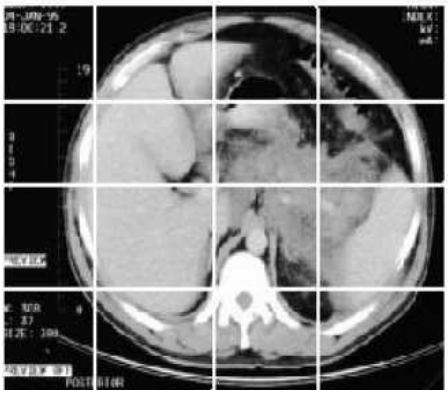
FEATURE: ICPR2006 Track 3 Invited Talk2

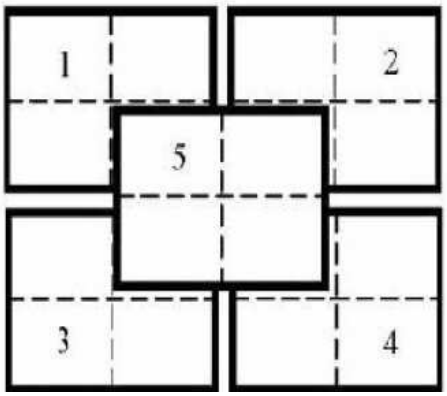
Image Representation and Retrieval Using Support Vector Machine and Fuzzy C-means Clustering Based Semantical Spaces

By Prabir Bhattacharya
(Professor, Concordia University, Canada)

Review by:
Daniel Zuwala
LORIA-INPL-Université de Nancy, France

Professor Bhattacharya spoke about image representation and retrieval applied to the medical domain. Medical images can be collected from different technologies like X-ray, ultrasound, or magnetic resonance. These images contain information that can be crucial in building a diagnostic.





The texture moments found from the medical image on the left are one of many features used for image query and retrieval.

Text based searches of annotated images have many limitations. It is difficult to capture the rich content of an image using text. Moreover, different experts can see different things, and even the same expert can see different things at different times.

This implies a need for content-based image retrieval (CBIR). This involves different domains like machine learning, pattern recognition, computer vision or artificial intelligence. CBIR systems are usually built in three steps: feature extraction, representation, and matching.

There are limitations that we have to be aware of. First there is a sensory gap between the object in the world and the information in the description. Secondly, there is a semantic gap, that is disagreements between the information we can extract from the visual data and what the expert user expects to extract. In medical images, moreover, there are important features that are more local than global, and small variations in these may imply radically different diagnoses.

Bhattacharya proposed a CBIR system based on a mixed approach (text and image) called ImageCLEF, whose objective is to perform image retrieval and automatic image annotation. The system is made of different steps. First, there is a categorization of the images by medical domain in order to improve the performance. At this step, it is possible to make a search for an image modality (X-ray, ultrasound, ...), for an anatomic region (foot, heart, ...), or for a pathology (leukemia, myelogenous, ...). A learning-based approach is then used on these data by using a support vector machine. Then he used an unsupervised fuzzy c-means clustering on the pixel images using a combined feature vector.

The results are promising and additional research on how real users query image retrieval systems will shed light on which system-oriented evaluation measures are most important.

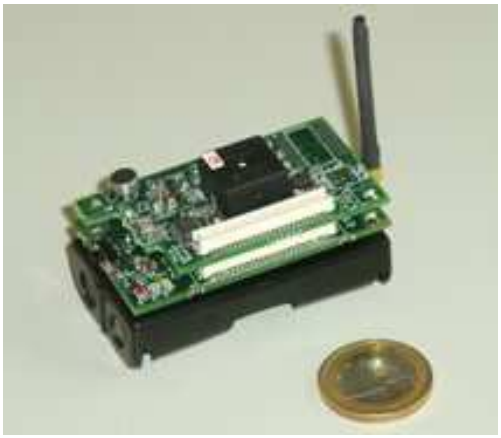
FEATURE: ICPR2006 Track 4 Invited Talk[1]

Challenges for Data Mining in Distributed Sensor Networks

By Virginio Cantoni
(Professor, University of Pavia, Italy)

Review by:
Adrian Ion
Vienna University of Technology

Besides presenting current and future challenges, Professor **Virginio Cantoni** gave a comprehensive overview of the field and its history. The objective of Sensor Networks (SN) is knowledge-gathering through systems that can answer questions that no single device could answer. Each contributor acts to maximize its contribution and adds detail/precision/speed to the answer. Each contributor has a role in the overall process and cooperates with the others to understand phenomena in situ and in real time.



MICA2 Sensor mote hardware.

A typical sensor node is a small battery-powered board, including a processing element (microprocessor), some measurement devices (visual, infra red, sonar, etc.), and a (wireless) communication device. In a typical network topology, sensor nodes communicate between themselves and with the base station, usually restricting such communication to the nodes in their “vicinity”. Evolution of network topology and distribution of processing, from the initial hierarchical structure to the current highly dynamic structure was presented.

Wireless Sensor Networks (WSN) will reach up to 10,000 nodes with an end-to-end reliability of more then 99.9%. Two technological issues include: data memory management, which is very critical due to the small amount usually installed; and radio frequency device communication, with its parameters like latency, positioning, heterogeneity, scalability, and self-organization. Another important set of issues are the ones related to the independence of the system when adapting to new situations. These include self-configuration, self-localization, self-optimization, self-awareness, self-healing, etc. The choice of the operating system running on the sensor nodes was also discussed with the concrete example of TinyOS.

Data management is the task of collecting data from sensors, storing data in the network, and efficiently delivering data to the users. Basic features of data management include: trade-offs energy-efficiency, flexibility, robustness, and locality. There are two possible approaches when defining the data management strategy: distributed database (data gathering is formulated as a database retrieval problem) and agent system (sensors are agents interacting according to multi-agent paradigms). Mobile nodes pose further challenges and open possibilities for more complex in-route data mining and fusion.

Regarding hypothesis formation, the naive strategy of collecting all data in a central computing node with high computational power results in undesirable energy-costly transmissions. Decentralized and distributed algorithms are two common solutions.

After presenting the main characteristics regarding networks of cameras and the concrete example called “Eye society”, some applications of distributed sensor networks were presented: Field and Border control, Environmental Monitoring, Intelligent Health-Care Network, Wearable sensors, Networked Info-mechanical System, Urban sensing, and Network Deployment Blueprint at a Health Clinic in Chicago.

