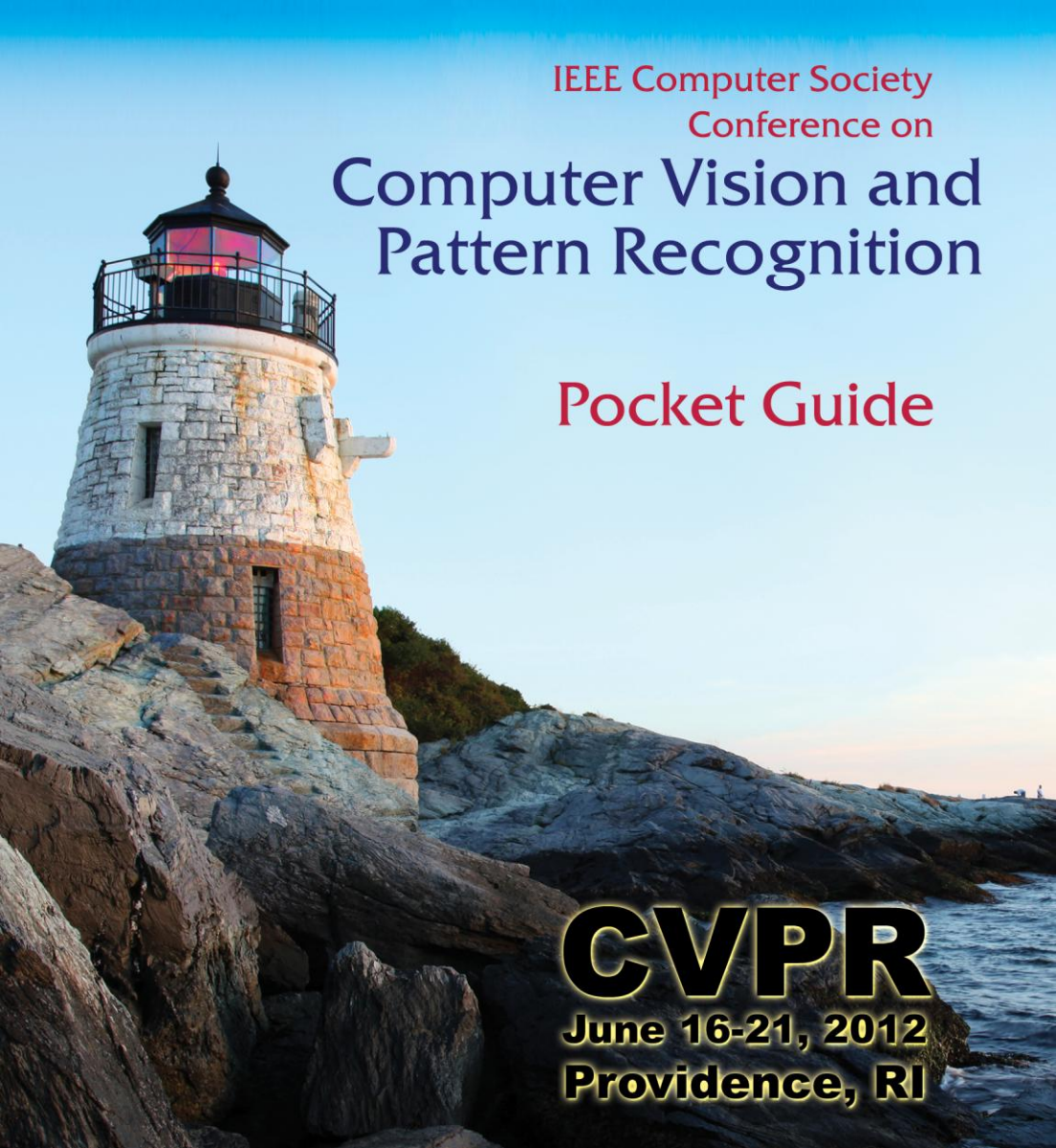
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# Message from the General and Program Chairs

Welcome to CVPR 2012 in Providence, Rhode Island. We received 1933 completed submissions to the conference, a substantial increase over the previous year. To select papers from these submissions, we invited 45 well-known vision researchers to act as Areas Chairs (ACs) and recruited an expert team of 935 reviewers from the broader computer vision community. Recognizing the crucial importance of qualified reviewers to the review and decision process, the initially compiled reviewer pool was first vetted by the Program Chairs through cross-checking a reviewer's recent publications in a number of major computer vision related conferences and journals, and then augmented by additional reviewers recommended by the ACs. We again used the CMT conference management service sponsored by Microsoft Research to manage the submission and selection of papers from beginning to end.

After the submission deadline, the papers were distributed between the ACs for the first time using an automated assignment system, the Toronto Paper Matching System. This system, based on the optimization method of Charlin et al. UAI 2011, suggests matches between papers and reviewers (ACs, in our case) based on bag-of-words descriptors extracted from the PDF files of submitted manuscripts and representative publications by each potential reviewer. The ACs in turn identified potential (and non-conflicted) reviewers for each of their assigned papers, from which the CMT system automatically selected three reviewers per paper. Extensive manual adjustments were made by the ACs and Program Chairs to achieve better matches between the papers and reviewers under the workload constraints. Reviewers were given seven weeks to complete their reviews, at which time the ACs stepped back in to finish their work: consolidating reviews and author rebuttals, initiating discussions for clarification, and making recommendations for decisions on papers. The Program Chairs and the ACs worked extremely hard to ensure that every paper eligible for full review received at least three reviews.

The decision process was designed to ensure that every paper and its reviews and author rebuttal were looked at by at least two ACs. To further support a thorough review process, at the AC Meeting in Long Beach, CA, we divided the ACs into four panels, with almost no conflict between the ACs and papers associated with each panel. The Program Chairs served as the panel chairs and worked hard to maintain consistency between the panels. All decisions were made by at least two ACs working together and, as needed, by the whole panel. A consensus of the entire panel was sought on the most difficult cases. The ACs produced detailed consolidation reports to justify all decisions. The Program Chairs and General Chairs did not submit any papers to CVPR 2012, allowing them to work without any direct conflicts throughout the review process. Additionally, the respective panel chairs were excluded from any decisions associated with papers from their affiliated institutions. The double-blind nature of the CVPR review process was strictly maintained throughout the review process.

The ACs accepted 48 papers as orals (2.5%) and 418 papers as posters (21.6%), with an overall acceptance rate of 24.1%. There was no prior constraint, either on the number of orals or posters.

We are publishing the proceedings in USB drive form. All published papers in the main conference and associated workshops will be indexed by the IEEE, and available through the IEEE Digital Library.

We wish to thank the other members of the Organizing Committee, the Area Chairs, Reviewers, Authors, and the CMT team for the immense amount of hard work and professionalism that has gone in to making CVPR 2012. Our thanks also go to the organizers of previous CVPRs for their helpful advice and support. Finally, we wish all the delegates a highly stimulating, informative, and enjoyable conference.

# Organizing Committee and Outstanding Reviewers

**CVPR 2012 Organizing Committee**

| | |
|---|---|
| General Chairs: | Rama Chellappa<br>Benjamin Kimia<br>Song Chun Zhu |
| Program Chairs: | Serge Belongie<br>Andrew Blake<br>Jiebo Luo<br>Alan Yuille |
| Workshops Chairs: | Anthony Hoogs<br>Ying Wu |
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Zhuowen Tu
Matthew Turk
Nuno Vasconcelos
Yair Weiss
Ying Wu
Dong Xu
Shuicheng Yan

**Outstanding Reviewers**

We are pleased to recognize the following researchers as "Outstanding Reviewers for CVPR 2012". These reviewers were selected from over 900 reviewers for their hard work in providing detailed reviews for the papers assigned to them. These reviewers were identified by one or more of the CVPR Area Chairs, who found their reviews of high quality. Review load was also accounted for in this decision (reviewers with low review loads were discounted).

**The CVPR 2012 Outstanding Reviewers:**

Sameer Agarwal
Roland Angst
Marni Bartlett
Christopher Brown
Dima Damen
Lixin Duan
Alexei Efros
Olof Enqvist
Vittorio Ferrari
Sanja Fidler

**The CVPR 2012 Outstanding Reviewers (continued):**

Mario Fritz
Stephen Gould
Abhinav Gupta
James Hays
Herve Jegou
George Kamberov
Edward Kim
Neeraj Kumar
Svetlana Lazebnik
Bastian Leibe
David Lowe
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Bjorn Stenger
Joost van de Weijer
Andrea Vedaldi
Jing Xiao

# Saturday, June 16

**0730–1730 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0830 Breakfast** (Prefunction/Rotunda)

**1230–1330 Box Lunch** (Prefunction, Rotunda, 4th Floor Lobby/Café)

## Embedded Vision Workshop

**Organizers:** Andrew Hunter
Ahmed Nabil Belbachir
Margrit Gelautz
Branislav Kisacanin

**Location:** Ballroom B

**Schedule:** Full Day

0830 **Welcome Message**

0835 **Keynote Talk:** Trends, Challenges and Opportunities in Embedded Vision, *Jeff Bier (President of BDTI and founder of the Embedded Vision Alliance)*

**S1: Smart Cameras (0920–1000)**

0920 Single-view Obstacle Detection for Smart Back-up Camera Systems, *Jeff Lalonde, Robert Laganière, Luc Martel*

0940 HighHigh-Speed Line-Scan Camera with Multi-Line CMOS Color Sensor, *Ernst Bodenstorfer, Ylber Hasani, Johannes Fürtler, Jörg Brodersen, Konrad J. Mayer*

**1000 Morning Break**

**S2: Reconfigurable Computing for Computer Vision (1030–1110)**

1030 Stereo Vision Embedded System for Augmented Reality, *Eduardo Gudis, Gooitzen van der Wal, Sujit Kuthirummal, Sek Chai, Supun Samarasekera, Rakesh Kumar, Vlad Branzoi*

1050 Feature Detection and Matching on an SIMD/MIMD Hybrid Embedded Processor, *Alejandro Nieto, David López Vilariño, Víctor M. Brea*

**S3: Detecting & Tracking Humans (1110–1230)**

1110 Head-tracking Virtual 3-D Display for Mobile Devices, *Miguel Bordallo López, Jari Hannuksela, Olli Silvén, Lixin Fan*

1130 Spatiotemporal Multiple Persons Tracking Using Dynamic Vision Sensor, *Ewa Piątkowska, Ahmed Nabil Belbachir, Stephan Schraml, Margrit Gelautz*

1150 SURF Cascade Face Detection Acceleration on Sandy Bridge Processor, *Eric Li, Liu Yang, Bin Wang, Jianguo Li, Ya-ti Peng*

1210 Real-time Body Motion Analysis For Dance Pattern Recognition, *Bernhard Kohn, Aneta Nowakowska, Ahmed Nabil Belbachir*

**1230 Lunch Break**

**S4: Embedded Vision for Safety & Security (1330–1445)**

1330 Embedded Smart Sensor for Outdoor Parking Lot Lighting Control, *Zhong Zhang, Amit Mistry, Weihong Yin, Péter L. Venetianer*

1350 Embedded Fall Detection with a Neural Network and Bio-Inspired Stereo Vision, *Martin Humenberger, Stephan Schraml, Christoph Sulzbachner, Ahmed Nabil Belbachir, Ágoston Srp, Ferenc Vajda*

**S5: Posters — Technologies & Applications (1410–1500)**

– A GPU Accelerated Fast Directional Chamfer Matching Algorithm and a Detailed Comparison with a Highly Optimized CPU Implementation, *Michael Rauter, David Schreiber*

- Event-driven Embodied System for Feature Extraction and Object Recognition in Robotic Applications, *Georg Wiesmann, Stephan Schraml, Martin Litzenberger, Ahmed Nabil Belbachir, Chiara Bartolozzi, Michael Hofstätter*
- A CPU-GPU Hybrid People Counting System for Real-World Airport Scenarios using Arbitrary Oblique View Cameras, *David Schreiber, Michael Rauter*

1500 **Afternoon Break**

**S6: Invited Talks 1—Vision Technology & Programs (1530–1640)**

1530 Vision Processing in Extreme Low Light and High Motion Environments, *Sek Chai (SRI)*

1605 DARPA's Mind's Eye Program: The Way Ahead for Visual Intelligence, *James Donlon (DARPA)*

**S7: Invited Talks 2—Automotive Safety & Challenges (1640–1750)**

1640 Embedded Computer Vision for Safety and Security: an FPGA-based Perspective, *Vittorio Murino (Italian Institute of Technology)*

1715 The Challenge of Putting Vision Algorithms into a Car, *Fridtjof Stein (Daimler)*

1750 **Paper Award & Closing Remarks**

## 3D Cinematography

**Organizers:** Remi Ronfard
Gabriel Taubin

**Location:** Ballroom C

**Schedule:** Full Day

0830 **Welcome & Opening Remarks**

0900 Keystone Correction for Stereoscopic Cinematography, *Feng Liu, Yuzhen Niu, Hailin Jin*

0930 Perceptual Based Stereoscopic Content Analysis using Salient Information, Dense Disparity Maps, and Modified Random Walk Framework, *Wei-Jia Huang, An-Chun Luo, Wen-Chao Chen, Wei-Hao Huang*

1000 2D-to-3D Image Conversion by Learning Depth from Examples, *Janusz Konrad, Meng Wang, Prakash Ishwar*

**1030 Morning Break**

1100 **Keynote Talk:** Holographic Video and How it Might Become Part of the 3D Ecosystem, *Michael Bove (Media Lab, MIT)*

**1200 Lunch Break**

1300 **Keynote Talk:** Monoscopic to Stereoscopic Video Conversion of YouTube Videos, *Debargha Mukherjee and Chen Wu (Google, Inc.)*

1400 The Measurement of Eyestrain Caused from Diverse Binocular Disparities, Viewing Time and Display Sizes in Watching Stereoscopic 3D Contents, *Sang-Hyun Cho, Hang-Bong Kang*

1430 Calibration for High-Definition Camera Rigs with Marker Chessboard, *Jianhui Chen, Karim Benzeroual, Robert S. Allison*

1500 Capture Considerations for Multiview Panoramic Cameras, *Harlyn Baker, Gregorij Kurillo, Zeyu Li, Q Luong, Constantin Papadas*

1530 3D Display Size Matters: Compensating for the Perceptual Effects of S3D Display Scaling , *Karim Benzeroual, Robert S. Allison, Laurie M. Wilcox*

**1600 Afternoon Break**

1630 **Invited Talk:** On the Causes and Consequences of Monocular Regions in Stereoscopic 3D Footage, *Laurie M. Wilcox (Centre for Vision Research, York Univ.)*

1700 **Invited Talk:** Stereoscopic 3D Video Monitoring and Correction: From Lab to Air, *Frederic Devernay (INRIA/LIG)*

1730 **Invited Talk:** Omnistereo Cinema: Capture, Display and Perception, *Vincent Couture, Michael S. Langer, Sébastien Roy (Montreal Univ.)*

1800 **Closing Remarks**

## Perceptual Organization in Computer Vision

**Organizers:** Charless Fowlkes
Iasonas Kokkinos

**Location:** 552-A

**Schedule:** Full Day

0830 Probabilistic Tensor Voting for Robust Perceptual Grouping, *Dian Gong, Gérard Medioni*

0850 On Evaluating Methods for Recovering Image Curve Fragments, *Yuliang Guo, Benjamin Kimia*

0910 **Invited Talk:** TBA, *Ronen Basri (Weizmann Institute of Science)*

**1000 Morning Break**

1030 PartBook for Image Parsing, *Kuiyuan Yang, Lei Zhang, Yong Rui, Hong-Jiang Zhang*

1050 **Invited Talk:** TBA, *Pedro Felzenszwalb (Brown Univ.)*

1140 **Invited Talk:** TBA, *Kristin Grauman (Univ. of Texas at Austin)*

**1230 Lunch Break**

1330 **Invited Talk:** TBA, *Jitendra Malik (Univ. of California at Berkeley)*

1420 Nonparametric Discovery of Activity Patterns from Video Collections, *Michael C. Hughes, Erik B. Sudderth*

1440 A Grammar for Hierarchical Object Descriptions in Logic Programs, *Toufiq Parag, Claus Bahlmann, Vinay Shet, Maneesh Singh*

**1500 Afternoon Break**

1530 The Differential Geometry of Shape from Shading: Biology Reveals Curvature Structure, *Benjamin Kunsberg, Steven W. Zucker*