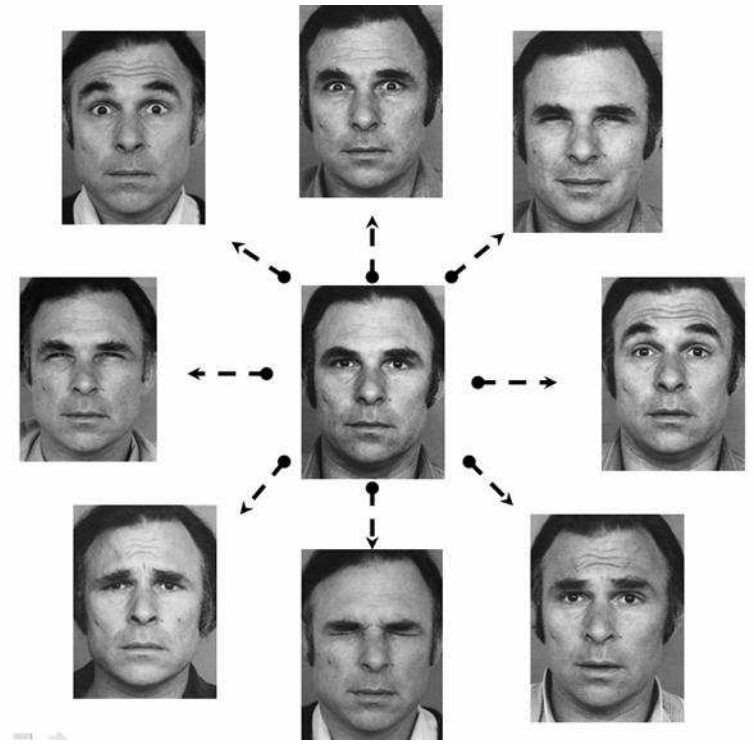
FEATURE: ICPR2006 Track 4 Invited Talk2

Pattern Recognition in Video

By Rama Chellappa
(Minta Martin Professor of Engineering, University of Maryland, College Park

Review by:
Michael Reiter
Vienna University of Technology

In his invited talk, Professor **Rama Chellappa** presented an overview of recent work of his research group, in which pattern recognition approaches were applied to video sequence analysis.



The many expressions of a single person illustrate one of the challenges of face recognition.

1. Ekman P. et.al, "Facial Action Coding Systems: The Manual", pp 1:527, 2002. Online: face-and-emotion.com/dataface/facs/new_version.jsp
2. Pittsburgh Pattern Recognition. Online: www.pittpatt.com/

Several examples of successful applications were demonstrated, including face recognition by appearance-adaptive models, gait-based human recognition, person tracking on a terminal, and tracking and analysis of the motion of a bees performing a waggle dance. (The waggle dance is performed by the bees to convey the direction of the food source to other bees in the hive. It is used to indicate the directions of distant floral sites, while the round dance is used for sites which are more close to the beehive). In such applications, pattern representation is crucial and should incorporate spatial and temporal pattern information.

Examples of useful representations are affine appearance models, 3D feature graphs and part-based descriptions (e.g. for gait-based person identification). Once a proper set of features is chosen the model parameters have to be estimated from observations. To accomplish this, particle filtering can be used to approximate the posterior densities of the state parameters. Identity and tracking parameters can be obtained as marginal maximum a-posterior estimates. In a similar way, tracking and behavior analysis can be performed together. For example, the learned motion models can be used to detect abnormal behavior (e.g., for surveillance applications).

FEATURE: ICPR2006 Track 5 Invited Talk[1]

A Computational Model of Social Signalling

By Alex Pentland
(Professor, MIT Media Lab, USA)

Review by:
Adrian ION
Vienna University of Technology

Sandy Pentland is shown at left interacting with Ron Caneel and Nathan Eagle, all wearing badge systems containing a microphone, accelerometer (motion sensor), and IR tag, for analyzing social interactions.

Motivated by the desire to increase the quality of collaboration and cooperation between humans, Professor **Alex Pentland** and his Human Dynamics research group at MIT have looked into the problem of understanding and predicting social aspects that seem to play an important role in human interaction, i.e., social context. First steps toward identifying social context in human communication have been taken by the development of three socially aware platforms that objectively measure several aspects of social context.

One of these platforms uses non-linguistic *social signals* and has been found to be particularly powerful for analysing and predicting human behaviour, sometimes exceeding even expert human capabilities. *Social signals* are non-linguistic signals measured by analysing the person's tone of voice, facial movement, or gesture. To quantify these social signals, texture-like measures have been developed for four types of social signalling: activity level, engagement, stress, and mirroring. Activity level is how much you participate in the conversation and is measured by the percentage of speaking time during a conversation. Engagement is how involved a person is in the current interaction, i.e., whether he or she is driving the conversation, setting the tone, etc. It is measured by looking at the influence speakers have on each other, i.e., when two people are acting, their individual turn-taking dynamics influence each other. Stress is the variation in prosodic emphasis and is measured by looking at the standard deviation of the formant frequency and spectral entropy (base frequency and frequency spread of one's voice during the conversation). Mirroring occurs when one participant subconsciously copies another participant's prosody and gesture. It is considered a signal of empathy and is measured by looking at the frequency of short interjections (“Uh-huh”) and back-and-forth exchanges typically consisting of single words (“OK?”, “OK!”).

The presented social signalling measurements have been incorporated into three socially aware communication systems (a badge, a PDA, and a mobile phone), and a set of experiments has been done. The experiments consisted in predicting the outcome in the following situations: who would exchange business cards at a meeting; which couples would exchange phone numbers at a bar; who would come out ahead in a negotiation; who was a connector within a work group; and a range of subjective judgements, including whether or not a person felt a negotiation was honest and fair or a conversation was interesting. After excluding cases where not enough data was available to make a decision, an average accuracy of almost 90 percent was achieved. If the system was asked to give an answer independent of the amount of available data, an accuracy of around 80 percent was observed.
More on this work can be found at:
http://web.media.mit.edu/~sandy/

FEATURE: ICPR2006 Track 5 Invited Talk2

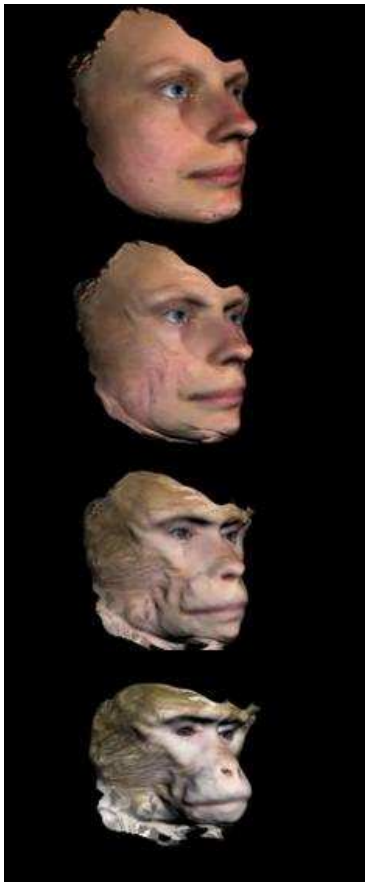
Kernel Machines for Computer Graphics

By Bernhard Schölkopf
(Professor, MPI for Biological Cybernetics, Germany)

Review by:
Michael Reiter
Vienna University of Technology

In this invited talk, Professor Bernhard Schölkopf presented applications of machine learning methods to problems in the field of computer graphics, in particular implicit surface modeling and computation of morphs between two 3D shapes of a certain object class (e.g., human heads).
The learning methods used are kernel methods, such as Support Vector Machine Regression (SVM-Regression), which have become a standard tools in the field of computer vision and pattern recognition but are relatively new in the computer graphics community.

An implicit surface model of an object is constructed using an SVM-regression based implicit surface fitting framework. The object is modeled by a signed distance function which takes on values greater than zero outside the object and values less than zero inside the object. By definition the zero set of the signed distance function corresponds to the surface of the object. Essentially, for implicit surface fitting a regularized SVM-regression method is used where the input are sample points and normal vectors of the objects surface. A novelty of the approach is that normal vectors can be directly incorporated in the SVM surface fitting framework. The approach is characterized by fast fitting and good interpolation properties and high compression ratios, since only a small number of basis functions are used to represent the shape.



Continuous morphing from one head model to another using regularized SVM-regression framework.

As was demonstrated in the talk by impressive 3D examples, SVM-based learning can also be employed for estimating dense deformation fields between objects. For example, a morph between the 3D head model of two individuals (male and female) was computed by the method. Although the 3D models where only roughly aligned and no landmark point correspondences were used, the point correspondences are found implicitly by the algorithm, such that in the continuous transition of one head model to the other, facial points such as eyes, nose, mouth and ears of the two models are accurately warped onto each other. This is accomplished by utilizing information about the surface normals in a local neighborhood of surface points. It is implemented in the regularized SVM-regression framework by incorporating gradients of the signed distance function into the penalty term of the cost function. Additionally, in some difficult cases where the point correspondences are not correct, a few manually annotated landmark points can improve the performance.

Overall, the results shown were very impressive, and Bernhard Schölkopf concluded that the applications serve as encouraging examples to show the potential of machine learning methods for shape processing tasks.

News from the
IAPR Executive Committee

By Denis Laurendeau

We hope that you enjoyed the last ICPR in Hong Kong.

The conference was a great success and offered the IAPR community an excellent opportunity to meet and exchange ideas on topics related to pattern recognition. Congratulations to the ICPR 2006 Organizing Committee for preparing the conference. Hong Kong is a city full of contrasts, and ICPR 2006 attendees certainly enjoyed being immersed in such a wide variety of cultures. We now wish good luck to the ICPR 2008 Organizing Committee. ICPR 2008 will take place in Tampa, Florida, in December 2008. Istanbul has been selected by the Governing Board as the venue for ICPR 2010, which will be ICPR's 20th anniversary.

At its biennial meeting, the Governing Board has approved the creation of a permanent IAPR Standing Committee for ICPR. Organizing an event such as ICPR requires a huge amount of work, and it is was felt that a standing IAPR committee for ICPR will help future organizers in planning and managing this major event for the IAPR.

This is the first "From the ExCo" column written by the new Executive Committee for the 2006-2008 term. The ExCo consists of the following people:

President, Karl Tombre
Past President, Walter Kropatsch
First Vice-President, Sergey Ablameyko
Second Vice President, Katsushi Ikeuchi
Treasurer, Kim Boyer
Secretary, Denis Laurendeau

The newly appointed ExCo started immediately to work on a number of issues. As usual, an urgent task in the months after ICPR is to set up the standing committees and to appoint new chairpersons to TCs. Again, the ExCo will encourage Technical Committees to appoint vice chairs, the idea being to favor continuity from one term to the other, to enhance diversity in geographical distribution, and to involve young scientists in the life of the committees.

According to IAPR's Constitution and Bylaws, the Nominating Committee and the KS Fu Prize Committee need a vote by the Governing Board. The ballot will be initiated soon, and we will report on its result in the next Newsletter. For all committees, please refer to the IAPR web page, www.iapr.org, for the latest update of the IAPR directory, with the names and contact information of all the standing committee members. With respect to the IAPR web page, the ExCo will continue to work in cooperation with the Publications and Publicity Committee and the professional web service provider in preparing the next steps of the develop-

From left: Walter Kropatsch, Sergey Ablameyko, Denis Laurendeau, Karl Tombre, Kim Boyer.

(Continued on page 16)

(Continued from page 15)

ment of e-services to the IAPR community. Another important topic on which the new ExCo will concentrate in the next months is the discussion with scientific publishers. The objective is to make the IAPR web site a central reference for the dissemination of knowledge and research results on Pattern Recognition.

The Governing Board meeting in Hong Kong voted a few amendments to the IAPR's Constitution, Bylaws and Statutes. This will be incorporated very soon into the text which can be found on the association's web site.

At the GB meeting, in Hong Kong, on request of the Chairman, Technical Committee 6 ("Special Hardware and Software Environments") has been cancelled. The creation of a new Technical Committee (TC4) on "Biometrics" has been approved by the Governing Board. Ways on increasing the activity of TC14 on "Signal Analysis and Machine Intelligence" will be addressed through potential interactions with EURASIP. (see related article on the next page).

The IAPR financial situation is good, and will allow us to continue the policy of helping with travel expenses to ICPR through stipends. Again this year for the ICPR in Hong Kong, researchers, most of them young scientists, benefited from this support.

We extend our warmest thanks to Maria Petrou and Rangachar Kasturi for their work as members of the ExCo. Although they are no longer ExCo members, we are convinced that they will still participate very actively in many IAPR activities. Their contribution to the association is invaluable and we hope that it will continue for a long time ahead.

Finally, Karl Tombre, the new president of the IAPR, will lead off the next issue of the IAPR Newsletter with a "Letter from the President". This January 2007 issue will convey extensive information about the new ExCo's plans and projects as well as the regular Newsletter articles and features.