1550 To Complete or Not to Complete: Gap Completion in Real Images, *Maruthi Narayanan, Benjamin Kimia*

1610 **Closing Discussion**

## Computer Vision for Computer Games

**Organizers:** Vasileios Argyriou
Oriel Bergig
Ioannis Kakadiaris
Vincent Leptit
Maria Petrou
Stefanos Zafeiriou

**Location:** 552-B

**Schedule:** Half Day (Afternoon)

1330 **Invited Talk:** Learning to Interact with Humans, *Pushmeet Kohli (Microsoft Research)*

1415 **Invited Talk:** The Third Dimension of Face Recognition: A Perspective on Promises and Challenges, *Ioannis A. Kakadiaris (Univ. of Houston)*

**1500 Afternoon Break**

1530 Gamesourcing to Acquire Labeled Human Pose Estimation Data, *Richard Souvenir, Ayman Hajja, Scott Spurlock*

1550 G3D: A Gaming Action Dataset and Real Time Action Recognition Evaluation Framework, *Victoria Bloom, Dimitrios Makris, Vasileios Argyriou*

1610 Computer Vision Based Assessment of Hand-Eye Coordination in Young Gamers: A Baseline Approach, *Jeremy Svendsen, Trevor Beugeling, Alexandra Branzan-Albu*

1630 Reinforcement Learning based Visual Attention with Application to Face Detection, *Ben Goodrich, Itamar Arel*

## Point Cloud Processing

**Organizers:** Martial Hebert
Florent Lafarge
Philippos Mordohai

**Location:** 556-A

**Schedule:** Full Day

0850 **Welcome Message**

**Oral Session 1 (0900–1000)**

0900 Online Facade Reconstruction from Dominant Frequencies in Structured Point Clouds, *Sam Friedman, Ioannis Stamos*

0920 Road Network Extraction from Airborne LiDAR Data using Scene Context, *Jiaping Zhao, Suya You*

0940 Detection of Windows in Point Clouds of Urban Scenes, *Agis Mesolongitis, Ioannis Stamos*

**1000 Morning Break**

1025 **Keynote Talk:** Urban and Architectural Reconstruction: Computational Geometry Can Help, *Jean-Philippe Pons (Acute3D)*

**Oral Session 2 (1110–1210)**

1110 Shape Matching of Repeatable Interest Segments in 3D Point Clouds , *Joseph Lam, Michael Greenspan*

1130 Automatic Registration of Mobile LiDAR and Spherical Panoramas, *Ruisheng Wang, Frank P. Ferrie, Jane Macfarlane*

1150 Point Cloud Matching Based on 3D Self-Similarity, *Jing Huang, Suya You*

**Poster & Demo Spotlights (1210–1230)**

**1230 Lunch Break**

**Oral Session 3 (1330–1410)**

1330 Simultaneous Image Segmentation and 3D Plane Fitting for RGB-D Sensors - An Iterative Framework, *Li Guan, Ting Yu, Peter Tu, Ser-Nam Lim*

1350 3D Landmark Model Discovery from a Registered Set of Organic Shapes, *Clement Creusot, Nick Pears, Jim Austin*

1415 **Keynote Talk:** Cloud Museum and e-Heritage, *Katsushi Ikeuchi (Univ. of Tokyo)*

**1500 Afternoon Break**

**Oral Session 4 (1530–1610)**

1530 Filling Large Holes in LiDAR Data By Inpainting Depth Gradients, *David Doria, Richard J. Radke*

1550 Similarity Based Filtering of Point Clouds, *Julie Digne*

1610 **Keynote Talk:** Advanced 3D Image Processing with Point Cloud Library, *Radu B. Rusu, Michael Dixon, Suat Gedikli, Patrick Mihelich (Willow Garage)*

**Posters & Demos (1655–1830)**

- Urban and Architectural Reconstruction: Computational Geometry Can Help, *Jean-Philippe Pons*
- PCL and ParaView—Connecting the Dots, *Patrick Marion, Roland Kwitt, Brad Davis, Michael Gschwandtner*
- Ascending Stairway Modeling Live Demo: Toward Autonomous Multi-floor Exploration, *Jeffrey Delmerico, Jason Corso, David Baran, Philip David, Julian Ryde*
- Real-time Quadric Fitting for Point Cloud Parameterization using Particle Convergence, *Karthik Mahesh Varadarajan, Markus Vincze*
- Shape Estimation from 3D Point Clouds, *Jingyong Su, Anuj Srivastava, Fred Huffer*
- The Difference of Normals as a Scale Operator in 3D Point Clouds, *Yani Ioannou, Babak Taati, Robin Harrap, Michael Greenspan*
- Online scene analysis from streaming Lidar, *Hanzhang Hu, Daniel Munoz, J. Andrew Bagnell, Martial Hebert*
- Sparse Scene Flow Segmentation for Object Detection and Tracking on the KITTI Vision Dataset, *Philip Lenz, Andreas Geiger, Christoph Stiller, Raquel Urtasun*
- Interactive Segmentation, Tracking, and Kinematic Modeling of Unknown Articulated Objects, *Dov Katz, Moslem Kazemi, J. Andrew Bagnell, Anthony Stentz*
- The KITTI Vision Dataset, *Andreas Geiger, Philip Lenz, Christoph Stiller, Raquel Urtasun*

## Change Detection Workshop

**Organizers:** Pierre-Marc Jodoin
Fatih Porikli
Janusz Konrad
Prakash Ishwar

**Location:** 556-B

**Schedule:** Full Day

0900 changedetection.net: A New Change Detection Benchmarking Dataset, *Nil Goyette, Pierre Jodoin, Fatih Porikli, Janusz Konrad, Prakash Ishwar*

0925 Background Segmentation with Feedback: The Pixel-Based Adaptive Segmenter, *Martin Hofmann, Philipp Tiefenbacher, Gerhard Rigoll*

0950 Learning a Background Model for Change Detection, *Ashutosh Morde, Xiang Ma, Sadiye Guler*

**1015 Morning Break**

1045 The SOBS Algorithm: What are the Limits?, *Lucia Maddalena, Alfredo Petrosino*

1110 Improving Foreground Segmentations with Probabilistic Superpixel Markov Random Fields, *Alexander Schick, Martin Bäuml, Rainer Stiefelhagen*

1135 Background Subtraction: Experiments and Improvements for ViBe, *Marc Van Droogenbroeck, Olivier Paquot*

**1200 Lunch Break**

1300 Evaluation Report of Integrated Background Modeling Based on Spatio-temporal Features, *Yosuke Nonaka, Atsushi Shimada, Hajime Nagahara, Rin-ichiro Taniguchi*

1325 **Invited Talk:** TBA, *Chris Stauffer (BAE Systems)*

1350 **Invited Talk:** TBA, *Hongcheng Wang (United Technologies Research Center)*

1425 **Panel Discussion**

## Large-Scale Image Retrieval and Classification

**Organizers:** Florent Perronnin
Hervé Jégou

**Time:** 0830-1230 (Half Day-Morning)

**Location:** 551-A

**Description:** The first half of the course will focus on large-scale image retrieval and will first introduce the typical use-cases and the datasets used for evaluation. We will present different classes of techniques considering different trade-offs with respect to efficiency and search quality. Starting with the most costly but precise patch-based matching and spatial verification techniques, we will present the bag-of-words model, its matching interpretation and several improvements, including re-ranking techniques based on spatial verification and query expansion. Finally, the most scalable techniques based on aggregation and compressed-domain search will be detailed.

The second half of the course will focus on large-scale image classification and we will first review the standard image classification pipeline, based on the bag-of-words histogram and non-linear kernel machines, and underline its limitations when considering large-scale datasets such as ImageNet. We will then explain how to scale to a large number of samples and classes. We will present learning algorithms made scalable by the use of explicit data embedding techniques and efficient linear classifier training. As the larger number of classes requires to incorporate fine-grained information in the image description, we will introduce recent local descriptor aggregation techniques which provide rich discriminative information and yet are cheap to compute. We will also explain how to address a large number of classes at test time with class hierarchies. We will show how one can easily scale to millions of images and thousands of categories by leveraging the previously described algorithms.

As large-scale image retrieval and classification have much in common, a particular attention will be given to the shared methodologies involved in these tasks. The commonalities and differences will be highlighted. We will show for instance how features, such as the Fisher vector, which were first introduced in the context of classification, are applied to large-scale retrieval. Similarly, compressions techniques originally designed for approximate search and image indexing are now used in combination with max-margin classifiers for large-scale classification.

## Compressive Sensing for Videos

**Organizer:** Ashok Veeraraghavan
Richard G. Baraniuk
Aswin C. Sankaranarayanan

**Time:** 1330-1700 (Half Day-Afternoon)

**Location:** 551-A

**Description:** We are on the throes of a "data crisis". We are building sensors of increasing capabilities—be it of resolution, frame rate or dimensions. Simultaneously, large scale deployment of such sensors are being increasingly common. Traditional models for sensors do not extend easily to such scenarios. This is especially relevant in the context of high speed imaging and multi-spectral imaging. We need a scalable theory of sensing. One such theory is that of compressed sensing.

In this course, we will present an extensive overview of computational imaging, and compressive sensing techniques while providing key ideas and insights into their workings. The participants will learn about topics related to computer vision, computational photography and compressive sensing. We hope to provide enough fundamentals to satisfy the technical specialist as well as tools/softwares to aid graphics and vision researchers, including graduate students.

## Domain Transfer Learning for Vision Applications

**Organizers:** Dong Xu
Kate Saenko
Ivor Tsang

**Time:** 0830-1230 (Half Day-Morning)

**Location:** 551-B

**Description:** Domain transfer learning (cross-domain learning or domain adaptation) is an emerging research topic in computer vision. In some vision applications, the (target) domain of interest contains very few labeled samples, while an existing (auxiliary) domain is often available with a large number of labeled examples. For example, millions of loosely labeled Flickr photos or YouTube videos can be readily obtained by using keywords (or tags) based search. On the other hand, some users are more interested in organizing their own multimedia collections of images and videos which they are reluctant to annotate by themselves.

It is well-known that the feature distributions of samples from different domains (e.g., web and consumer) may differ tremendously in terms of statistical properties (such as mean, intra-class/inter-class variance). Recently, domain transfer learning methods have been developed to cope with the considerable variation in feature distributions between different domains. While domain transfer learning has been studied for years in other fields (e.g., sentiment classification, natural language processing and text categorization), it is still an emerging research topic in computer vision. Therefore, this tutorial hs two specific objectives: 1) review and summarize the recent transfer learning methods (with a focus on the methods developed specifically for vision applications); 2) present insight into the challenges and future directions in this area.

In our half day tutorial, we plan to introduce the important general concepts and themes of this timely topic which are of interest to the general vision audience. We expect the number of participants to be 80 to 100. The course materials are mainly from the recent publications and some of the major publications from the organizers and other research groups are listed at the end of the proposal.

Tentative topics include:

- Introduction of transfer learning and its applications in vision (e.g., cross-domain transfer, cross-dataset transfer and cross-knowledge transfer)
- Basic theory (e.g., sample selection bias, covariate shift, different distance measures for measuring distribution mismatch, predictive distribution matching, and generalization bounds for domain adaptation)
- Algorithms:
  - Feature-based approaches (e.g., Feature Replication, Maximum Mean Discrepancy Embedding, and Transfer Component Analysis)
  - Classifier-based approaches (e.g., Adaptive SVM and Domain Adaptation Machine for multiple source domain adaptation)
  - MKL-based approaches (e.g., Domain Transfer MKL and Adaptive MKL)
  - Distance-based approaches (e.g., [13])
  - Transform-based approaches (e.g., Asymmetric Nonlinear Transforms [14])
  - Unsupervised approaches (e.g., [16] and kernel mean matching)
  - Cross-knowledge transfer approaches
- Challenges and Future Directions
  - Negative transfer
  - Domain selection in multiple source domain adaptation
  - Heterogeneous Domain Adaptation

## Multiview Feature Learning

**Organizer:** Roland Memisevic

**Time:** 1330-1700 (Half Day-Afternoon)

**Location:** 551-B

**Description:** In many vision tasks, good performance is all about the right representation. Learning of image features (Sparse Coding, Dictionary Learning, or Deep Learning) has thus become a common approach in tasks like recognition.

Standard feature learning works well on static images, but many computer vision tasks go beyond these: Problems like motion and action understanding, stereo vision, invariant recognition, and others, do not come in the form of unordered, static images. Instead, in these tasks, the relationship between images that carries the relevant information.

Recently, higher-order sparse coding models have emerged which try to address this issue by learning codes that represent relationships instead of just the content of images. Interestingly, some of these models are currently the best performing methods in action and motion recognition tasks, and they are increasingly used in similar tasks where relations are of interest, such as learning invariances and modeling analogical reasoning. Most of these models were introduced independently and from various different perspectives, but they are all based on the same core idea: Sparse codes can act like "gates", that modulate the connections between the other variables in a model. This allows them to dynamically represent changes inherent in an image sequence, turning model parameters into "stereo", "mapping" or "spatio-temporal" features. Higher-order feature learning models are closely related to biologically inspired models of complex cells known as "energy models".

The tutorial will show how higher order features allow us to learn to relate images. It will discuss efficient learning and inference methods and recent applications in a variety of domains. Illustrations with code from freely available software packages will be used to help build intuition and get a practical understanding of the methods.

The tutorial will also discuss in some detail the connections to biological models of complex cells as well as to multi-layer feature learning and deep learning methods.

## All You Want to Know About Gaussian Processes

**Organizer:** Raquel Urtasun
Neil Lawrence

**Time:** 0830-1700 (Full Day)

**Location:** 555-A

**Description:** This tutorial provides the theoretical background for a good understanding of Gaussian processes and illustrates the applications where Gaussian processes have been shown to work well; in some cases outperforming the state-of-the-art. The target audience ranges from experts in the field to undergraduate students interested in enlarging their understanding of machine learning tools and Bayesian statistics. In terms of basic understanding of Gaussian processes, we will cover the following topics: We will introduce Gaussian processes starting with parametric models and generalized linear models. We will further show how basis functions can be increased in number to lead to non parametric regression models. An overview of how prediction with Gaussian processes is formed through conditioning in a joint Gaussian density will then be provided. We will then demonstrate how covariance parameters can be learned and what is the role of the log determinant in the likelihood. Gaussian processes have a natural trade-off between data fit and regularization, we will explain where this come from. We will then extend Gaussian processes from the Gaussian noise model, and show how to deal with non Gaussian likelihood models including likelihoods for classification. Finally, we will show how to make Gaussian process models computationally efficient. The usefulness of these processes will be demonstrated in a wide variety of vision related applications including pose estimation and object recognition. The second part of the tutorial will focus on how to use Gaussian processes to perform manifold modeling. In particular, we will review the Gaussian process latent variable model (GPLVM) as well as its variants that incorporate prior knowledge in the form of dynamics, labels, topologies and physical constraints. We will finish by discussing mechanistic models with incorporated latent forces and show a wide range of applications of these latent variable models including character animation, articulated tracking as well as deformable surface estimation. In summary, the tutorial is composed of the following subjects:

- Parametric models and Bayesian treatments.
- Introduction to Gaussian processes through non parametric models.
- Non parametric modelling of functions using Gaussian processes.
- Extending beyond Gaussian noise models: classification and robust regression.
- Applications of Gaussian processes: object recognition, pose estimation.
- Manifold Modelling with Gaussian Processes: GPLVM
- Incorporating prior knowledge: dynamics, labels, topology, physical constraints.
- Mechanistic Models using Gaussian Processes
- Applications of GPLVM: recognition, animation, tracking of humans and deformable surfaces.

## Stochastic Image Grammars for Object, Scence and Event Understanding

**Organizers:** Song-Chun Zhu
Ales Leonardis
Sinisa Todorovic

**Time:** 0830-1730 (Full Day)

**Location:** 555-B

**Description:** Stochastic image grammar (SIG) is a general theoretical framework that includes hierarchical representations of objects, events, and their spatiotemporal contexts, as well as associated learning and inference algorithms. In comparison with other alternative frameworks, SIG has been demonstrated as competitive, and often superior, in terms of accuracy, learnability and scalability, for answering the "What/Who" and "Where/When" queries. SIG has also been successfully used for formalizing additional types of reasoning, including causality ("Why"), and synthesis (e.g., prediction and postdiction). Importantly, unlike alternatives, SIG provides a unified framework for addressing all these diverse vision problems.