Past-President Walter Kropatsch taming the lion at ICPR2006 in Hong Kong.

IAPR Technical Committees 2006-2008

At ICPR2006, the IAPR Governing Board voted on changes to the list of IAPR Technical Committees as outlined below.

IAPR has established a number of Technical Committees to provide leadership in designated technical specialties and to further the objectives of the Association.

Each Technical Committee has a distinct purpose and scope and is under the responsibility of a chairperson appointed by the IAPR President. These committees may organize into subcommittees, may hold regular or special meetings, and may propose and plan IAPR workshops and other professional activities within its scope, either by itself or in collaboration with other Technical Committees

TC #	TC Focus	TC Chair	***TC web site***
TC1	Statistical Pattern Recognition	Prof. Fabio Roli	*ict.ewi.tudelft.nl/~duin/TC1/*
TC2	Structural and Syntactical Pattern Recognition	Prof. James Tin-Yau Kwok	*grfia.dlsi.ua.es/tc2/*
TC3	Neural Networks and Computational Intelligence	Dr. Simone Marinai	*www.dsi.unifi.it/TC3/*
TC4	Biometrics	Prof. Tieniu Tan	
TC5	Benchmarking and Software	Dr. Roberto Paredes	*algoval.essex.ac.uk:8080/tc5/intro/default.jsp?op=1*
TC6	*cancelled*	—	—
TC7	Remote Sensing and Mapping	Prof. Selim Aksoy	*www.iapr-tc7.org/*
TC8	Machine Vision Applications	Dr. Shigeru Sasaki	*www.cvl.iis.u-tokyo.ac.jp/iapr/tc8/*
TC9	Biomedical Applications	*Not defined yet*	*lit.fe.uni-lj.si/TC9/*
TC10	Graphics Recognition	Prof. Liu Wenyin	*www.cvc.uab.es/iapr-tc10/*
TC11	Reading Systems	Dr. Jianying Hu	*www.iapr-tc11.org/*
TC12	Multimedia and Visual Information Systems	Dr. Marcel Worring	*staff.science.uva.nl/~worring/TC12/*
TC13	Pattern Recognition in Astronomy and Astrophysics	Dr. Tin Kam Ho	*www.cs.bell-labs.com/who/tkh/TC13/index.html*
TC14	Signal Analysis for Machine Intelligence	Prof. Sergios Theodoridis	*www2.hh.se/staff/josef/tc14/*
TC15	Graph Based Representations	Prof. Luc Brun	*www.iapr-tc15.unisa.it/*
TC16	Algebraic and Discrete Mathematical Techniques	Dr-Eng Igor Gurevich	*www.ccas.ru/tc16/first.htm*
TC17	Machine Learning and Data Mining	Prof. Atsushi Imiya	*www.ibai-research.de/index.php*
TC18	Discrete Geometry	Prof. David Coeurjolly	*www.cb.uu.se/~tc18/*
TC19	Cultural Heritage Applications	Dr. Robert Sablatnig	*iapr-tc19.prip.tuwien.ac.at/*
TC20	Bioinformatics	Prof. Jagath C. Rajapakse	*www.cse.psu.edu/~acharya/IAPR/iapr.htm*

IAPR Awards: Congratulations!

A number of awards were presented at ICPR2006. Congratulations to all recipients!

The King-Sun Fu Prize: Professor Fu was instrumental in the founding of IAPR, served as its first president, and is widely recognized for his extensive contributions to the field of pattern recognition.

This biennial prize is given to a living person in the recognition of an outstanding technical contribution to the field of pattern recognition, and consists of a cash amount and a suitably inscribed certificate. The prize is derived from interest income from a special fund set up for this purpose.

Congratulations to Josef Kittler, the 2006 recipient of the K.S. Fu Prize!

The J.K. Aggarwal Prize: Professor Aggarwal is widely recognized for his extensive contributions to the field of pattern recognition and for his participation in IAPR's activities.

The recipient of this prize is a young scientist (under the age of 40 at the date of the deadline for nominations) who has brought a substantial contribution to a field that is relevant to the IAPR community and whose research work has had a major impact on the field.

Congratulations to Bernard Scholköpf, the first recipient of the J.K. Aggarwal Prize!

IAPR Fellows: The IAPR fellowship is conferred on persons in recognition of their outstanding contributions to IAPR and to the field of pattern recognition.

The prestigious IAPR Fellow award was introduced in 1994 to acknowledge distinguished contributions of IAPR members to the field of pattern recognition and to IAPR activities.

According to the Constitution and Bylaws of IAPR, the number of fellows elected biennially must not exceed 0.25% of the total IAPR membership. Both service to IAPR and scientific contributions to the field of pattern recognition are taken into account in the election procedure.

Congratulations to the 2006 IAPR Fellows:

Eduardo José Bayro Corrochano—"For contributions to geometric computing for perception action systems"

Zen Chen—"For contributions to computer vision and related applications, and for service to IAPR"

Rita Cucchiara—" For contributions to pattern recognition for video-surveillance"

Xiaoqing Ding—" For contributions to OCR, face recognition, biometric technology and document image analysis"

Patrick J. Flynn—" For contributions to research in three-dimensional object recognition systems and biometrics"

Xiaoyi Jiang—" For contributions to range image analysis and structural pattern recognition, and for service to IAPR"

Ching-Chung Li—" For contributions to biomedical pattern recognition and multiresolution image processing"

Vittorio Murino—" For contributions to the design of probabilistic (graphical) methods for pattern recognition"

B. John Oommen—"For contributions to fundamental and applied problems in syntactic and statistical pattern recognition"

Petra Perner—"For contributions to image interpretation by developing methods for case-based reasoning, machine learning and data mining, and for service to IAPR"

Katsuhiko Sakaue—"For contributions to computer vision and its applications"

Mubarak Shah—" For contributions to motion-based recognition and shape from shading in computer vision"

Tieniu Tan—" For contributions to computer vision and pattern recognition"

B.V.K. Vijaya Kumar—" For contributions to frequency domain pattern recognition methods"

David Zhang—" For contributions to biometrics technologies and systems"

(Awards continued on Page 19)

(Awards continued from Page 18)

The Piero Zamperoni Best Student Paper Award: Dr. Piero Zamperoni was an outstanding educator in pattern recognition.

The IAPR Education Committee presents this award to acknowledge and encourage excellence in pattern recognition research by students, and to help assure the future livelihood of the field.