Computer vision experiences a resurgence of SIGs in recent years, e.g., AND-OR graphs, sum-product networks, Markov logic networks, and deep learning. This momentum is, in part, due to two successful workshops–SIG-09 and SIG-11–aimed at formulating a unified theoretical framework of SIGs, and demonstrating their merit in computer vision.

SIGs, however, have not reached their full potential in vision, due to a number of reasons. First, it seems that there is a disconnect between current progress and previous work. Researchers who are new to SIGs tend to "re-invent the wheel," at almost all levels of formalism, from introducing new terms for already established concepts to re-deriving old theoretical results. Second, the SIG subcommunity has thus far provided relatively poor research infrastructure, in terms of teaching material, open-source code, implementation documentation, datasets, and standardized evaluation methodologies. Such an infrastructure is instrumental for ensuring continued progress, and a broader involvement of both experts and beginners in the SIG-related research.

We view CVPR 2012 as a great opportunity to organize a full-day short course on SIGs. The course will be aimed at addressing the above issues by:

- Providing lectures, slides, and other teaching material on the key theoretical foundations of SIGs,
- Presenting live demos of our software for SIG-based object and activity recognition, with a focus on answering "What/Who", "Where/When" and "Why" queries,
- Establishing a solid infrastructure for research on SIGs in terms of a designated website for sharing open-source code, datasets, evaluation methodologies, presentations, and technical reports.

# Sunday, June 17

**0730–1730 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0830 Breakfast** (Prefunction/Rotunda)

**1230–1330 Lunch** (Prefunction, Rotunda, 4th Floor Lobby/Café)

## Egocentric Vision

**Organizers:** James M. Rehg
Deva Ramanan
Xiaofeng Ren
Alireza Fathi
Hamed Pirsiavash

**Location:** 552-A

**Schedule:** Full day

0850 **Welcome and Opening Remarks**

0900 **Keynote Talk:** TBA, *Takeo Kanade (Carnegie Mellon Univ.)*

**1000 Morning Break**

1015 Coupling Eye-Motion and Ego-Motion Features for First-Person Activity Recognition, *Keisuke Ogaki, Kris M. Kitani, Yusuke Sugano, Yoichi Sato*

1035 Detecting Activities of Daily Living in First-person Camera Views, *Hamed Pirsiavash, Deva Ramanan*

1055 The Accuracy-Obtrusiveness Tradeoff for Wearable Vision Platforms, *David S. Hayden, Carl Vondrick, Stella X. Jia, Yafim Landa, Robert C. Miller, Antonio Torralba, Seth Teller*

1115 **Keynote Talk:** TBA, *Chen Yu (Indiana Univ.)*

**1215 Lunch Break**

1330 **Keynote Talk:** TBA, *Hartmut Neven (Google)*

**1430 Poster Session & Afternoon Break**

- Wearable Omnidirectional Vision System for Personal Localization and Guidance, *Ana C. Murillo, Daniel Gutiérrez-Gómez, Alejandro Rituerto, Luis Puig, Josechu J. Guerrero*
- Consistency Analysis and Improvement for Single-camera Localization, *Joel A. Hesch, Stergios I. Roumeliotis*
- Adaptive Object Tracking by Learning Background Context, *Ali Borji, Simone Frintrop, Dicky N. Sihite, Laurent Itti*
- Inside Out Camera for Acquiring 3D Gaze Points, *Hironobu Fujiyoshi, Yuto Goto, Makoto Kimura*
- Gaze Guided Object Segmentation in Egocentric Video, *Yin Li, Alireza Fathi, Zhefan Ye, James M. Rehg*
- Mutual Gaze Detection in Egocentric Video, *Zhefan Ye, Yin Li, Alireza Fathi, James M. Rehg*
- Object Discovery from First Person's View, *Hongwen Kang, Martial Hebert, Takeo Kanade*
- Object Detection from First Person's View using Exemplar SVMs, *Abhinav Shrivastava, Alexei A. Efros, Abhinav Gupta*
- In the Sight of My Wearable Camera: Classifying My Visual Experience, *Alessandro Perina, Nebojsa Jojic*

1540 Novelty Detection in Wearable Vision System, *Omid Aghazadeh, Josephine Sullivan, Stefan Carlsson*

1600 Discovering Important People and Objects for Egocentric Video Summarization, *Yong Jae Lee, Joydeep Ghosh, Kristen Grauman*

1620 Learning to Recognize Daily Activities Using Attention, *Alireza Fathi, James M. Rehg*

1640 Capturing the Changing Statistics in Infant Visual Experience, *Caitlin M. Fausey, Swapnaa Jayaraman, Linda B. Smith*

1700 **Invited Talk:** Wearable Computing and Computer Vision Research at Intel China Labs, *Yimin Zhang (Intel China Research Center)*

1720 **Discussion & Panel**

## Gesture Recognition

**Organizers:** Isabelle Guyon
Vassilis Athitsos
Alex Kipman

**Location:** Ballroom B

**Schedule:** Full day

**Morning: Gesture Recognition — From Theory to Practice**

0800 **Welcome and Introduction,** *Alex Kipman (Microsoft)*

0820 Results of the ChaLearn Gesture Challenge, *Isabelle Guyon (Clopinet)*

0840 **Results of the Demonstration Competition,** *Vassilis Athitsos (Univ. of Texas at Arlington)*

0900 **Invited Talk:** Non-verbal Communication and Facial Expression, *Jeffrey Cohn (Univ. of Pittsburgh)*

0930 **Challenge Paper 1 (2nd Place):** TBA, *Peccect Team (Univ. of Pennsylvania)*

0950 **Challenge Paper 2 (3rd Place):** An HMM-Based Approach For Gesture Recognition Using Edge Features, *Eric Jackson (One Million Monkeys)*

1010 **Invited Talk:** Unsupervised and Weakly Supervised Discovery of Events for Human Sensing, *Fernando De la Torre (Carnegie Mellon Univ.)*

**1040 Morning Break**

1050 **Invited Talk:** Semiotic Analysis of Gestures, *Adam Kendon (Univ. of Pennsylvania)*

1120 **Challenge Paper 3:** One Shot Learning Gesture Recognition from RGBD Images, *Di Wu, Fan Zhu, Ling Shao (Univ. of Sheffield)*

1140 **Challenge Paper 4:** A Least Squares Regression Framework on Manifolds and its Application to Gesture Recognition, *Yui Man Lui (Colorado State Univ.)*

**1205 Lunch Break & Poster Session**

- Real-time Gesture Recognition using Bio Inspired 3D Vision Sensor, *Bernhard Kohn, Ahmed Nabil Belbachir, Aneta Nowakowska*
- A Temporal Bayesian Model for Classifying, Detecting and Localizing Activities in Video Sequences, *Manavender R. Malgireddy, Ifeoma Nwogu, Venu Govindaraju*
- Exploring Human Visual System: Study to Aid the Development of Automatic Facial Expression Recognition Framework, *Rizwan Ahmed Khan, Alexandre Meyer, Hubert Konik, Saida Bouakaz*
- Enhanced Continuous Sign Language Recognition using PCA and Neural Network Features, *Yannick L. Gweth, Christian Plahl, Hermann Ney*

**Afternoon: Gesture Recognition — From Practice to Applications**

1400 **Invited Talk:** Body Motion Detection and Understanding Using Both 2D and 3D Setups, *Takeo Kanade (Carnegie Mellon Univ.)*

1430 **Demonstration Competition (1st Place):** TBA

1450 **Demonstration Competition (2nd Place):** TBA

1510 **Invited Talk:** Estimating Human Poses in Images and Videos, *Deva Ramanan (Univ. of California at Irvine)*

**1540 Afternoon Break**

1550 **Invited Talk:** Gesture Recognition and Human Computer Interaction, *Thad Starner (Georgia Institute of Technology)*

1620 Magic Mirror: A Virtual Handbag Shopping System, *Lu Wang, Ryan Villamil, Supun Samarasekera, Rakesh Kumar*

1640 Gaze Estimation from Multimodal Kinect Data, *Kenneth Alberto Funes Mora, Jean-Marc Odobez*

1700 **Invited Talk:** Machine Learning for Low-latency Gesture Recognition: Issues in Data Acquisition and Labeling, *Sebastian Nowozin (Microsoft)*

1730 Randomized Decision Forests for Static and Dynamic Hand Shape Classification, *Cem Keskin, Furkan Kıraç, Yunus Emre Kara, Lale Akarun*

1750 **Concluding Remarks & Advertisement for Next Challenge**

## Vision Industry & Entrepreneur Workshop

**Organizers:** Sek Chai
Boaz Super
Himanshu Arora
Bernhard Rinner
Khanh Vo Duc

**Location:** Ballroom C

**Schedule:** Full day

0820 **Welcome Message**, *Sek Chai*

**S1: Invited Talks (0840–1000)**

0840 **Invited Talk:** Teaching Innovation and Entrepreneurship: Ten Lessons from the Trenches, *Terrance Boult (Securics & Univ. of Colorado at Colorado Springs)*

0920 **Invited Talk:** Venture Financing, *David Sardana (Motorola Solutions Venture Capital)*

**1000 Morning Break**

**S2: Computer Vision Companies & Organizations (1030–1230)**

1030 **Poster Spotlights** *(Session Chair: Himanshu Arora)*

1100 **Poster Session**

- ObjectVideo Intelligent Video Analytics, *Peter Venetianer*
- Embedded Vision Alliance, *Jeff Bier, Jeremy Giddings*
- InaPic Smart Albums, *Kaushal Solanki, Nitin Solanki*
- Immersive Labs: Adaptive Advertising for the Real World, *Stephen Moore, Akshay Chavan, Jason Sosa*
- Advanced Surveillance, *Sandra Mau, Abbas Bigdeli, Brian Lovell*
- CeeQ: Image-based Privacy and Reputation Management for Social Networks, *Sandra Mau, Abbas Bigdeli*
- kooaba: Large-scale Image Retrieval for Real-world Applications, *Till Quack, Christian Wengert*
- Cortically Coupled Computer Vision for Image Search, *Neophytos Neophytou, Michael A. Repucci, Daniel Rosenthal, Steven E. Barbaro, Barbara Hanna*
- Large Scale Computer Vision at eBay, *Anurag Bhardwaj, Wei Di, Raffay Hamid, Robinson Piramuthu, Neel Sundaresan*
- Oblong Industries: The Next Step in Interactive Spatial Operating Systems, *David Minnen*
- SRI Vision Technology in Consumer Electronics, *Sek Chai, David Zhang*
- Computer Vision for Enterprise and Public Safety at Motorola Solutions, *Yan Zhang, Boaz Super, Cuneyt Taskiran, Kevin O'Connell*
- Real-Time Stereo Vision for Reliable and Accurate 3D Measurement, *Martin Humenberger, Christian Zinner*
- PICTORRIA: Visual Recognition and Verification as a Service, *Mohsen Hejrati, Brian Reinhart, Mohammad Rastegari, Ramesh Jain*
- Computer Vision Central: A Web Destination for the Computer Vision Community, *Yu Wang, Boaz Super, Sek Chai*
- Real-Time 3D Gesture Control Based on Depth Estimation, *Ching-Chun Hsiao, Chi-Hao Wu, Po-Kuan Huang, Chao-Kang Liao*
- Tandent Vision Science, *Patrick Buehler*
- Cognex, *David Michael, Pat McMahon, Matthew Bauer*
- Automatic Video Content Training, QA, and Monitoring over Cloud Machines, *Ali Zandifar, Jonathan Dodson, Ben Reiter, Robert Impollonia, Michael Sullivan*

**1230 Lunch Break**

1330 **Poster Wrap-up**, *Boaz Super (Motorola Solutions)*

**S3: Invited Talks (1330–1500)**

1340 **Invited Talk:** Innovating in an Emerging Industry: The Opportunity and the Challenge, *Richard Friedhoff (Tandent Vision Science)*

1420 **Invited Talk:** Contract Research as an Engine for Innovation and Ventures, *Peter Burt (SRI International)*

**1500 Afternoon Break**

1530 **Invited Talk:** Imaging Ventures, *Ramesh Raskar (EyeNetra and MIT)*

**S4: Closing Events (1610–1740)**

1610 The State of the Computer Vision Industry, *Boaz Super (Motorola Solutions)*

1630 **Panel Discussion**: *Terrance Boult, David Sardana, Richard Friedhoff, Peter Burt, Ramesh Raskar. Moderator: Sek Chai*

1730 **Closing Remarks**

## Workshop on Camera Networks & Wide Area Scene Analysis

**Organizers:** Faisal Z. Qureshi
Amit K. Roy-Chowdhury
Bi Song

**Location:** 556-A

**Schedule:** Full day

0900 **Welcome**

0910 **Keynote 1:** Camera Network Computer Vision: Research vs. Reality, *Richard Radke (RPI)*

**1000 Morning Break**

1030 Manifold-based Fingerprinting for Target Identification, *Kang-Yu Ni, Terrell N. Mundhenk, Kyungnam Kim, Yuri Owechko*

1050 Object Browsing and Searching in A Camera Network using Graph Models, *Zefeng Ni, Jiejun Xu, B. Manjunath*

1110 Detecting and Tracking All Moving Objects inWide-Area Aerial Video, *Thomas Pollard, Matthew Antone*

1130 2D and 3D Visualization with Dual-Resolution for Surveillance, *Shen-Chi Chen, Chung-Yi Lee, Chih-Wei Lin, Iok-Long Chan, Yong-Sheng Chen, Sheng-Wen Shih, Yi-Ping Hung*

1150 Re-Identify people in wide area camera network, *Niki Martinel, Christian Micheloni*

**1210 Lunch Break**

1340 **Keynote 2:** Camera Networks and Wide Area Surveillance, *Mubarak Shah (Univ. of Central Florida)*

1430 Tracking Many Vehicles in Wide Area Aerial Surveillance, *Jan Prokaj, Xuemei Zhao, Gérard Medioni*

1450 Pixel-wise Motion Detection in Persistent Aerial Video Surveillance, *Grace Vesom*

1510 Using Scene Features to Improve Wide-Area Video Surveillance, *Ziyan Wu, Richard J. Radke*

1530 Resource-Aware Configuration in Smart Camera Networks, *Bernhard Rinner, Bernhard Dieber, Lukas Esterle, Peter R. Lewis, Xin Yao*

1550 **Concluding Remarks**

## Projector–Camera Systems

**Organizers:** Kari Pulli
Ivo Ihrke

**Location:** 552-B

**Schedule:** Full day

0850 **Opening Remarks**

0900 **Keynote Talk:** ProCams: Research. And beyond?, *Oliver Bimber (Johannes Kepler Univ. Linz)*

**1000 Morning Break**

**Paper Session 1 (1015–1100)**

1015 Shading Illusion : A Novel Way for 3-D Representation on the Paper Media, *Toshiyuki Amano*

1035 Gradient Domain Color Restoration of Clipped Highlights, *Mushfiqur Rouf, Cheryl Lau, Wolfgang Heidrich*

1100 **Keynote Talk:** From Idea to Reality: Practical Applications for Camera and Projection Systems, *Helge Seetzen (TandemLaunch Technologies)*

**1200 Lunch Break**

**Paper Session 2 (1330–1430)**

1330 A Low-power Structured Light Sensor for Outdoor Scene Reconstruction and Dominant Material Identification, *Christoph Mertz, Sanjeev J. Koppal, Solomon Sia, Srinivas Narasimhan*

1350 Single Lens Off-Chip Cellphone Microscopy, *Aydin Arpa, Gordon Wetzstein, Douglas Lanman, Ramesh Raskar*

1410 Active 3D Shape Acquisition Using Smartphones, *Jae Hyun Won, Man Hee Lee, In Kyu Park*

**1430 Afternoon Break**

**Paper Session 3 (1450–1530)**

1450 Making Any Planar Surface Into a Touch-sensitive Display by a Mere Projector and Camera, *Jingwen Dai, Ronald Chung*

1510 ARmy: A Study of Multi-User Interaction in Spatially Augmented Games, *Andrew Dolce, Joshua Nasman, Barbara Cutler*

1530 **Keynote Talk:** Structured Light 3D Scanning Under Global Illumination, *Amit Agrawal (MERL)*

1630 **Concluding Remarks**

## Biometrics

**Organizers:** Bir Bhanu
Nalini K. Ratha
Venu Govindaraju

**Location:** 556-B

**Schedule:** Full day

0845 **Opening Remarks**

**S1: Face Recognition I (0900-1000)**

0900 Data Insufficiency in Sketch Versus Photo Face Recognition, *Jonghyun Choi, Abhishek Sharma, David W. Jacobs, Larry S. Davis*