Congratulations to Fan Zhang and Edwin R. Hancock whose paper "A Riemannian Weighted Filter for Edge-sensitive Image Smoothing" won this award at ICPR2006.

The Best Industry-Related Paper Award: This award acknowledges the best paper by authors in industry as voted by the IAPR Industrial Liaison Committee.

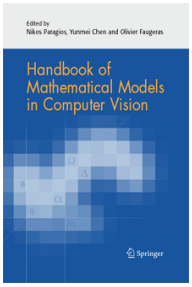
Congratulations to Junji Sato, Tomokazu Takahashi, Ichiro Ide and Hiroshi Murase whose paper titled "Change Detection in Streetscapes from GPS Coordinated Omni-Directional Image Sequences" won this award.

The Best Track Paper Award (ICPR2006 Only): This year, for the 18th International Conference on Pattern Recognition, IBM sponsored a best paper per track award.

Congratulations to the following authors:

Track	Best Student Paper	Best Paper
1 Computer Vision and Image Analysis	Title: Segmentation and Probabilistic Registration of Articulated Body Models Authors: Aravind Sundaresan and Rama Chellappa	Title: Human Tracking by Particle Filtering Using Full 3D Model of Both Target and Environment Authors: Tatsuya Osawa, Xiaojun Wu, Kaoru Wakabayashi and Takayuki Yasuno
2 Pattern Recognition and Basic Technologies	Title: Utilizing Information Theoretic Diversity for SVM Active Learning Authors: Charlie K. Dagli, Shyamsundar Rajaram and Thomas S. Huang	Title: Learning Pairwise Similarity for Data Clustering Authors: Ana Fred and Anil Jain
3 Signal, Speech and Image Processing	Title: Audio Segmentation and Speaker Localization in Meeting Videos Authors: Himanshu Vajaria, Tanmoy Islam, Sudeep Sarkar, Ravi Sankar and Ranga Kasturi	Title: Tone Mapping for HDR Image using Optimization - A New Closed Form Solution Authors: Guoping Qiu, Jian Guan, Jian Duan and Min Chen
4 Systems, Robotics and Applications	Title: Comparative Analysis of Decision-Level Fusion Algorithms for 3D Face Recognition Authors: Berk Gokberk and Lale Akarun	Title: Unsupervised Decomposition of Mixed Pixels Using the Maximum Entropy Principle Authors: Lidan Miao, Hairong Qi and Harold Szu
5 Cognitive Approaches & Soft Computing	Title: Continuous Gesture Recognition Using a Sparse Bayesian Classifier Authors: Shu-Fai Wong and Roberto Cipolla	Title: Analyzing Facial Expressions Using Intensity-Variant 3D Data for Human Computer Interaction Authors: Lijun Yin, Xiaozhou Wei, Peter Longo and Abhinesh Bhuvanesh

BOOKSBOOKSBOOKS



Handbook of Mathematical Models in Computer Vision

by

Nikos Paragios, Yunmei Chen, and Olivier Faugeras (Editors)
Springer, 2006

Reviewed by: Arjan Kuijper

When attending a general computer vision conference like xCCV, did you ever feel lost at certain sessions? Well, don't always blame the presenters! The field covered by Computer Vision has become so broad that it is almost impossible to understand what is going on and to keep track of the latest developments. To (partially) overcome this problem, the editors of the *Handbook of Mathematical Models in Computer Vision* have done a great job.

One can become a bit skeptical reading such a title. How complete can such a handbook be? However, going through the 33 chapters, indeed a wide breadth is treated. The focus of the book is on mathematical methods that both model and reproduce human visual abilities. This is the field of biological vision in which the editors have a strong background.

The editors chose three distinct categories of mathematical models, namely variational techniques (those attending Prof. Faugeras' talk at ICPR 2006 may remember his statement that they give the fundamental equations in computer vision!), statistical methods, and combinatorial approaches. The chapters are grouped in six sections that circle around these three categories. Although going through the book chapters by mentioning keyword may yield a rather boring list, it shows the wide variety of topics that are being dealt with.

The book starts with a section on low-level vision: *Image Reconstruction*. Here one can find information on diffusion filters and wavelets, total variation methods, and PDE based inpainting.

The second section is concerned with *Boundary Extraction, Segmentation and Grouping.* Here subjects like levelings, graph cuts, minimal paths and fast marching methods, deformable models, variational segmentation with shape priors, curve propagation, level set methods, and a stochastic model of geometric snakes are discussed.

Section three switches to high level vision. It deals with *Shape Modeling & Registration*, divided into topics concerning invariant processing and occlusion resistant recognition, image-based inferences, point matching and uncertainty-driven, point-based image registration.

In the fourth section, *Motion Analysis, Optical Flow & Tracking*, the concept of time is added and one encounters the topics of optical flow estimation, image warping, alignment and stitching, visual tracking, image and video segmentation, human motion capture, and dynamic textures.

Section five deals with *3D from Images, Projective Geometry & Stereo Reconstruction,* treated by boundary detection, stereo, texture and color, shape from shading, calibration, motion and shape recovery, multi-view reconstruction, binocular stereo with occlusions, and modeling non-rigid dynamic scenes.

The last section may seem a bit odd: *Applications: Medical Image Analysis*. However, this is one of the

(Continued on page 21)

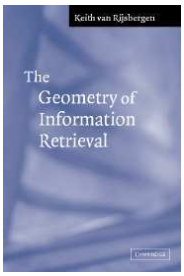
(Continued from page 20)

most prominent areas in computer vision. Although here certain vision aspects do not occur, compared to natural images (just think of the influence of the sun), for many tasks the performance of the mathematical methods can be evaluated since a ground truth is often available – provided by humans whom the models are supposed to mimic. In this section, applications of interactive graph-based segmentation methods, 3D active shape and appearance models, characterization of diffusion anisotropy, segmentation, variational approaches, and statistical methods of registration are given.

The danger of publishing an edited volume is the difference in style and treatment of the topics among the various contributions. This is not the case here. Each chapter gives a general introduction to the topic, introduces the mathematical model, discusses the underlying ideas globally, and shows some results. For the full details the readers are referred to the extensive bibliography with 929 entries.

This book is a must-have for those interested in the full breadth of research done in the biological & computer vision community. As a bonus, the chapters can also be used in a seminar-based, advanced undergraduate course in mathematical based computer vision.