0920 Preliminary Studies on the Good, the Bad, and the Ugly Face Recognition Challenge Problem, *Yui Man Lui, David Bolme, P. Jonathon Phillips, J. Ross Beveridge, Bruce A. Draper*

0940 A Passive Stereo System for 3D Human Face Reconstruction and Recognition at a Distance, *Mostafa Abdelrahman, Asem Ali, Shireen Elhabian, Ham Rara, Aly A. Farag*

**1000 Morning Break**

**S2: Face Recognition II (1030-1110)**

1030 Restoring Occluded Regions Using FW-PCA for Face Recognition, *Tomoki Hosoi, Sei Nagashima, Koji Kobayashi, Koichi Ito, Takafumi Aoki*

1050 Face Detection at a Distance using Saliency Maps, *Ahmed EL-Barkouky, Ham Rara, Aly Farag, Phil Womble*

1100 Face Verification Using Sparse Representations, *Huimin Guo, Ruiping Wang, Jonghyun Choi, Larry S. Davis*

**S3: Iris (1110-1150)**

1110 Analysis of Template Aging in Iris Biometrics, *Samuel P. Fenker, Kevin W. Bowyer*

1120 Effects of Dominance and Laterality on Iris Recognition, *Amanda Sgroi, Kevin W. Bowyer, Patrick Flynn*

1130 Iris Recognition using Quaternionic Sparse Orientation Code (QSOC), *Ajay Kumar, Tak-Shing Chan*

1140 Biometric Match Score Fusion using RVM: A Case Study in Multi-unit Iris Recognition, *Hunny Mehrotra, Mayank Vatsa, Richa Singh, Banshidhar Majhi*

**S4: Fingerprint (1150-1230)**

1150 Fingerprint Indexing Based on Local Combinations of Minutiae Neighborhoods, *Akhil Vij, Anoop Namboodiri*

1210 Cascaded Filtering for Fingerprint Identification using Random Projections, *Atif Iqbal, Anoop Namboodiri*

1220 Ground Truth and Evaluation for Latent Fingerprint Matching, *Anna Mikaelyan, Josef Bigun*

**1230 Lunch Break**

**S5: Biometrics Security (1330-1420)**

1330 PRIVV: Private Remote Iris-authentication with Vaulted Verification, *Michael J. Wilber, Walter J. Scheirer, Terrance E. Boult*

1350 "Has this Person Been Encountered Before?": Modeling an Anonymous Identification System, *Brian DeCann, Arun Ross*

1400 Vulnerabilities in Binary Face Template, *Yi C. Feng, Pong C. Yuen*

**S6: Biometrics Score (1420-1450)**

1420 Utilization of Matching Score Vector Similarity Measures in Biometric Systems, *Xi Cheng, Sergey Tulyakov, Venu Govindaraju*

1430 Keystroke Dynamics for User Authentication, *Yu Zhong, Yunbin Deng, Anil K. Jain*

1440 Analysis of User-specific Score Characteristics for Spoof Biometric Attacks, *Ajita Rattani, Norman Poh, Arun Ross*

**1450 Afternoon Break**

**S7: Face Recognition: Pose and Expression (1530-1620)**

1530 Soft Biometric Trait Classification from Real-world Face Videos Conditioned on Head Pose Estimation, *Meltem Demirkus, Doina Precup, James J. Clark, Tal Arbel*

1550 Lip-motion Events Analysis and Lip Segmentation using Optical Flow, *Stefan M. Karlsson, Josef Bigun*

1600 Features and Fusion for Expression Recognition - A Comparative Analysis, *Usman Tariq, Thomas S. Huang*

## Vision Applications on Mobile using OpenCV

**Organizers:** Gary Bradski
Victor Eruhimov
Vadim Pisarevsky

**Time:** 0830-1230 (Half Day-Morning)

**Location:** 551-A

**Description:** It is forecast that in 2012, 450 Million smart phones with cameras will be sold, increasing to 650 Million units in 2013. Those with interests in commercial applications of computer vision simply cannot afford to ignore this growth in "smart cameras" enabled by mobile devices. This tutorial is intended to be hands on. We will:

- Review OpenCV, the Open Source Computer Vision Library.
- Cover some of the tools for developing vision applications on mobile devices with focus on OpenCV.
- We will then show you step by step how to implement vision applications on
  - Android and
  - iOS.
- We will go through the implementation of a simple application that tracks points on a planar surface and renders onto that surface.
- This application can serve as a stub which attendees can modify for their own applications. As time permits, we will guide/advise attendees in starting their own applications.

## Advanced 3D Image Processing with Point Cloud Library (PCL)

**Organizer:** Michael Dixon
Suat Gedikli
Radu B. Rusu

**Time:** 1330-1700 (Half Day-Afternoon)

**Location:** 551-A

**Description:** Point clouds are one of the most fascinating and challenging sensor streams, leading to countless publications. The advent of low cost 3D cameras, such as the Microsoft Kinect, has led to a wide range of new ideas and projects in this field. The PCL community tries to bring together all these activities to produce one open source library. Backed up by leading institutions and researchers around the world, as well as dedicated senior level programmers, this gives us the opportunity to join all the loose ends in point cloud processing. The point cloud library gives every researcher the opportunity to try new ideas fast as well as discuss them with and get support from a big community. Most of this is done through electronic communication, including mailing lists and chat systems, but to share it with the broader robotics community, as well as to get more people involved, we propose a one day tutorial. We will give an introduction to the library, guide the attendees in their first steps using it, as well as show what great results have been achieved with it already. PCL is a truly open community with a low administrative structure. We have especially designed our documentation to guide new users and have created help channels to give them the opportunity to rapidly become contributors.

## Applied Bayesian Nonparametrics

**Organizers:** Erik Sudderth

**Time:** 0830-1230 (Half Day-Morning)

**Location:** 551-B

**Description:** Bayesian nonparametric (BNP) models define distributions on infinite-dimensional spaces of functions, partitions, or other combinatorial structures. They lead to flexible, data-driven unsupervised learning algorithms, and models whose internal structure continually grows and adapts to new observations. Applied to computer vision problems, BNP methods have lead to segmentation algorithms which adapt their resolution to each image, learning algorithms which discover objects and activities from videos, and low-level vision systems which adapt their local appearance dictionaries to each image. More generally, BNP models provide a practical alternative to the model selection difficulties which arise with traditional unsupervised learning algorithms.

This tutorial surveys state-of-the-art approaches to Bayesian nonparametrics, from its foundations in stochastic processes to the practical tools needed for large-scale computation. Our focus is on those BNP models which have proven most useful in practice, including models which allow "infinite" cluster or feature-based data representations, and extensions which capture temporal or spatial dependencies. We discuss learning algorithms based on variational and Monte Carlo approximations, and ground our presentation in applied examples of modeling image and video data.

In this tutorial, we aim to make the big ideas underlying BNP methods accessible to the entire computer vision community. However, an introductory course in statistical machine learning will be helpful in understanding some concepts. Revelant foundational material includes parametric Bayesian methods for prediction and parameter estimation; clustering via probabilistic mixture models; the expectation maximization (EM) algorithm; and Markov chain Monte Carlo (MCMC) methods, particularly the Gibbs sampler.

## Computer Vision on Rolling Shutter Cameras

**Organizers:** Per-Erik Forssén
Erik Ringaby
Johan Hedborg

**Time:** 1330-1630 (Half Day-Afternoon)

**Location:** 551-B

**Description:** Most digital cameras sold today have rolling shutters. These cause geometric distorsions in the acquired images whenever either the camera, or the target is moving. This tutorial describes how classical projective geometry is modified to take a rolling shutter into account. We also cover recent research on how to adapt computer vision algorithms such as structure from motion and video stabilisation to rolling shutter cameras.

**Audience:** Due to the ubiquity of rolling shutter cameras, this tutorial is of general interest to CVPR attendees. Especially researchers working in geometry based computer vision will benefit from following the tutorial.

**Course Schedule:**

1330 Introduction
1400 Projective Geometry
1415 Rectification and Stabilization

**1500 Afternoon Break**

1530 Rolling Shutter and the Kinect
1545 Structure from Motion

## Deep Learning Methods for Vision

**Organizers:** Rob Fergus
Honglak Lee
Marc'Aurelio Ranzato
Ruslan Salakhutdinov
Graham Taylor
Kai Yu

**Time:** 0830-1700 (Full Day)

**Location:** 555-A

**Description:** Hand-designed features such as SIFT and HOG underpin many successful object recognition approaches. However, these only capture low-level edge information and it has proven difficult to design features that effectively capture mid-level cues (e.g. edge intersections) or high-level representation (e.g. object parts). However, recent developments in machine learning, known as "Deep Learning", have shown how hierarchies of features can be learned in an unsupervised manner directly from data. This tutorial will describe these feature learning approaches, as applied to images and video.

The tutorial will start by motivating the need to learn features, rather than hand-craft them. It will then introduce several basic architectures, explaining how they learn features, and showing how they can be "stacked" into hierarchies that can extract multiple layers of representation. Throughout, links will be drawn between these methods and existing approaches to recognition, particularly those involving hierarchical representations. The final part of the lecture will examine the current performances obtained by feature learning approaches on a range of standard vision benchmarks, highlighting their strengths and weaknesses.

## Using MATLAB for Computer Vision: Computer Vision System Toolbox & More

**Organizers:** Dima Lisin
Witek Jachimczyk
Bruce Tannenbaum

**Time:** 0900-1700 (Full Day)

**Location:** 555-B

**Description:** MATLAB and Image Processing Toolbox provide a well-known platform for research and development in the computer vision community. MATLAB is a high-level language and a development environment for idea exploration, visualization, and algorithm design, while Image Processing Toolbox provides essential algorithms that form the basis of any computer vision system.

In 2011, MathWorks took the next step by launching Computer Vision System Toolbox for researchers and practitioners. This new toolbox provides standard algorithms for tasks such as feature detection, extraction, and matching, object detection and tracking, and stereo image rectification. These algorithms can serve as building blocks for developing vision systems, benchmarks for comparison of new approaches, and starting points for new research directions.

In this tutorial, we will share practical information about Computer Vision System Toolbox as well as other MATLAB products appropriate for computer vision. In the morning, we will provide an overview and then cover computer vision functionality through a number of in-depth examples. In the afternoon, we included sessions on other MATLAB topics that are relevant to the computer vision community. We will spend most of our time in MATLAB itself and will leave plenty of time to answer questions from attendees.

This seminar assumes some experience with MATLAB and Image Processing Toolbox. We will focus mostly on Computer Vision System Toolbox.

# Monday, June 18

**0730–1830 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0830 Breakfast** (Prefunction/Rotunda)

**0830–1830 Exhibits** (Ballrooms B-C & D-E)

**Open during Poster Sessions**

- Google
- Qualcomm
- Springer
- MathWorks
- now publishers
- Point Grey
- Delphi
- Cognex
- Morgan & Claypool Publishers
- Tandent Vision Science, Inc.
- 4D View Solutions
- Cambridge University Press
- CogniMem Technologies Inc.
- Texas Instruments, Inc
- SimpleCV
- Elsevier

**0830–1830 Demos** (Room 551)

**Open during Poster Sessions**

- Mobile Product Search with Bag of Hash Bits and Boundary Reranking, *Columbia* (Booth 1)
- iModel: Object of Interest 3D Modeling via Interactive Cosegmentation on a Mobile Device, *Cornell* (Booth 2)
- Sketch2Image Search: Image Search by Object Detection in Sketches on a Mobile Device, *Cornell* (Booth 2)
- Augmented Reality Platform on Mobile Device, *Dekko Inc.* (Booth 3)
- PhotoShape: From Photos to Arbitrary-Shaped Collage, *HP Labs* (Booth 4)
- Settlement Extraction from Aerial Scenes, *Oak Ridge National Lab* (Booth 5)
- MugHunt: Calibration for Attribute Fusion and Similarity Search, *Securics* (Booth 6)
- Exploratory Search of Long Surveillance Video, *Boston Univ.* (Booth 7)
- Video Anomaly Detection based on Local Statistical Aggregation, *Boston Univ.* (Booth 7)
- Real-Time Detection Of Abnormal Crowd Behavior Using a Matrix Approximation-Based Approach, *Wayne State* (Booth 8)
- Image Search Tools, *MIT Lincoln Lab* (Booth 9)
- FaceHugger: The ALIEN Tracker Applied to Faces, *Univ. of Florence* (Booth 10)

**0830–1030 Posters 1A: Computational Photography, Shape Representation & Matching, Illumination & Reflectance, Shape from X**
(Ballrooms B-C/D-E: Rooms 555/556)

1. Aligning Images in the Wild, *Wem-Yan Lin, Linlin Liu, Yasuyuki Matsushita, Kok-Lim Low, Siying Liu*
2. A Physically-based Approach to Reflection Separation, *Naejin Kong, Yu-Wing Tai, Sung Yong Shin*
3. Motion-Aware Noise Filtering for Deblurring of Noisy and Blurry Images, *Yu-Wing Tai, Stephen Lin*
4. Nonlinear Camera Response Functions and Image Deblurring, *Sunyeong Kim, Yu-Wing Tai, Seon Joo Kim, Michael S. Brown, Yasuyuki Matsushita*
5. Laser Speckle Photography for Surface Tampering Detection, *YiChang Shih, Abe Davis, Sam W. Hasinoff, Frédo Durand, William T. Freeman*
6. Globally Consistent Depth Labeling of 4D Lightfields, *Sven Wanner, Bastian Goldluecke*
7. Scene Warping: Layer-based Stereoscopic Image Resizing, *Ken-Yi Lee, Cheng-Da Chung, Yung-Yu Chuang*
8. A Data-driven Approach for Facial Expression Synthesis in Video, *Kai Li, Feng Xu, Jue Wang, Qionghai Dai, Yebin Liu*
9. Color Constancy Using Faces, *Simone Bianco, Raimondo Schettini*
10. A Two-stage Approach to Blind Spatially-varying Motion Deblurring, *Hui Ji, Kang Wang*
11. Enhancing Underwater Images and Videos by Fusion, *Cosmin Ancuti, Codruta Orniana Ancuti, Tom Haber, Philippe Bekaert*
12. Video Stabilization with a Depth Camera, *Shuaicheng Liu, Yingting Wang, Lu Yuan, Jiajun Bu, Ping Tan, Jian Sun*