BOOKSBOOKSBOOKS



The Geometry of Information Retrieval

by

C.J. van Rijsbergen

Cambridge University Press, 2004

The field of information retrieval (IR) has received much attention in recent years mainly due to the enormous growth and financial success of Internet search engine companies such as Google and Yahoo. This slim book (150 pages) provides a refreshing new approach to IR research by explaining how the theorems of quantum mechanics (QM) can be applied to IR. The author, C.J. "Keith" van Rijsbergen, has spent more than thirty years in IR research and is currently a professor of and leader of the IR group at the University of Glasgow, Scotland. He is the author of the widely cited 1979 classic: *Information Retrieval*.

But what is the advantage of using the language of QM for IR? One main advantage is that the QM paradigm can be used to combine the three main current IR models (*viz.* the probabilistic, logical and vector space models). In addition, the approach described in this book is not text specific and is applicable to other data types, such as images, video and music. One of the central ideas presented is that an IR object (such as a document) can be represented in Hilbert space (the mathematical foundation for QM), and Hermitian operators (in QM, these are quantities that be measured experimentally) can represent the relevance of queries to that object.

The Geometry of Information Retrieval consists of a prolog, followed by an introduction and five short and concise main chapters. Three appendices are also included. The bibliography is one highlight of this interesting book, with the author providing a brief description of each referenced work.

The prolog introduces the main ideas in the book with a fictional discussion between a senior academic K (a thinly disguised van Rijsbergen) and two other critical academics. This is an interesting approach (reminding me of Douglas Hofstadter's narratives in *Gödel, Escher, Bach*), which give the reader motivation to continue reading through the rest of the book.

Chapter two is an overview of IR using set theory. It provides definitions of the most commonly used IR measurements (precision, recall, etc.). The final part of this chapter explains why Boolean logic is unable to handle object classes in IR, and discusses limitations in the traditional inverted file Boolean approach where keywords are not available (for example, when image features need to be indexed).

The third and forth chapters provide background mathematics on vector spaces and operators. Chapter three introduces vector and Hilbert spaces and the Dirac notation. The cosine coefficient (often used in IR as a measure of similarity between two document vectors) is also discussed. Chapter four is concerned with linear transformations, operators (such as projectors), eigenvalues and eigenvectors, and the spectral theorem (which shows that if an observable is seen as a question, it can be reduced to a set of yes/no questions).

(Continued on page 23)

(Continued from page 22)

Chapter five presents a formal connection between conditional logic in IR (that is: if a query is implied by a document then the document is assumed to be about the query) and quantum logic. According to the author this allows conditional logic to be interpreted in Hilbert (or vector) space for the first time.

The background work is then tied together in chapter six, which is the longest and most interesting chapter. A language, based on the Dirac notation, is introduced which uses a small set of operators (such as the density operator) and functions. This language is then discussed with application to IR topics such as co-ordination level matching, pseudo-relevance and relevance feedback, dynamic clustering and ostensive retrieval.

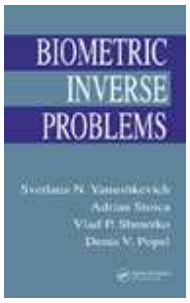
As mentioned earlier, the book contains three useful appendices. The first of these provides an introduction to linear algebra using Hilbert spaces, and also introduces the Dirac notation. The second appendix presents a brief introduction to QM and includes sections on physical states, observables, measurements and the famous Heisenberg Uncertainty Principle. The last appendix describes classical and quantum probability. These appendices contain a great deal of condensed information, and each concludes with a well-written section on further reading.

This is a very interesting book, which appears to provide a solid foundation for future research. The math required some effort, particularly as I was not familiar with QM. However van Rijsbergen's explanations are well written and logical. In addition, there are many pointers to other sources of relevant information.

This book would be of particular interest to those conducting IR, Artificial Intelligence or Cognitive Science research. The novel approach may also be of interest to web search engine developers. As the author points out, this book could also provide a useful introduction to quantum computation, as most of the required mathematics is included. It would be great to see a discussion of implementation issues for an IR system based on van Rijsbergen's mathematical foundation, covering such topics as performance, scalability and reliability.

In conclusion, this is a clearly written and thought-provoking book that has been a pleasure to read. It is highly recommended.

BOOKSBOOKSBOOKS



Biometric Inverse Problems

by
S. N. Yanushkevich, A. Stoica, V. P. Shmerko, and D. V. Popel
CRC Press/Taylor & Francis Group, 2005

Reviewed by: Patrick S. Wang

I had the pleasure of visiting the Biometric Technology Laboratory at the University of Calgary in 2004 and 2006. This Laboratory is distinctive among other biometric laboratories—it's unique focus is synthetic biometrics. This is the focus of the book "Biometric Inverse Problems" written by my colleagues from this laboratory.

The reasons for the intense increase in interest in biometrics are applications such as homeland security, testing of biometric devices, training personnel of biometric-based systems, and modeling the attacks on biometric systems.

This book is about the *inverse* problems of biometrics that correspond to the *synthesis* of biometric information. We widely use inverse operators and transforms, such as inverse filtering, inverse Fourier and Laplace transforms in image processing. We know that a system is *invertible,* if inputs can be recovered from the output except for a constant scale factor. Unfortunately, these techniques are not acceptable for the inverse problems in biometrics. The reason is that biometric data are complex structures of statistical nature. It implies that it is possible to construct fingerprints, iris, signature patterns using the corresponding requirements to topology of this data. This paradigm is a key point of the book. It should be noted that any solution to an inverse problem in any field helps better understand the direct problem and can give more benefits, for example, reconstruction of an object in topography. This book is the first compiled work in this direction.

The first impression of this book is that it is written in a reader-friendly style. For example, the complicated multidisciplinary problems are introduced softly, that is, the reader feels that authors care about his or her understanding of the materials. However, this style requires very precise balance between professional and simplified representation. The authors try to keep this balance by including some recommendations for further reading with detailed comments at the end of each chapter.

I have found it reasonable to estimate the usefulness of this book for various communities of researchers, including designers of biometric-based systems, experts in image analysis and biometrics, users of biometric devices, and instructors and students of classes on biometrics.

Designers of biometric-based systems can find here a number of innovative ideas on implementation of generators of synthetic biometric data. For example, in Chapter 3, the reader can find a detailed description of the generator of synthetic signatures. The next generation of polygraphs is introduced in Chapter 5. Note, that some advanced polygraph techniques are adopted in PASS [1]. Another application, the iris pattern design, is widely used in oculist practice [3,4] (Chapter 6). The authors demonstrate, in particular, techniques for automatic iris synthesis.