13. Compressive Depth Map Acquisition Using a Single Photon-Counting Detector: Parametric Signal Processing Meets Sparsity, *Andrea Colaço, Ahmed Kirmani, Gregory A. Howland, John C. Howell, Vivek K. Goyal*
14. The Vitruvian Manifold: Inferring Dense Correspondences for One-Shot Human Pose Estimation, *Jonathan Taylor, Jamie Shotton, Toby Sharp, Andrew Fitzgibbon*
15. Computing Nearest-Neighbor Fields via Propagation-Assisted KD-Trees, *Kaiming He, Jian Sun*
16. A New Convexity Measurement for 3D Meshes, *Zhouhui Lian, Afzal Godil, Paul L. Rosin, Xianfang Sun*
17. Factorized Graph Matching, *Feng Zhou, Fernando De la Torre*
18. Learning Contour-Fragment-based Shape Model with And-Or Tree Representation, *Liang Lin, Xiaolong Wang, Wei Yang, Jianhuang Lai*
19. Scale Resilient, Rotation Invariant Articulated Object Matching, *Hao Jiang, Taipeng Tian, Kun He, Stan Sclaroff*
20. Fan Shape Model for Object Detection, *Xinggang Wang, Xiang Bai, Tianyang Ma, Wenyu Liu, Longin Jan Latecki*
21. Intrinsic Shape Context Descriptors for Deformable Shapes, *Iasonas Kokkinos, Michael M. Bronstein, Roee Litman, Alexander M. Bronstein*
22. Twisted Window Search for Efficient Shape Localization, *Steve Gu, Ying Zheng, Carlo Tomasi*
23. Robust Nonrigid ICP Using Outlier-Sparsity Regularization, *Hidekata Hontani, Takamiti Matsuno, Yoshihide Sawada*
24. A Game-Theoretic Approach to Deformable Shape Matching, *Emanuele Rodolà, Alexander M. Bronstein, Andrea Albarelli, Filippo Bergamasco, Andrea Torsello*
25. Progressive Shape Models, *Antoine Letouzey, Edmond Boyer*
26. The Schrödinger Distance Transform (SDT) for Point-sets and Curves, *Manu Sethi, Anand Rangarajan, Karthik Gurumoorthy*
27. Image Matching using Local Symmetry Features, *Daniel Cabrini Hauagge, Noah Snavely*
28. Geometric Understanding of Point Clouds Using Laplace-Beltrami Operator, *Jian Liang, Rongjie Lai, Tsz Wai Wong, Hongkai Zhao*
29. On the Dimensionality of Video Bricks under Varying Illumination, *Youdong Zhao, Xi Song, Yunde Jia*
30. A Biquadratic Reflectance Model for Radiometric Image Analysis, *Boxin Shi, Ping Tan, Yasuyuki Matsushita, Katsushi Ikeuchi*
31. Single Image Multimaterial Estimation, *Stephen Lombardi, Ko Nishino*
32. Depth from Optical Turbulence, *Yuandong Tian, Srinivasa G. Narasimhan, Alan J. Vannevel*
33. Optimal Integration of Photometric and Geometric Surface Measurements Using Inaccurate Reflectance/Illumination Knowledge, *Takayuki Okatani, Koichiro Deguchi*
34. Photometric Stereo for Outdoor Webcams, *Jens Ackermann, Fabian Langguth, Simon Fuhrmann, Michael Goesele*
35. Bispectral Photometric Stereo based on Fluorescence, *Imari Sato, Takahiro Okabe, Yoichi Sato*
36. Names and Shades of Color for Intrinsic Image Estimation, *Marc Serra Vidal, Olivier Penacchio, Robert Benavente, Maria Vanrell*
37. Refractive Height Fields from Single and Multiple Images, *Qi Shan, Sameer Agarwal, Brian Curless*
38. A Learning-Based Framework for Depth Ordering, *Zhaoyin Jia, Andrew Gallagher, Yao-Jen Chang, Tsuhan Chen*
39. Example-Based 3D Object Reconstruction from Line Drawings, *Tianfan Xue, Jianzhuang Liu, Xiaoou Tang*
40. Angular Domain Reconstruction of Dynamic 3D Fluid Surfaces, *Jinwei Ye, Yu Ji, Feng Li, Jingyi Yu*
41. Robust Photometric Stereo using Sparse Regression, *Satoshi Ikehata, David Wipf, Yasuyuki Matsushita, Kiyoharu Aizawa*
42. 2.5D Building Modeling by Discovering Global Regularities, *Qian-Yi Zhou, Ulrich Neumann*
43. Shape, Albedo, and Illumination from a Single Image of an Unknown Object, *Jonathan T. Barron, Jitendra Malik*
44. Robust Stereo with Flash and No-flash Image Pairs, *Changyin Zhou, Alejandro Troccoli, Kari Pulli*
45. Detection by Detections: Non-parametric Detector Adaptation for a Video, *Xiaoyu Wang, Gang Hua, Tony X. Han*

**1000–1030 Morning Break**

**1020–1030 Message from Chairs** (Ballroom A & Exhibit Hall D)

**1030–1150 Orals 1A: Computational Photography** (Ballroom A)

**Chairs :** Richard Szeliski *(Microsoft Research)*
James Hays *(Brown Univ.)*

Format (17 min. for presentation + 3 min. for questions)

1. From Pixels to Physics: Probabilistic Color De-rendering, *Ying Xiong, Kate Saenko, Trevor Darrell, Todd Zickler*
2. Decomposing Global Light Transport using Time of Flight Imaging, *Di Wu, Matthew O'Toole, Andreas Velten, Amit Agrawal, Ramesh Raskar*
3. Accidental Pinhole and Pinspeck Cameras: Revealing the Scene Outside the Picture, *Antonio Torralba, William T. Freeman*
4. Jigsaw Puzzles with Pieces of Unknown Orientation, *Andrew C. Gallagher*

**1030–1150 Orals 1B: Shape Representation & Matching** (Exhibit Hall D)

**Chairs :** Iasonas Kokkinos *(Ecole Centrale Paris)*
Charless Fowlkes *(UC Irvine)*

Format (17 min. for presentation + 3 min. for questions)

1. Affine-Invariant, Elastic Shape Analysis of Planar Contours, *Darshan Bryner, Anuj Srivastava, Eric Klassen*
2. Progressive Graph Matching: Making a Move of Graphs via Probabilistic Voting, *Minsu Cho, Kyoung Mu Lee*
3. The Shape Boltzmann Machine: A Strong Model of Object Shape, *Seyed M. Ali Eslami, Nicolas Heess, John Winn*
4. Surface Regions of Interest for Viewpoint Selection, *George Leifman, Elizabeth Shtrom, Ayellet Tal*

**1150–1300 Lunch** (Prefunction, Rotunda, 4th Floor Lobby/Café)

**1210–1340 Doctoral Consortium** (Room 555/556) (by invitation only)

Supported by:

National Science Foundation
WHERE DISCOVERIES BEGIN

- Alireza Fathi *(Georgia Institute of Technology)*
- Chris Chew *(Queensland Univ. of Technology)*
- Ehsan Hoque *(Massachussets Institute of Technology)*
- Hamed Pirsiavash *(Univ. of California, Irvine)*
- Hien Nguyen *(Univ. of Maryland)*
- Hossein Mobahi *(Univ. of Illinois at Urbana-Champaign)*
- Hyung Jin Chang *(Seoul National Univ.)*
- Ilan Kadar *(Ben-Gurion Univ.)*
- Jagan Varadarajan *(EPFL)*
- Jaishanker Pillai *(Univ. of Maryland)*
- Jia Deng *(Princeton Univ.)*
- Jingyong Su *(Florida State Univ.)*
- Joel A. Hesch *(Univ. of Minnesota)*
- Junfeng He *(Columbia Univ.)*
- Junseok Kwon *(Seoul National Univ.)*
- Karthik Muthuswamy *(Nanyang Technological Univ.)*
- Lixin Duan *(Nanyang Technological Univ.)*
- Meng Yang *(Hong Kong Polytechnic Univ.)*
- Min Sun *(Univ. of Michigan)*
- Munir Shah *(Univ. of Otago)*
- Murad Al Haj *(Universitat Autonoma de Barcelona)*
- Peng Guan *(Brown Univ.)*
- Pyry Matikainen *(Carnegie Mellon Univ.)*
- Ray Ptucha *(Rochester Institute of Technology)*
- Santosh Kumar Divvala *(Carnegie Mellon Univ.)*
- Shireen Elhabian *(Univ. of Louisville)*
- Tali Basha *(Tel-Aviv Univ.)*
- Wei Liu *(Columbia Univ.)*
- Xavier Giro-i-Nieto *(Universitat Politecnica de Catalunya)*
- Xiaoyu Wang *(Univ. of Missouri)*
- Yuchao Dai *(Northwestern Polytechnical Univ.)*
- Zhilin Zhang *(Univ. of California, San Diego)*
- Zihan Zhou *(Univ. of Illinois at Urbana-Champaign)*

## 1300-1500 Posters 1B: Color & Texture, Early & Biological Vision, Image Based Modeling, Segmentation & Grouping

(Ballrooms B-C/D-E; Rooms 555/556)

1. Discrete Texture Traces: Topological Representation of Geometric Context, *Jan Ernst, Maneesh K. Singh, Visvanathan Ramesh*
2. Cross-Based Local Multipoint Filtering, *Jiangbo Lu, Keyang Shi, Dongbo Min, Liang Lin, Minh N. Do*
3. Boosting Bottom-up and Top-down Visual Features for Saliency Estimation, *Ali Borji*
4. Identigram/Watermark Removal using Cross-channel Correlation, *Jaesik Park, Yu-Wing Tai, In So Kweon*
5. Leveraging Stereopsis for Saliency Analysis, *Yuzhen Niu, Yujie Geng, Xueqing Li, Feng Liu*
6. The Scale of Edges, *Xianming Liu, Changhu Wang, Hongxun Yao, Lei Zhang*
7. Probabilistic Learning of Task-Specific Visual Attention, *Ali Borji, Dicky N. Sihite, Laurent Itti*
8. Exploiting Local and Global Patch Rarities for Saliency Detection, *Ali Borji, Laurent Itti*
9. Example-based Cross-Modal Denoising, *Dana Segev, Yoav Y. Schechner, Michael Elad*
10. A Unifying Resolution-Independent Formulation for Early Vision, *Fabio Viola, Andrew Fitzgibbon, Roberto Cipolla*
11. The Image Torque Operator: A New Tool for Mid-level Vision, *Morimichi Nishigaki, Cornelia Fermüller, Daniel DeMenthon*
12. FREAK: Fast Retina Keypoint, *Alexandre Alahi, Raphaël Ortiz, Pierre Vandergheynst*
13. Parameter-free/Pareto-driven Procedural 3D Reconstruction of Buildings from Ground-Level Sequences, *Loic Simon, Olivier Teboul, Panagiotis Koutsourakis, Luc Van Gool, Nikos Paragios*
14. Per-Pixel Translational Symmetry Detection, Optimization, and Segmentation, *Peng Zhao, Lei Yang, Honghui Zhang, Long Quan*
15. Fast and Globally Optimal Single View Reconstruction of Curved Objects, *Martin R. Oswald, Eno Töppe, Daniel Cremers*
16. Multi-Class Cosegmentation, *Armand Joulin, Francis Bach, Jean Ponce*
17. Improved Subspace Clustering via Exploitation of Spatial Constraints, *Duc-Son Pham, Saha Budhaditya, Dinh Phung, Svetha Venkatesh*
18. Figure-Ground Segmentation by Transferring Window Masks, *Daniel Kuettel, Vittorio Ferrari*
19. Automated Reconstruction of Tree Structures using Path Classifiers and Mixed Integer Programming, *Engin Türetken, Fethallah Benmansour, Pascal Fua*
20. Efficient Structure Detection via Random Consensus Graph, *Hairong Liu, Shuicheng Yan*
21. Efficient Inference for Fully-Connected CRFs with Stationarity, *Yimeng Zhang, Tsuhan Chen*
22. Learning Image-Specific Parameters for Interactive Segmentation, *Zhanghui Kuang, Dirk Schnieders, Hao Zhou, Kwan-Yee K. Wong, Yizhou Yu, Bo Peng*
23. Fixed-Rank Representation for Unsupervised Visual Learning, *Risheng Liu, Zhouchen Lin, Fernando De la Torre, Zhixun Su*
24. Mode-Seeking on Graphs via Random Walks, *Minsu Cho, Kyoung Mu Lee*
25. Higher Order Motion Models and Spectral Clustering, *Peter Ochs, Thomas Brox*
26. The Role of Image Understanding in Contour Detection, *C. Lawrence Zitnick, Devi Parikh*
27. Center-Shift: An Approach Towards Automatic Robust Mesh Segmentation (ARMS), *Mengtian Sun, Yi Fang, Karthik Ramani*
28. Globally Optimal Line Clustering and Vanishing Point Estimation in Manhattan World, *Jean-Charles Bazin, Yong Duek Seo, Cédric Demonceaux, Pascal Vasseur, Katsushi Ikeuchi, In So Kweon, Marc Pollefeys*
29. Actionable Saliency Detection: Independent Motion Detection Without Independent Motion Estimation, *Georgios Georgiadis, Alper Ayvaci, Stefano Soatto*
30. Adaptive Figure-Ground Classification, *Yisong Chen, Antoni B. Chan, Guoping Wang*
31. What Are Good Parts for Hair Shape Modeling?, *Nan Wang, Haizhou Ai, Feng Tang*
32. Maximum Weight Cliques with Mutex Constraints for Video Object Segmentation, *Tianyang Ma, Longin Jan Latecki*

33. Linear Solution to Scale Invariant Global Figure Ground Separation, *Hao Jiang*
34. A Hierarchical Image Clustering Cosegmentation Framework, *Edward Kim, Hongsheng Li, Xiaolei Huang*
35. Higher Level Segmentation: Detecting and Grouping of Invariant Repetitive Patterns, *Yunliang Cai, George Baciu*
36. Describing the Scene as a Whole: Joint Object Detection, Scene Classification and Semantic Segmentation, *Jian Yao, Sanja Fidler, Raquel Urtasun*
37. The Random Cluster Model for Robust Geometric Fitting, *Trung Pham, Tat-Jun Chin, Jin Yu, David Suter*
38. Weighted Color and Texture Sample Selection for Image Matting, *Ehsan Shahrian Varnousfaderani, Deepu Rajan*
39. Graph Cuts Optimization for Multi-Limb Human Segmentation in Depth Maps, *Antonio Hernández-Vela, Nadezhda Zlateva, Alexander Marinov, Miguel Reyes, Petia Radeva, Dimo Dimov, Sergio Escalera*
40. Saliency Filters: Contrast Based Filtering for Salient Region Detection, *Federico Perazzi, Philipp Krähenbühl, Yael Pritch, Alexander Hornung*
41. Exploiting Nonlocal Spatiotemporal Structure for Video Segmentation, *Hsien-Ting Cheng, Narendra Ahuja*
42. Unsupervised Co-segmentation Through Region Matching, *Jose C. Rubio, Joan Serrat, Antonio López, Nikos Paragios*
43. Multi View Registration for Novelty/Background Separation, *Omid Aghazadeh, Josephine Sullivan, Stefan Carlsson*
44. Seeded Watershed Cut Uncertainty Estimators for Guided Interactive Segmentation, *Christoph-N Straehle, Ullrich Koethe, Graham Knott, Kevin Briggman, Winfried Denk, Fred A. Hamprecht*
45. Affinity Aggregation for Spectral Clustering, *Hsin-Chien Huang, Yung-Yu Chuang, Chu-Song Chen*
46. Bag of Textons for Image Segmentation via Soft Clustering and Convex Shift, *Zhiding Yu, Ang Li, Oscar C. Au, Chunjing Xu*
47. Segmentation Using Superpixels: A Bipartite Graph Partitioning Approach, *Zhenguo Li, Xiao-Ming Wu, Shih-Fu Chang*

### 1430–1500 Afternoon Break

### 1500-1620 Orals 1C: Illumination & Reflectance (Ballroom A)

**Chairs :** Ko Nishino *(Drexel Univ.)*
Yoichi Sato *(Univ. of Tokyo)*

Format (17 min. for presentation + 3 min. for questions)

1. Discriminative Illumination: Per-Pixel Classification of Raw Materials based on Optimal Projections of Spectral BRDF, *Jinwei Gu, Chao Liu*
2. Camera Spectral Sensitivity Estimation from a Single Image under Unknown Illumination by using Fluorescence, *Shuai Han, Yasuyuki Matsushita, Imari Sato, Takahiro Okabe, Yoichi Sato*
3. Micro Phase Shifting, *Mohit Gupta, Shree K. Nayar*
4. A Closed-Form Solution to Uncalibrated Photometric Stereo via Diffuse Maxima, *Paolo Favaro, Thoma Papadhimitri*

### 1500–1620 Orals 1D: Segmentation and Grouping (Exhibit Hall D)

**Chairs :** Kyoung Mu Lee *(Seoul National Univ.)*
Eric Mortensen *(Lucidyne Technologies, Inc.)*

Format (17 min. for presentation + 3 min. for questions)

1. Connected Contours: A New Contour Completion Model that Respects the Closure Effect, *Yansheng Ming, Hongdong Li, Xuming He*
2. On Multiple Foreground Cosegmentation, *Gunhee KIM, Eric P. Xing*
3. Weakly Supervised Structured Output Learning for Semantic Segmentation, *Alexander Vezhnevets, Vittorio Ferrari, Joachim M. Buhmann*
4. A Unified Approach to Salient Object Detection via Low Rank Matrix Recovery, *Xiaohui Shen, Ying Wu*

## 1620-1830 Posters 1C: Vision for Graphics, Sensors, Medical, Vision for Robotics, Applications

(Ballrooms B-C/D-E: Rooms 555/556)

1. Facial Expression Editing in Video Using a Temporally-Smooth Factorization, *Fei Yang, Lubomir Bourdev, Eli Shechtman, Jue Wang, Dimitris Metaxas*
2. KNN Matting, *Qifeng Chen, Dingzeyu Li, Chi-Keung Tang*
3. Automatic Upright Adjustment of Photographs, *Hyunjoon Lee, Eli Shechtman, Jue Wang, Seungyong Lee*
4. Synthesizing Oil Painting Surface Geometry from a Single Photograph, *Wei Luo, Zheng Lu, Xiaogang Wang, Ying-Qing Xu, Moshe Ben-Ezra, Xiaoou Tang, Michael S. Brown*
5. Modelling and Correction of Multipath Interference in Time of Flight Cameras, *David Jiménez Cabello, Daniel Pizarro Pérez, Manuel Mazo Quintas, Sira Elena Palazuelos Cagigas*
6. An Analysis of Color Demosaicing in Plenoptic Cameras, *Zhan Yu, Jingyi Yu, Andrew Lumsdaine, Todor Georgiev*
7. Spatial Bias in Multi-Atlas Based Segmentation, *Hongzhi Wang, Paul A. Yushkevich*
8. 2D/3D Rotation-Invariant Detection using Equivariant Filters and Kernel Weighted Mapping, *Kun Liu, Qing Wang, Wolfgang Driever, Olaf Ronneberger*
9. Reconstruction of Super-Resolution Lung 4D-CT Using a Patch-Based Sparse Representation, *Yu Zhang, Guorong Wu, Pew-Thian Yap, Qianjin Feng, Jun Lian, Wufan Chen, Dinggang Shen*
10. Fast Radial Symmetry Detection Under Affine Transformations, *Jie Ni, Maneesh K. Singh, Claus Bahlmann*
11. Sparse Bayesian Multi-Task Learning for Predicting Cognitive Outcomes from Neuroimaging Measures in Alzheimer's Disease, *Jing Wan, Zhilin Zhang, Jingwen Yan, Taiyong Li, Bhaskar D. Rao, Shiaofen Fang, Sungeun Kim, Shannon L. Risacher, Andrew J. Saykin, Li Shen*
12. The Use of On-line Co-training to Reduce the Training Set Size in Pattern Recognition Methods: Application to Left Ventricle Segmentation in Ultrasound, *Gustavo Carneiro, Jacinto C. Nascimento*
13. From Label Fusion to Correspondence Fusion: A New Approach to Unbiased Groupwise Registration, *Paul A. Yushkevich, Hongzhi Wang, John Pluta, Brian B. Avants*
14. Multiple Clustered Instance Learning for Histopathology Cancer Image Classification, Segmentation and Clustering, *Yan Xu, Jun-Yan Zhu, Eric Chang, Zhuowen Tu*
15. Automatic Mitral Leaflet Tracking in Echocardiography by Outlier Detection in the Low-rank Representation, *Xiaowei Zhou, Can Yang, Weichuan Yu*
16. A Learning Based Deformable Template Matching Method for Automatic Rib Centerline Extraction and Labeling in CT Images, *Dijia Wu, David Liu, Zoltan Puskas, Chao Lu, Andreas Wimmer, Christian Tietjen, Grzegorz Soza, S. Kevin Zhou*
17. Graph-based Detection, Segmentation & Characterization of Brain Tumors, *Sarah Parisot, Hugues Duffau, Stéphane Chemouny, Nikos Paragios*
18. Robust Non-Rigid Registration of 2D and 3D Graphs, *Eduard Serradell, Przemyslaw Glowacki, Jan Kybic, Francesc Moreno-Noguer, Pascal Fua*
19. Efficient Automatic 3D-Reconstruction of Branching Neurons from EM Data, *Jan Funke, Bjoern Andres, Fred A. Hamprecht, Albert Cardona, Matthew Cook*
20. Learning to Segment Dense Cell Nuclei with Shape Prior, *Xinghua Lou, Ullrich Koethe, Jochen Wittbrodt, Fred A. Hamprecht*
21. A Riemannian Approach for Estimating Orientation Distribution Function (ODF) Images from High-Angular Resolution Diffusion Imaging (HARDI), *Kai Krajsek, Hanno Scharr*
22. Sasaki Metrics for Analysis of Longitudinal Data on Manifolds, *Prasanna Muralidharan, P. Thomas Fletcher*
23. Globally Optimal Hand-Eye Calibration, *Thomas Ruland, Tomas Pajdla, Lars Krüger*
24. Real-time Image-based 6-DOF Localization in Large-Scale Environments, *Hyon Lim, Sudipta N. Sinha, Michael F. Cohen, Matt Uyttendaele*
25. A New Mirror-based Extrinsic Camera Calibration Using an Orthogonality Constraint, *Kosuke Takahashi, Shohei Nobuhara, Takashi Matsuyama*
26. Online Continuous Stereo Extrinsic Parameter Estimation, *Peter Hansen, Hatem Alismail, Peter Rander, Brett Browning*
27. Learning Attention Map from Images, *Yao Lu, Wei Zhang, Cheng Jin, Xiangyang Xue*

28. A Line-Structure-Preserving Approach to Image Resizing, *Che-Han Chang, Yung-Yu Chuang*
29. Detecting Texts of Arbitrary Orientations in Natural Images, *Cong Yao, Xiang Bai, Wenyu Liu, Yi Ma, Zhuowen Tu*
30. Markov Weight Fields for Face Sketch Synthesis, *Hao Zhou, Zhanghui Kuang, Kwan-Yee K. Wong*
31. Unsupervised Feature Learning Framework for No-reference Image Quality Assessment, *Peng Ye, Jayant Kumar, Le Kang, David Doermann*
32. Scalable k-NN Graph Construction for Visual Descriptors, *Jing Wang, Jingdong Wang, Gang Zeng, Zhuowen Tu, Rui Gan, Shipeng Li*
33. Multi-scale Dictionary for Single Image Super-resolution, *Kaibing Zhang, Xinbo Gao, Dacheng Tao, Xuelong Li*
34. Image Collection Summarization via Dictionary Learning for Sparse Representation, *Chunlei Yang, Jinye Peng, Jianping Fan*
35. Icon Scanning: Towards Next Generation QR Codes, *Itamar Friedman, Lihi Zelnik-Manor*
36. Automated Quantitative Description of Spiral Galaxy Arm-Segment Structure, *Darren R. Davis, Wayne B. Hayes*
37. Sparse Representation for Blind Image Quality Assessment, *Lihuo He, Dacheng Tao, Xuelong Li, Xinbo Gao*
38. Fast Axis Estimation from a Segment of Rotationally Symmetric Object, *Dongjin Han, Hern-soo Hahn*
39. Computer Vision Aided Target Linked Radiation Imaging, *Dashan Gao, Yi Yao, Feng Pan, Ting Yu, Bing Yu, Li Guan, Walter Dixon III, Brian Yanoff, Tai-Peng Tian, Nils Krahnstoever*
40. Automated Annotation of Coral Reef Survey Images, *Oscar Beijbom, Peter J. Edmunds, David I. Kline, B. Gregory Mitchell, David Kriegman*
41. Classifying Covert Photographs, *Haitao Lang, Haibin Ling*
42. City Scale Geo-spatial Trajectory Estimation of a Moving Camera, *Gonzalo Vaca-Castano, Amir Roshan Zamir, Mubarak Shah*

**1830–2000** **Dinner Buffet** (Ballroom A, Prefunction, Rotunda, 4th Floor Lobby/Café)

**2000–2200** **PAMI TC Meeting** (Exhibit Hall D)

# Tuesday, June 19

**0730–1900 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0815 Breakfast** (Prefunction/Rotunda)

**0815–1900 Exhibits** (Ballrooms B-C & D-E)

**Open during Poster Sessions**

- Same as Monday morning Exhibits

**0815–1900 Demos** (Room 551)

**Open during Poster Sessions**

- Modeling Task-Driven Visual Attention, *USC* (Booth 1)
- EVA: Engine for Visual Annotation, *Stanford* (Booth 2)
- Real-Time Scene Text Localization and Recognition, *Czech Technical Univ.* (Booth 3)
- Auto Face Re-Ranking By Mining the Web and Video Archives, *NII* (Booth 4)
- A Text Detection System for Urban Scenes and Related Applications, *Nokia* (Booth 5)
- Real-Time Multiclass Object Recognition, *UC Berkeley* (Booth 6)
- Joint Parsing: Spatial, Temporal, and Causal Inference for Understanding Image and Video, *UCLA* (Booth 7)
- Detecting and Recognizing Texts of Arbitrary Orientations in Natural Images, *Huazhong Univ. of Science and Technology* (Booth 8)
- FREAK: Fast Retina Keypoint, *EPFL* (Booth 9)
- Uncertainty Estimators for Guided Interactive Segmentation, *Univ. of Heidelberg* (Booth 10)

**0815–1015 Posters 2A: Video Analysis, Stereo & Structure from Motion** (Ballrooms B-C & D-E: Rooms 555 & 556)

1. A Database for Fine Grained Activity Detection of Cooking Activities, *Marcus Rohrbach, Sikandar Amin, Mykhaylo Andriluka, Bernt Schiele*
2. Evaluation of Super-Voxel Methods for Early Video Processing, *Chenliang Xu, Jason J. Corso*
3. Scalable Action Recognition with a Subspace Forest, *Stephen O'Hara, Bruce A. Draper*
4. A Flow Model for Joint Action Recognition and Identity Maintenance, *Sameh Khamis, Vlad I. Morariu, Larry S. Davis*
5. Social Interactions: A First-person Perspective, *Alireza Fathi, Jessica K. Hodgins, James M. Rehg*
6. Action Bank: A High-Level Representation of Activity in Video, *Sreemanananth Sadanand, Jason J. Corso*
7. Discovering Discriminative Action Parts from Mid-Level Video Representations, *Michalis Raptis, Iasonas Kokkinos, Stefano Soatto*
8. Learning Latent Temporal Structure for Complex Event Detection, *Kevin Tang, Li Fei-Fei, Daphne Koller*
9. Detecting Regions of Interest in Dynamic Scenes with Camera Motions, *Kihwan Kim, Dongryeol Lee, Irfan Essa*
10. A Unified Framework for Event Summarization and Rare Event Detection, *Junseok Kwon, Kyoung Mu Lee*
11. Efficient Activity Detection with Max-Subgraph Search, *Chao-Yeh Chen, Kristen Grauman*
12. Generalized Time Warping for Multi-modal Alignment of Human Motion, *Feng Zhou, Fernando De la Torre*
13. Mining Actionlet Ensemble for Action Recognition with Depth Cameras, *Jiang Wang, Zicheng Liu, Ying Wu, Junsong Yuan*
14. Multimodal Feature Fusion for Robust Event Detection in Web Videos, *Pradeep Natarajan, Shuang Wu, Shiv Vitaladevuni, Xiaodan Zhuang, Stavros Tsakalidis, Unsang Park, Rohit Prasad, Premkumar Natarajan*
15. Dynamic Scene Understanding: The Role of Orientation Features in Space and Time in Scene Classification, *Konstantinos G. Derpanis, Matthieu Lecce, Kostas Daniilidis, Richard P. Wildes*

16. Sum-Product Networks for Modeling Activities with Stochastic Structure, *Mohamed R. Amer, Sinisa Todorovic*
17. Social Behavior Recognition in Continuous Video, *Xavier P. Burgos-Artizzu, Piotr Dollár, Dayu Lin, David J. Anderson, Pietro Perona*
18. Substructure and Boundary Modeling for Continuous Action Recognition, *Zhaowen Wang, Jinjun Wang, Jing Xiao, Kai-Hsiang Lin, Thomas Huang*
19. Exploiting Web Images for Event Recognition in Consumer Videos: A Multiple Source Domain Adaptation Approach, *Lixin Duan, Dong Xu, Shih-Fu Chang*
20. Discovering Important People and Objects for Egocentric Video Summarization, *Yong Jae Lee, Joydeep Ghosh, Kristen Grauman*
21. Social Roles in Hierarchical Models for Human Activity Recognition, *Tian Lan, Leonid Sigal, Greg Mori*
22. Cross-view Activity Recognition using Hankelets, *Binlong Li, Octavia I. Camps, Mario Sznaier*
23. Action Recognition by Exploring Data Distribution and Feature Correlation, *Sen Wang, Yi Yang, Zhigang Ma, Xue Li, Chaoyi Pang, Alex G. Hauptmann*
24. A Combined Pose, Object, and Feature Model for Action Understanding, *Ben Packer, Kate Saenko, Daphne Koller*
25. Modulation Transfer Function of Patch-Based Stereo Systems, *Ronny Klowsky, Arjan Kuijper, Michael Goesele*
26. General Trajectory Prior for Non-Rigid Reconstruction, *Jack Valmadre, Simon Lucey*
27. A Non-Local Cost Aggregation Method for Stereo Matching, *Qingxiong Yang*
28. Practical Low-Rank Matrix Approximation under Robust L1-Norm, *Yinqiang Zheng, Guangcan Liu, Shigeki Sugimoto, Shuicheng Yan, Masatoshi Okutomi*
29. Finite Element based Sequential Bayesian Non-Rigid Structure from Motion, *Antonio Agudo, Begoña Calvo, J. M. M. Montiel*
30. Structure and Motion from Scene Registration, *Tali Basha, Shai Avidan, Alexander Hornung, Wojciech Matusik*
31. Rolling Shutter Bundle Adjustment, *Johan Hedborg, Per-Erik Forssén, Michael Felsberg, Erik Ringaby*
32. Visibility Based Preconditioning for Bundle Adjustment, *Avanish Kushal, Sameer Agarwal*
33. Dense Reconstruction On-the-Fly, *Andreas Wendel, Michael Maurer, Gottfried Graber, Thomas Pock, Horst Bischof*
34. Seeing Double Without Confusion: Structure-from-Motion in Highly Ambiguous Scenes, *Nianjuan Jiang, Ping Tan, Loong Fah Cheong*
35. Consistent Depth Maps Recovery from a Trinocular Video Sequence, *Wenzhuo Yang, Guofeng Zhang, Hujun Bao, Jiwon Kim, Ho-Young Lee*
36. Saliency-Guided Integration of Multiple Scans, *Ran Song, Yonghuai Liu, Ralph R. Martin, Paul L. Rosin*
37. Robust Plane-Based Structure From Motion, *Zihan Zhou, Hailin Jin, Yi Ma*
38. Multi-View Hair Capture using Orientation Fields, *Linjie Luo, Hao Li, Sylvain Paris, Thibaut Weise, Mark Pauly, Szymon Rusinkiewicz*
39. Schematic Surface Reconstruction, *Changchang Wu, Sameer Agarwal, Brian Curless, Steven M. Seitz*
40. Making Minimal Solvers Fast, *Martin Bujnak, Zuzana Kukelova, Tomas Pajdla*
41. Discovering and Exploiting 3D Symmetries in Structure from Motion, *Andrea Cohen, Christopher Zach, Sudipta N. Sinha, Marc Pollefeys*
42. On SIFTs and their Scales, *Tal Hassner, Viki Mayzels, Lihi Zelnik-Manor*
43. Real-Time 6D Stereo Visual Odometry with Non-Overlapping Fields of View, *Tim Kazik, Laurent Kneip, Janosch Nikolic, Marc Pollefeys, Roland Siegwart*

**0945–1015 Morning Break**

**1015–1045 Invited Talk: *David Mumford***
(Ballroom A with video broadcast to Exhibit Hall D)

**1045–1115 Invited Talk: *Ulf Grenander***
(Ballroom A with video broadcast to Exhibit Hall D)

### 1115–1235 Orals 2A: Video Analysis & Active Vision (Ballroom A)

**Chairs :** Ying Wu *(Northwestern Univ.)*
Greg Hager *(Johns Hopkins Univ.)*

Format (17 min. for presentation + 3 min. for questions)

1. Video from Nearly Still: An Application to Low Frame-rate Gait Recognition, *Naoki Akae, Al Mansur, Yasushi Makihara, Yasushi Yagi*
2. We are not Contortionists: Coupled Adaptive Learning for Head and Body Orientation Estimation in Surveillance Video, *Cheng Chen, Jean-Marc Odobez*
3. What Are We Looking For: Towards Statistical Modeling of Saccadic Eye Movements and Visual Saliency, *Xiaoshuai Sun, Hongxun Yao, Rongrong Ji*
4. Stream-based Joint Exploration-Exploitation Active Learning, *Chen Change Loy, Timothy M. Hospedales, Tao Xiang, Shaogang Gong*

### 1115–1235 Orals 2B: Optimization Methods (Exhibit Hall D)

**Chairs :** Anand Rangarajan *(Univ. of Florida)*
Ronen Basri *(Weizmann Institute of Science)*

Format (17 min. for presentation + 3 min. for questions)

1. Incremental Gradient on the Grassmannian for Online Foreground and Background Separation in Subsampled Video, *Jun He, Laura Balzano, Arthur Szlam*
2. Curvature-Based Regularization for Surface Approximation, *Carl Olsson, Yuri Boykov*
3. General and Nested Wiberg Minimization, *Dennis Strelow*
4. A-Optimal Non-negative Projection for Image Representation, *Haifeng Liu, Zheng Yang, Zhaohui Wu, Xuelong Li*

### 1235–1335 Lunch (Prefunction, Rotunda, 4th Floor Lobby/Café)

### 1300–1400 Qualcomm Lunch Discussion (Room 552) (Open to all)

**Topic:** Computer Vision For Mobile: Here today and evolving faster than you think

**Speakers:** Michael Mangan, Product Manager
Gary McGrath, Director, Engineering

1. Overview of Computer Vision (CV) applications running on mobile devices.
2. Issues running CV applications on mobile devices.
3. How FastCV enhances CV applications.
4. CV applications running on next generation mobile chipsets/devices.