(Continued on page 25)

(Continued from page 24)

Experts in pattern recognition and image analysis can find several new applications of their knowledge in biometrics. Analysis-by-synthesis approach in image modeling is the bridge between image processing and synthetic biometrics. For example, Chapter 5 on synthetic face design advocates for using morphed faces to improve performance of facial recognition systems.

Several features of this book can be used by **experts in biometrics.** In particular, specialists in analysis (direct problem of biometrics), can extend the area of expertise by applying synthesis (inverse problems). This book is aimed at helping them in this.

For **users of biometric devices**, this book provides particular knowledge in understanding of biometric data. I believe that professionals from such areas as forensic, justice, border security control and automated banking systems, should be familiar with the approaches that can be used to deceive the defense. For example, synthetic fingerprints (Chapter 4) can be generated so that an automatic system is fooled with the fingerprints of individuals who do not exist. These specialists should know that handwriting can be generated automatically without a person in the loop. This and other useful knowledge can help users of biometric technologies to keep a reasonable level of confidence in biometric data.

Finally, the book can be useful for **students and instructors** of classes on biometrics. From a quick look through this book, one can conclude that the material is well structured and illustrated. In particular, examples are short, clear, and well placed; summaries give the quintessence of each chapter; problems are useful for detail study. I found especially useful the recommendations and comments for further reading provided in each chapter.

There are still several unsolved problems of synthetic biometrics. It refers to the concept of *acceptability* of synthetic data—biometric data can be recognized as synthetic data and can be used by experts in automated identification systems [2]. Also it seems to me that the authors overestimate the effectiveness of Voronoi diagrams (Chapter 7) in the synthesis of topological representations of biometric data. From the other side, the final chapter (Chapter 8) can be recognized as a contribution in the next generation of biometric systems, DNA-based biometrics.

In summary, I think that this book can be recognized as an important event in the biometric community and related areas, including pattern recognition.

1. S. N. Yanushkevich, A. Stoica, V. P. Shmerko, Experience of Design and Prototyping of a Multi-Biometric, Physical Access, Early Warning Security Systems Based on Screening Discipline of Service (PASS) and Training System T-PASS, The 32nd Annual Conf. of the IEEE Industrial Electronics Society, IECON, Paris, 2006

2. Cappelli R. Synthetic fingerprint generation. In Maltoni D, Maio D, Jain AK, Prabhakar S, Eds., Handbook of Fingerprint Recognition, pp. 203--232, Springer, Heidelberg, 2003.

3. J. Cui, Y. Wang, J. Huang, T. Tan, Z. Sun, and L. Ma, An Iris Image Synthesis Method Based on PCA and Super-Resolution, Proc. Int. Conf. on Pattern Recognition, 2004

4. A. Lefohn, B. Budge, P. Shirley, R. Caruso, and E. Reinhard, An Ocularist's Approach to Human Iris Synthesis, Computer Graphics and Applications, IEEE Magazine, 23(6):70--75, 2003

Conference Report: CRV 2006
3rd Canadian Conference on Computer and Robot Vision

7-9 June 2006
Quebec City, Quebec, Canada

Report prepared by Conference Chairs
Ioannis Rekleitis (Canadian Space Agency) and Greg Mori (School of Computing Science, Simon Fraser University)

The Third Canadian Conference on Computer and Robot Vision (CRV 2006) took place June 7-9th in Quebec City, Canada. This conference was the third successor to 16 Vision Interface (VI) conferences, the last of which was held in Halifax, Nova Scotia in 2003. CRV 2006 continued the VI/CRV tradition of providing an excellent forum for the Canadian and International Computer and Robot Vision communities to share their work. As usual, our conference was sponsored by CIPPRS/ACTIRF (Canadian Image Processing and Pattern Recognition Society/Association Canadienne de Traitment d'Images et de Reconnaissance des Formes) and endorsed by IAPR (International Association for Pattern Recognition), with additional support provided by the Canadian Space Agency. CIPPRS/ACTIRF is a special interest group of the Canadian Information Processing Society (CIPS) and is the official Canadian member of the governing board of the IAPR. The goal of CIPPRS/ACTIRF is to promote research and development activities in Computer Vision, Robot Vision, Image Processing, Medical Imaging, and Pattern Recognition.

In addition to our sponsors, the conference proceedings were published by the IEEE Computer Society, and will be available on-line through IEEE Xplore and the IEEE/IEE (Institution of Electrical Engineers) Electronic Libraries (IEL). The proceedings are also indexed through the INSPEC indexing service. The best papers from CRV 2005 will be appearing in a special issue of the Journal of Image and Vision Computing. We are currently making similar arrangements for CRV 2006.

This year, we had an excellent collection of papers which were reviewed by at least two reviewers each from a 61 member program committee assembled from a worldwide community of vision researchers. We received a total of 113 submissions, out of which 35 papers were accepted for oral presentation (31 percent), while another 35 papers were accepted as poster papers (31 percent). We believe all of the conference papers are of excellent quality.

CRV is attracting broad international participation. Submissions were received from 19 different countries, and papers from 12 different countries were accepted. While Canada remains the dominant source of papers, this year's CRV features 21 papers from international participants (30 percent).

(Continued on page 27)

(Continued from page 26)

At the conference banquet, we were pleased to present 4 paper awards:

♦ Robert Sim, Pantelis Elinas, Matt Griffin, Alex Shyr, and James J. Little received the Best Robotics Paper award for their paper titled "Design and analysis of a framework for real-time vision-based SLAM using Rao-Blackwellised particle filters".

♦ Weihua Xiong and Brian Funt won the Best Vision Paper award for their paper titled "Stereo Retinex".

♦ The IAPR Best Student Paper award went to Aniket Murarka, Joseph Modayil, and Benjamin Kuipers for their paper titled "Local Safety Maps for a Wheelchair Robot using Vision and Lasers".

♦ The IAPR Best Paper award for CRV 2006 was given to Dan Levi and Shimon Ullman for their paper titled "Learning to classify by ongoing feature selection".

We graciously acknowledge the support of the IAPR in providing the cash prizes for the Best Paper and Best Student Paper awards. In addition, John Tsotsos and Hong Zhang were each presented with a CIPPRS research and service award. We congratulate them on their outstanding research achievements and contributions to the vision and robotics communities in Canada.

CRV 2006 featured invited talks from three internationally recognized scientists -- Jana Kosecka from George Mason University, Yann LeCun from New York University, and John Leonard from the Massachusetts Institute of Technology.

This year, we were pleased to add a special session on Video Processing for Security (VP4S-06), organized by Dmitry Gorodnichy at the National Research Council and Lijun Yin from SUNY at Binghamton.