## 1335-1530 Posters 2B: Optimization Methods, Motion & Tracking (Ballrooms B-C & D-E; Rooms 555 & 556)

1. See All by Looking at A Few: Sparse Modeling for Finding Representative Objects, *Ehsan Elhamifar, Guillermo Sapiro, René Vidal*
2. A Branch-and-Bound Algorithm for Globally Optimal Hand-Eye Calibration, *Jan Heller, Michal Havlena, Tomas Pajdla*
3. An Efficient Branch-and-Bound Algorithm for Optimal Human Pose Estimation, *Min Sun, Murali Telaprolu, Honglak Lee, Silvio Savarese*
4. Isogeometric Finite-Elements Methods and Variational Reconstruction Tasks in Vision - A Perfect Match, *Jonathan Balzer, Thomas Mörwald*
5. A Tiered Move-making Algorithm for General Pairwise MRFs, *Vibhav Vineet, Jonathan Warrell, Philip H. S. Torr*
6. Irregular Lattices for Complex Shape Grammar Facade Parsing, *Hayko Riemenschneider, Ulrich Krispel, Wolfgang Thaller, Michael Donoser, Sven Havemann, Dieter Fellner, Horst Bischof*
7. Geometry Constrained Sparse Coding for Single Image Super-resolution, *Xiaoqiang Lu, Haoliang Yuan, Pingkun Yan, Yuan Yuan, Xuelong Li*
8. Random Walks based Multi-Image Segmentation: Quasiconvexity Results and GPU-based Solutions, *Maxwell D. Collins, Jia Xu, Leo Grady, Vikas Singh*
9. What Is Optimized in Tight Convex Relaxations for Multi-Label Problems?, *Christopher Zach, Christian Häne, Marc Pollefeys*
10. Robust Maximum Likelihood Estimation by Sparse Bundle Adjustment using the L1 Norm, *Zhijun Dai, Fengjun Zhang, Hongan Wang*
11. Application of the Mean Field Methods to MRF Optimization in Computer Vision, *Masaki Saito, Takayuki Okatani, Koichiro Deguchi*
12. A Bundle Approach To Efficient MAP-Inference by Lagrangian Relaxation, *Jörg Hendrik Kappes, Bogdan Savchynskyy, Christoph Schnörr*
13. MAP-MRF Inference Based on Extended Junction Tree Representation, *Yun Zheng, Pei Chen, Jiang-Zhong Cao*
14. Fast Algorithms for Structured Robust Principal Component Analysis, *Mustafa Ayazoglu, Mario Sznaier, Octavia I. Camps*
15. A Convex Representation for the Vectorial Mumford-Shah Functional, *Evgeny Strekalovskiy, Antonin Chambolle, Daniel Cremers*
16. Parsing Facade with Rank-One Approximation, *Chao Yang, Tian Han, Long Quan, Chiew-Lan Tai*
17. Fast Dynamic Programming for Labeling Problems with Ordering Constraints, *Junjie Bai, Qi Song, Olga Veksler, Xiaodong Wu*
18. Seeing through the Blur, *Hossein Mobahi, C. Lawrence Zitnick, Yi Ma*
19. Multitarget Data Association with Higher-Order Motion Models, *Robert T. Collins*
20. Optical Flow in the Presence of Spatially-Varying Motion Blur, *Travis Portz, Li Zhang, Hongrui Jiang*
21. Non-sparse Linear Representations for Visual Tracking with Online Reservoir Metric Learning, *Xi Li, Chunhua Shen, Qinfeng Shi, Anthony Dick, Anton van den Hengel*
22. Layered Segmentation and Optical Flow Estimation Over Time, *Deqing Sun, Erik B. Sudderth, Michael J. Black*
23. Decomposing and Regularizing Sparse/Non-sparse Components for Motion Field Estimation, *Zhuoyuan Chen, Jiang Wang, Ying Wu*
24. Exemplar-Based Human Action Pose Correction and Tagging, *Wei Shen, Ke Deng, Xiang Bai, Tommer Leyvand, Baining Guo, Zhuowen Tu*
25. Collection Flow, *Ira Kemelmacher-Shlizerman, Steven M. Seitz*
26. Dense Lagrangian Motion Estimation with Occlusions, *Susanna Ricco, Carlo Tomasi*
27. Online Robust Image Alignment via Iterative Convex Optimization, *Yi Wu, Bin Shen, Haibin Ling*
28. Part-based Multiple-Person Tracking with Partial Occlusion Handling, *Guang Shu, Afshin Dehghan, Omar Oreifej, Emily Hand, Mubarak Shah*
29. Visual Tracking via Adaptive Structural Local Sparse Appearance Model, *Xu Jia, Huchuan Lu, Ming-Hsuan Yang*
30. Real Time Robust L1 Tracker Using Accelerated Proximal Gradient Approach, *Chenglong Bao, Yi Wu, Haibin Ling, Hui Ji*

31. Robust Object Tracking via Sparsity-based Collaborative Model, *Wei Zhong, Huchuan Lu, Ming-Hsuan Yang*
32. Video Segmentation by Tracing Discontinuities in a Trajectory Embedding , *Katerina Fragkiadaki, Geng Zhang, Jianbo Shi*
33. Robust Tracking via Weakly Supervised Ranking SVM, *Yancheng Bai, Ming Tang*
34. Tracking the Articulated Motion of Two Strongly Interacting Hands, *Iason Oikonomidis, Nikolaos Kyriazis, Antonis A. Argyros*
35. Spatio-temporal Motion Tracking with Unsynchronized Cameras, *Ahmed Elhayek, Carsten Stoll, Nils Hasler, Kwang In Kim, Hans-Peter Seidel, Christian Theobalt*
36. Joint Motion Estimation and Segmentation of Complex Scenes with Label Costs and Occlusion Modeling, *Markus Unger, Manuel Werlberger, Thomas Pock, Horst Bischof*
37. Decentralized Particle Filter for Joint Individual-Group Tracking, *Loris Bazzani, Marco Cristani, Vittorio Murino*
38. Efficient Online Structured Output Learning for Keypoint-Based Object Tracking, *Sam Hare, Amir Saffari, Philip H. S. Torr*
39. Hand Tracking by Binary Quadratic Programming and Its Application to Retail Activity Recognition, *Hoang Trinh, Quanfu Fan, Prasad Gabbur, Sharath Pankanti*
40. Distribution Fields for Tracking, *Laura Sevilla-Lara, Erik Learned-Miller*
41. Multi-Target Tracking by Online Learning of Non-linear Motion Patterns and Robust Appearance Models, *Bo Yang, Ram Nevatia*
42. Discrete-Continuous Optimization for Multi-Target Tracking, *Anton Andriyenko, Konrad Schindler, Stefan Roth*
43. An Optimized DBN-Based Mode-Focussing Particle filter, *Séverine Dubuisson, Christophe Gonzales*
44. Locally Orderless Tracking, *Shaul Oron, Aharon Bar-Hillel, Dan Levi, Shai Avidan*
45. Coupling Detection and Data Association for Multiple Object Tracking, *Zheng Wu, Ashwin Thangali, Stan Sclaroff, Margrit Betke*
46. Order Determination and Sparsity-Regularized Metric Learning for Adaptive Visual Tracking, *Nan Jiang, Wenyu Liu, Ying Wu*
47. Robust Visual Tracking using Autoregressive Hidden Markov Model, *Dong Woo Park, Junseok Kwon, Kyoung Mu Lee*
48. Improving Multi-target Tracking via Social Grouping, *Zhen Qin, Christian R. Shelton*
49. Growing a Bag of Systems Tree for Fast and Accurate Classification, *Emanuele Coviello, Adeel Mumtaz, Antoni B. Chan, Gert R. G. Lanckriet*
50. Branch-and-Price Global Optimization for Multi-view Multi-object Tracking, *Laura Leal-Taixé, Gerard Pons-Moll, Bodo Rosenhahn*
51. A Contextual Maximum Likelihood Framework for Modeling Image Registration, *Christian Wachinger, Nassir Navab*
52. Monotonicity and Error Type Differentiability in Performance Measures for Target Detection and Tracking in Video, *Ido Leichter, Eyal Krupka*
53. Generalizing Wiberg Algorithm for Rigid and Nonrigid Factorizations with Missing Components and Metric Constraints, *Yinqiang Zheng, Shigeki Sugimoto, Shuicheng Yan, Masatoshi Okutomi*

## 1500–1530 Afternoon Break

## 1530-1650 Orals 2C: Structure from Motion & Tracking (Exhibit Hall A)

**Chairs :** Ming-Hsuan Yang *(UC Merced)*
Mark Pollefeys *(ETH Zurich)*

Format (17 min. for presentation + 3 min. for questions)

1. A Simple Prior-free Method for Non-Rigid Structure-from-Motion Factorization, *Yuchao Dai, Hongdong Li, Mingyi He*
2. On Template-Based Reconstruction from a Single View: Analytical Solutions and Proofs of Well-Posedness for Developable, Isometric and Conformal Surfaces, *Adrien Bartoli, Yan Gérard, François Chadebecq, Toby Collins*
3. An Online Learned CRF Model for Multi-Target Tracking, *Bo Yang, Ram Nevatia*
4. Robust Visual Tracking via Multi-Task Sparse Learning, *Tianzhu Zhang, Bernard Ghanem, Si Liu, Narendra Ahuja*

### 1530-1650 Orals 2D: Statistical Methods & Learning (Exhibit Hall B)

**Chairs :** William Freeman *(MIT)*
Alex Berg *(Stony Brook Univ.)*

Format (17 min. for presentation + 3 min. for questions)

1. Learning Rotation-Aware Features: From Invariant Priors to Equivariant Descriptors, *Uwe Schmidt, Stefan Roth*
2. QsRank: Query-sensitive Hash Code Ranking for Efficient ϵ-neighbor Search, *Xiao Zhang, Lei Zhang, Heung-Yeung Shum*
3. Geodesic Flow Kernel for Unsupervised Domain Adaptation, *Boqing Gong, Yuan Shi, Fei Sha, Kristen Grauman*
4. Supervised Hashing with Kernels, *Wei Liu, Jun Wang, Rongrong Ji, Yu-Gang Jiang, Shih-Fu Chang*

### 1650-1900 Posters 2C: Video Surveillance, Statistical Methods & Learning (Ballrooms B-C & D-E: Rooms 555 & 556)

1. Online Content-aware Video Condensation, *Shikun Feng, Zhen Lei, Dong Yi, Stan Z. Li*
2. Active Attentional Sampling for Speed-up of Background Subtraction, *Hyung Jin Chang, Hawook Jeong, Jin Young Choi*
3. Bridging the Past, Present and Future: Modeling Scene Activities From Event Relationships and Global Rules, *Jagannadan Varadarajan, Rémi Emonet, Jean-Marc Odobez*
4. Background Modeling Using Adaptive Pixelwise Kernel Variances in a Hybrid Feature Space, *Manjunath Narayana, Allen Hanson, Erik Learned-Miller*
5. Video Anomaly Detection Based on Local Statistical Aggregates, *Venkatesh Saligrama, Zhu Chen*
6. Multi-View Latent Variable Discriminative Models For Action Recognition, *Yale Song, Louis-Philippe Morency, Randall Davis*
7. Sharing Features in Multi-class Boosting via Group Sparsity, *Sakrapee Paisitkriangkrai, Chunhua Shen, Anton van den Hengel*
8. Learning the Right Model: Efficient Max-Margin Learning in Laplacian CRFs, *Dhruv Batra, Ashutosh Saxena*
9. Power SVM: Generalization with Exemplar Classification Uncertainty, *Weiyu Zhang, Stella X. Yu, Shang-Hua Teng*
10. Active Image Clustering: Seeking Constraints from Humans to Complement Algorithms, *Arijit Biswas, David Jacobs*
11. Generalized Multiview Analysis: A Discriminative Latent Space, *Abhishek Sharma, Abhishek Kumar, hal Daume III, David W. Jacobs*
12. Robust Visual Domain Adaptation with Low-Rank Reconstruction, *I-Hong Jhuo, Dong Liu, Der-Tsai Lee, Shih-Fu Chang*
13. Manifold Guided Composite of Markov Random Fields for Image Modeling, *Dahua Lin, John Fisher III*
14. Image Categorization Using Fisher Kernels of Non-iid Image Models, *Ramazan Gokberk Cinbis, Jakob Verbeek, Cordelia Schmid*
15. Matrix Completion by Truncated Nuclear Norm Regularization, *Debing Zhang, Yao Hu, Jieping Ye, Xuelong Li, Xiaofei He*
16. Sign Language Recognition using Sequential Pattern Trees, *Eng-Jon Ong, Helen Cooper, Nicolas Pugeault, Richard Bowden*
17. Group Action Induced Distances for Averaging and Clustering Linear Dynamical Systems with Applications to the Analysis of Dynamic Scenes, *Bijan Afsari, Rizwan Chaudhry, Avinash Ravichandran, René Vidal*
18. Semi-Coupled Dictionary Learning with Applications to Image Super-Resolution and Photo-Sketch Image Synthesis, *Shenlong Wang, Lei Zhang, Yan Liang, Quan Pan*
19. Relaxed Collaborative Representation for Pattern Classification, *Meng Yang, Lei Zhang, David Zhang, Shenlong Wang*
20. Efficient Discriminative Learning of Parametric Nearest Neighbor Classifiers, *Ziming Zhang, Paul Sturgess, Sunando Sengupta, Nigel Crook, Philip H. S. Torr*
21. Multi-feature Metric Learning with Knowledge Transfer among Semantics and Social Tagging, *Shuhui Wang, Shuqiang Jiang, Qingming Huang, Qi Tian*
22. A Constrained Latent Variable Model, *Aydin Varol, Mathieu Salzmann, Pascal Fua, Raquel Urtasun*
23. Model Recommendation for Action Recognition, *Pyry Matikainen, Rahul Sukthankar, Martial Hebert*

24. Robust Boltzmann Machines for Recognition and Denoising, *Yichuan Tang, Ruslan Salakhutdinov, Geoffrey Hinton*
25. Nonparametric Learning for Layered Segmentation of Natural Images, *Soumya Ghosh, Erik B. Sudderth*
26. Learning Hierarchical Similarity Metrics, *Nakul Verma, Dhruv Mahajan, Sundararajan Sellamanickam, Vinod Nair*
27. Large Scale Metric Learning from Equivalence Constraints, *Martin Köstinger, Martin Hirzer, Paul Wohlhart, Peter M. Roth, Horst Bischof*
28. Top-Down Visual Saliency via Joint CRF and Dictionary Learning, *Jimei Yang, Ming-Hsuan Yang*
29. Complex Loss Optimization via Dual Decomposition, *Mani Ranjbar, Arash Vahdat, Greg Mori*
30. Affinity Learning via Self-diffusion for Image Segmentation and Clustering, *Bo Wang, Zhuowen Tu*
31. Sparse Kernel Approximations for Efficient Classification and Detection, *Andrea Vedaldi, Andrew Zisserman*
32. Non-Negative Low Rank and Sparse Graph for Semi-Supervised Learning, *Liansheng Zhuang, Haoyuan Gao, Zhouchen Lin, Yi Ma, Xin Zhang, Nenghai Yu*
33. Learning 3D Object Templates by Hierarchical Quantization of Geometry and Appearance Spaces, *Wenze Hu*
34. Power Mean SVM for Large Scale Visual Classification, *Jianxin Wu*
35. Multi-Label ReliefF and F-statistic Feature Selections for Image Annotation, *Deguang Kong, Chris Ding, Heng Huang, Haifeng Zhao*
36. Bilevel Sparse Coding for Coupled Feature Spaces, *Jianchao Yang, Zhaowen Wang, Zhe Lin, Xianbiao Shu, Thomas Huang*
37. Batch Mode Adaptive Multiple Instance Learning for Computer Vision Tasks, *Wen Li, Lixin Duan, Ivor Wai-Hung Tsang, Dong Xu*
38. Regression Tree Fields — An Efficient, Non-parametric Approach to Image Labeling Problems, *Jeremy Jancsary, Sebastian Nowozin, Toby Sharp, Carsten Rother*
39. A Regularized Spectral Algorithm for Hidden Markov Models with Applications in Computer Vision, *Hà Quang Minh, Marco Cristani, Alessandro Perina, Vittorio Murino*
40. Image Denoising: Can Plain Neural Networks Compete with BM3D? , *Harold C. Burger, Christian J Schuler, Stefan Harmeling*
41. Unsupervised Learning of Translation Invariant Occlusive Components, *Zhenwen Dai, Jörg Lücke*
42. AVA: A Large-Scale Database for Aesthetic Visual Analysis, *Naila Murray, Luca Marchesotti, Florent Perronnin*
43. Learning Structural Element Patch Models With Hierarchical Palettes, *Jeroen Chua, Inmar Givoni, Ryan Adams, Brendan Frey*
44. Chebyshev Approximations to the Histogram c2 Kernel, *Fuxin Li, Guy Lebanon, Cristian Sminchisescu*
45. Low Level Vision via Switchable Markov Random Fields, *Dahua Lin, John Fisher III*
46. Revisiting Uncertainty in Graph Cut Solutions, *Daniel Tarlow, Ryan P. Adams*
47. Boosting Algorithms for Simultaneous Feature Extraction and Selection, *Mohammad J. Saberian, Nuno Vasconcelos*
48. Iterative Nearest Neighbors for Classification and Dimensionality Reduction, *Radu Timofte, Luc Van Gool*
49. Robust Non-negative Graph Embedding: Towards Noisy Data, Unreliable Graphs, and Noisy Labels, *Hanwang Zhang, Zhengjun Zha, Shuicheng Yan, Meng Wang, Tat-seng Chua*