The organization of a conference is a task that requires the collaboration of many people. We personally would like to thank warmly all members of the CRV 2006 program committee. Without their help and dedication it would not be possible to produce this proceedings of high-quality papers in such a short time frame. Their effort deserves special thanks as the turnaround time between submissions and decisions was only three weeks. We would like to thank John Barron at the University of Western Ontario for his tireless guidance and assistance, and CIPPRS President Gregory Dudek for additional time and support. Special acknowledgements go to the Canadian Space Agency and Simon Fraser University, whose support permitted our organizing efforts.

Finally, we would like to thank all authors who submitted their papers, no matter whether their papers were accepted or not. Their contributions made CRV 2006 an enjoyable and stimulating conference, and we look forward to seeing all of you at CRV 2007 in Montreal!

Workshop Report: EVA Vienna 2006

1st EVA Vienna - 2006 - "Digital Cultural Heritage—Essential for Tourism"

August 27 - August 30, 2006
Vienna, Austria

Co-Chairs: Robert Sablatnig (IAPR TC19) and James Hemsley (EVA Conferences)

Report prepared by Co-Chair Robert Sablatnig and Paul Kammerer

The Co-Chairs James Hemsley and Robert Sablatnig with participants of IAPR TC19 - EVA Vienna in front of the venue, the Austrian Academy of Sciences

The first conference of the EVA (Electronic Information, the Visual Arts & Beyond) series in Vienna under the topic “Digital Cultural Heritage - Essential for Tourism” was organized by the Pattern Recognition and Image Processing (PRIP) Group and the Austrian Computer Society (OCG). The conference was endorsed by the IAPR-TC19 “Computer Vision for Cultural Heritage Applications” http://iapr-tc19.prip.tuwien.ac.at/).

The main aim of this first EVA Event in Vienna was to create a forum for discussions between the cultural heritage research community, technology researchers and cultural institutions. Our mission is to establish new technical tools for experts in the cultural heritage field. The accompanying motto of the conference is "Digital Cultural Heritage – Essential for Tourism". Therefore, the conference was focused on image analysis, cultural tourism, speech and communication in cultural heritage, archaeography, and museum and archaeological applications. The focus was on applied work as well as theoretical advances.

EVA Vienna was a small but very successful event, which brought together more than forty participants from fifteen different countries. Fifteen out of thirty contributions were accepted and presented in five oral sessions. These sessions where devoted to Classification & Communication in Cultural Heritage, 2D/3D Reconstruction, Cultural Tourism, Archaeological Applications, and Documentation from Multimedia. The EVA Vienna conference also hosted two successful workshops, one on “IT and Cultural Tourism” and the other on “Cultural Archives for Virtual Tourists”.

The success of the conference was due to the authors who have contributed their work to the symposium, to the dedicated work of the members of the program committee, and, finally, to the organizing committee. Following the tradition of all EVA conferences, the conference will not only impact on the current research of the readers but will also represent important archival material.

The EVA Vienna also featured an outstanding venue at the Austrian Academy of Sciences and a well organized social program with trips to Cultural Heritage sites in Bratislava and the castle of Schönbrunn.

The next TC19-EVA conference is planned in 2008.

.

Proceedings of EVA Vienna 2006 have been published in the book series of the

Austrian Computer Society (OCG), volume 211

(www.ocg.at/publikationen/books/volumes/sr211.html)

Conference Planner

*NOTE: This is not an exhaustive list of conferences. It is a list of conferences sponsored or endorsed by IAPR plus additional conferences that have been brought to the attention of the editor (these non-IAPR events are denoted with an *). The IAPR web site has more up-to-date information about IAPR conferences and a link to USC's Institute for Robotics and Intelligent Systems list of Computer Vision Conferences (L. O'Gorman, ed.)*

2006			
IWFHR 10	*10th International Workshop on Frontiers in Handwriting Recognition*	La Baule, France	23-26 Oct 06
DGCI 06	*Discrete Geometry for Computer Imagery*	Szeged, Hungary	25-27 Oct 06
CIARP 2006	*11th Iberoamerican Congress on Pattern Recognition*	Cancun, Mexico	14-17 Nov 06
AVSS 2006*	*IEEE International Conference on Advanced Video and Signal-based Surveillance*	Sydney, NSW, Australia	22-24 Nov 06
2007			
AND 2007	*Workshop on Analytics for Noisy Unstructured Text Data Held at: IJCAI 2007 International Joint Conference on AI*	Hyderabad, India	6-8 Jan 07
ICVS 2007	*International Conference on Computer Vision Systems*	Bielefeld University, Germany	21-24 Mar 07
SPIE07 DS36*	*Biometric Technology for Human Identification IV (DS36)* Part of the *SPIE Int'l Defense and Security Symposium*	Orlando, Florida, USA	9-13 Apr 07
MVA 2007	*10th IAPR International Conference on Machine Vision Applications*	Tokyo, Japan	16-18 May 07
PRIP 2007	*9th International Conference on Pattern Recognition and Information Processing*	Minsk, Belarus	22–24 May 07
MLDM 2007	*5th IAPR International Conference on Machine Learning and Data Mining*	Leipzig, Germany	4-6 July 07
SCIA 2007	*15th Scandinavian Conference on Image Analysis*	Aalborg, Denmark	10-13 Jun 07
GbR2007	*6th IAPR-TC15 Workshop on Graph-based Representations*	Alicante, Spain	11-13 Jun 07
AIPR-2007*	*2007 International Conference on Artificial Intelligence and Pattern Recognition*	Orlando, Florida, USA	9-12 Jul 07
CIVR 2007	*6th International Conference on Image and Video Retrieval*	Amsterdam, Netherlands	18-20 Jul 07
CAIP 07	*12th International Conference on Computer Analysis of Images and Patterns*	Vienna, Austria	27-29 Aug 07
ICB2007*	*2nd International Conference on Biometrics*	Seoul, Korea	27-29 Aug 07
ICIAP 2007	*14th International Conference on Image Analysis and Processing*	Modena, Italy	10-14 Sep 07
ICDAR 2007	*9th International Conference on Document Analysis and Recognition*	Curitiba, Parana, Brazil	23-26 Sep 07
PRIB 2007	*2007 IAPR International Workshop on Pattern Recognition in Bioinformatics*	Singapore	1-2 Oct 07
2008			
ICPR 08	*19th International Conference on Pattern Recognition*	Tampa, Florida, USA	8-11 Dec 08

Highlighting indicates that paper submission deadline has not yet passed.