**1900–2000 Banquet & Awards Session**
(Exhibit Hall A)

# Wednesday, June 20

**0730–1900 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0830 Breakfast** (Prefunction/Rotunda)

**0830–1900 Exhibits** (Ballrooms B-C & D-E)

**Open during Poster Sessions**

- Same as Monday morning Exhibits

**0830–1900 Demos** (Room 551)

**Open during Poster Sessions**

- Laser Speckle Photography for Surface Tampering Detection, *MIT* (Booth 1)
- Semi-Automated Tracing of Tree Structures with Tubular Geodesics, *EPFL* (Booth 2)
- Deformable 3D Surface Registration in Real-Time, *EPFL* (Booth 2)
- The Schrodinger Distance Transform for Point-Sets and Curves, *Univ. of Florida* (Booth 3)
- A Non-Local Cost Aggregation Method for Stereo Matching, *City Univ. of Hong Kong* (Booth 4)
- Ascending Stairway Modeling: Toward Autonomous Multi-Floor Exploration, *SUNY Buffalo* (Booth 5)
- Fast and Globally Optimal Single View Reconstruction of Curved Objects, *TU Munich* (Booth 6)
- Augmented Reality via 3D Projector for Open Surgery, *Chang Bing Show Chwan Memorial Hospital* (Booth 7)
- Online Continuous Stereo Extrinsic Parameter Estimation, *CMU - Qartar* (Booth 8)
- Intelligent Situation Awareness on the EYECANE, *Konkuk Univ.* (Booth 9)
- CARE: A Dynamic Stereo Vision Sensor System for Fall Detection, *Austrian Institute of Technology* (Booth 10)
- Dance Pattern Recognition with Dynamic Vision Sensor, *Austrian Institute of Technology* (Booth 10)

**0830–1030 Posters 3A: Face & Gesture, Human ID, Document Analysis, Scene Understanding** (Ballrooms B-C & D-E: Rooms 555 & 556)

1. Edge-Preserving Photometric Stereo via Depth Fusion, *Qing Zhang, Mao Ye, Ruigang Yang, Yasuyuki Matsushita, Bennett Wilburn, Huimin Yu*
2. Hierarchical Face Parsing via Deep Learning, *Ping Luo, Xiaogang Wang, Xiaoou Tang*
3. Discriminately Decreasing Discriminability with Learned Image Filters, *Jacob Whitehill, Javier Movellan*
4. Covariance Discriminative Learning: A Natural and Efficient Approach to Image Set Classification, *Ruiping Wang, Huimin Guo, Larry S. Davis, Qionghai Dai*
5. l2,1 Regularized Correntropy for Robust Feature Selection, *Ran He, Tieniu Tan, Liang Wang, Wei-Shi Zheng*
6. Discriminant Image Filter Learning for Face Recognition with Local Binary Pattern Like Representation, *Zhen Lei, Dong Yi, Stan Z. Li*
7. Learning Hierarchical Representations for Face Verification with Convolutional Deep Belief Networks, *Gary B. Huang, Honglak Lee, Erik Learned-Miller*
8. Linear Discriminative Image Processing Operator Analysis, *Toru Tamaki, Bingzhi Yuan, Kengo Harada, Bisser Raytchev, Kazufumi Kaneda*
9. Metric Learning with Two-Dimensional Smoothness for Visual Analysis, *Xinlei Chen, Zifei Tong, Haifeng Liu, Deng Cai*
10. Memory Constrained Face Recognition, *Ashish Kapoor, Simon Baker, Sumit Basu, Eric Horvitz*
11. A Study on Human Age Estimation Under Facial Expression Changes, *Guodong Guo, Xiaolong Wang*
12. Improved Facial Expression Recognition via Uni-Hyperplane Classification, *Sien W. Chew, Simon Lucey, Patrick Lucey, Sridha Sridharan, Jeff F. Cohn*
13. Learning Active Facial Patches for Expression Analysis, *Lin Zhong, Qingshan Liu, Peng Yang, Bo Liu, Junzhou Huang, Dimitris N. Metaxas*
14. Learning Ordinal Discriminative Features for Age Estimation, *Changsheng Li, Qingshan Liu, Jing Liu, Hanqing Lu*

15. Real-time Facial Feature Detection using Conditional Regression Forests, *Matthias Dantone, Juergen Gall, Gabriele Fanelli, Luc Van Gool*
16. Sparse Representation for Face Recognition based on Discriminative Low-Rank Dictionary Learning, *Long Ma, Chunheng Wang, Baihua Xiao, Wen Zhou*
17. Neighborhood Repulsed Metric Learning for Kinship Verification, *Jiwen Lu, Junlin Hu, Xiuzhuang Zhou, Yuanyuan Shang, Yap-Peng Tan, Gang Wang*
18. On Partial Least Squares in Head Pose Estimation: How to Simultaneously Deal with Misalignment, *Murad Al Haj, Jordi Gonzàlez, Larry S. Davis*
19. 3D Constrained Local Model for Rigid and Non-Rigid Facial Tracking, *Tadas Baltrušaitis, Peter Robinson, Louis-Philippe Morency*
20. Low-Rank Matrix Recovery with Structural Incoherence for Robust Face Recognition, *Chih-Fan Chen, Chia-Po Wei, Yu-Chiang Frank Wang*
21. Image Sets Alignment for Video-based Face Recognition, *Zhen Cui, Shiguang Shan, Haihong Zhang, Shihong Lao, Xilin Chen*
22. Multi-output Laplacian Dynamic Ordinal Regression for Facial Expression Recognition and Intensity Estimation, *Ognjen Rudovic, Vladimir Pavlovic, Maja Pantic*
23. Feature-domain Super-resolution Framework for Gabor-based Face and Iris Recognition, *Kien Nguyen Thanh, Sridha Sridharan, Simon Denman, Clinton Fookes*
24. Transfer Re-identification: From Person to Set-based Verification, *Wei-Shi Zheng, Shaogang Gong, Tao Xiang*
25. "Knock! Knock! Who is it?" Probabilistic Person Identification in TV-Series, *Makarand Tapaswi, Martin Bäuml, Rainer Stiefelhagen*
26. PCCA: A New Approach for Distance Learning from Sparse Pairwise Constraints, *Alexis Mignon, Frédéric Jurie*
27. Single Image 3D Human Pose Estimation from Noisy Observations, *Edgar Simo-Serra, Arnau Ramisa, Guillem Alenyà, Carme Torras, Francesc Moreno-Noguer*
28. Customizing Biometric Authentication Systems via Discriminative Score Calibration, *Norman Poh, Massimo Tistarelli*
29. Top-Down and Bottom-up Cues for Scene Text Recognition, *Anand Mishra, Karteek Alahari, C. V. Jawahar*
30. Recognizing Scene Viewpoint using Panoramic Place Representation, *Jianxiong Xiao, Krista A. Ehinger, Aude Oliva, Antonio Torralba*
31. Semantic Structure From Motion with Points, Regions, and Objects, *Sid Yingze Bao, Mohit Bagra, Yu-Wei Chao, Silvio Savarese*
32. Small Sample Scene Categorization from Perceptual Relations, *Ilan Kadar, Ohad Ben-Shahar*
33. Bayesian Geometric Modeling of Indoor Scenes, *Luca Del Pero, Joshua Bowdish, Daniel Fried, Bonnie Kermgard, Emily Hartley, Kobus Barnard*
34. Learning Object Relationships via Graph-based Context Model, *Heesoo Myeong, Ju Yong Chang, Kyoung Mu Lee*
35. Automatic Discovery of Groups of Objects for Scene Understanding, *Congcong Li, Devi Parikh, Tsuhan Chen*
36. Context Aware Topic Model for Scene Recognition, *Zhenxing Niu, Gang Hua, Xinbo Gao, Qi Tian*
37. SUN Attribute Database: Discovering, Annotating, and Recognizing Scene Attributes, *Genevieve Patterson, James Hays*
38. RGB-(D) Scene Labeling: Features and Algorithms, *Xiaofeng Ren, Liefeng Bo, Dieter Fox*
39. Learning Sparse Covariance Patterns for Natural Scenes, *Liwei Wang, Yin Li, Jiaya Jia, Jian Sun, David Wipf, James M. Rehg*
40. Reconfigurable Models for Scene Recognition, *Sobhan Naderi Parizi, John G. Oberlin, Pedro F. Felzenszwalb*
41. Multiclass Pixel Labeling with Non-Local Matching Constraints, *Stephen Gould*
42. Image Description with a Goal: Building Efficient Discriminating Expressions for Images, *Amir Sadovnik, Yi-I Chiu, Noah Snavely, Shimon Edelman, Tsuhan Chen*
43. Nonparametric Image Parsing using Adaptive Neighbor Sets, *David Eigen, Rob Fergus*
44. Recovering Free Space of Indoor Scenes from a Single Image, *Varsha Hedau, Derek Hoiem, David Forsyth*
45. Efficient Structured Prediction for 3D Indoor Scene Understanding, *Alexander G. Schwing, Hazan Tamir, Marc Pollefeys, Raquel Urtasun*
46. Joint 2D-3D Temporally Consistent Semantic Segmentation of Street Scenes, *Georgios Floros, Bastian Leibe*

47. Robust Camera Self-Calibration from Monocular Images of Manhattan Worlds, *Horst Wildenauer, Allan Hanbury*
48. Factorizing Appearance Using Epitomic Flobject Analysis, *Patrick S. Li, Brendan J. Frey*

**1000–1030 Morning Break**

**1030–1115 Invited Talk: *Sebastian Thrun***
(Exhibit Hall A)

**1115–1235 Orals 3A: Video Analysis & Event Recognition** (Exhibit Hall A)

**Chairs :** Anthony Hoogs *(Kitware)*
Robert Collins *(Penn. State Univ.)*

Format (17 min. for presentation + 3 min. for questions)

1. Detecting Activities of Daily Living in First-person Camera Views, *Hamed Pirsiavash, Deva Ramanan*
2. Discriminative Virtual Views for Cross-View Action Recognition, *Ruonan Li, Todd Zickler*
3. Max-Margin Early Event Detectors, *Minh Hoai, Fernando De la Torre*
4. Understanding Collective Crowd Behaviors: Learning a Mixture Model of Dynamic Pedestrian-Agents, *Bolei Zhou, Xiaogang Wang, Xiaoou Tang*

**1115–1235 Orals 3B: Detecting Faces & Bodies**
(Exhibit Hall B)

**Chairs :** Shuicheng Yan *(National Univ. of Singapore)*
Erik Learned-Miller *(UMass Amherst)*

Format (17 min. for presentation + 3 min. for questions)

1. Face Detection, Pose Estimation, and Landmark Localization in the Wild, *Xiangxin Zhu, Deva Ramanan*
2. Face Alignment by Explicit Shape Regression, *Xudong Cao, Yichen Wei, Fang Wen, Jian Sun*
3. Contextual Boost for Pedestrian Detection, *Yuanyan Ding, Jing Xiao*
4. Pedestrian Detection at 100 Frames per Second, *Rodrigo Benenson, Markus Mathias, Radu Timofte, Luc Van Gool*

**1235–1335 Lunch** (Prefunction, Rotunda, 4th Floor Lobby/Café)

**1335-1530 Posters 3B: Image & Video Retrieval, Object Detection**
(Ballrooms B-C/D-E; Rooms 555/556)

1. Three Things Everyone Should Know to Improve Object Retrieval, *Relja Arandjelović, Andrew Zisserman*
2. Robust and Discriminative Distance for Multi-Instance Learning, *Hua Wang, Feiping Nie, Heng Huang*
3. Towards Compact Topical Descriptors, *Rongrong Ji, Ling-Yu Duan, Jie Chen, Wen Gao*
4. Multi-Attribute Spaces: Calibration for Attribute Fusion and Similarity Search, *Walter J. Scheirer, Neeraj Kumar, Peter N. Belhumeur, Terrance E. Boult*
5. D-Nets: Beyond Patch-Based Image Descriptors, *Felix von Hundelshausen, Rahul Sukthankar*
6. Weak Attributes for Large-Scale Image Retrieval, *Felix X. Yu, Rongrong Ji, Ming-Hen Tsai, Guangnan Ye, Shih-Fu Chang*
7. Spherical Hashing, *Jae-Pil Heo, Youngwoon Lee, Junfeng He, Shih-Fu Chang, Sung-Eui Yoon*
8. Auto Face Re-Ranking By Mining the Web and Video Archives, *Duy-Dinh Le, Shin'ichi Satoh*
9. WhittleSearch: Image Search with Relative Attribute Feedback, *Adriana Kovashka, Devi Parikh, Kristen Grauman*
10. Graph-Guided Sparse Reconstruction for Region Tagging, *Yahong Han, Fei Wu, Jian Shao, Qi Tian, Yueting Zhuang*
11. Nonparametric Kernel Estimators for Image Classification, *Barnabás Póczos, Liang Xiong, Dougal J. Sutherland, Jeff Schneider*
12. Unsupervised Metric Fusion by Cross Diffusion, *Bo Wang, Jiayan Jiang, Wei Wang, Zhi-Hua Zhou, Zhuowen Tu*
13. Mobile Product Search with Bag of Hash Bits and Boundary Reranking, *Junfeng He, Jinyuan Feng, Xianglong Liu, Tao Cheng, Tai-Hsu Lin, Hyunjin Chung, Shih-Fu Chang*
14. Object Retrieval and Localization with Spatially-constrained Similarity Measure and k-NN Re-ranking, *Xiaohui Shen, Zhe Lin, Jonathan Brandt, Shai Avidan, Ying Wu*
15. Robust Late Fusion With Rank Minimization, *Guangnan Ye, Dong Liu, I-Hong Jhuo, Shih-Fu Chang*
16. Image Search Results Refinement via Outlier Detection using Deep Contexts, *Junyang Lu, Jiazhen Zhou, Jingdong Wang, Tao Mei, Xian-Sheng Hua, Shipeng Li*
17. Fast approximate k-means via cluster closures, *Jing Wang, Jingdong Wang, Qifa Ke, Gang Zeng, Shipeng Li*
18. Leveraging Category-Level Labels For Instance-Level Image Retrieval, *Albert Gordo, José A. Rodríguez-Serrano, Florent Perronnin, Ernest Valveny*
19. A Fast Nearest Neighbor Search Algorithm by Nonlinear Embedding, *Yoonho Hwang, Bohyung Han, Hee-Kap Ahn*
20. (Unseen) Event Recognition via Semantic Compositionality, *Julian Stöttinger, Jasper R. R. Uijlings, Anand K. Pandey, Nicu Sebe, Fausto Giunchiglia*
21. The Inverted Multi-Index, *Artem Babenko, Victor Lempitsky*
22. Fast Computation of min-Hash Signatures for Image Collections, *Ondřej Chum, Jiří Matas*
23. Meta-Class Features for Large-Scale Object Categorization on a Budget, *Alessandro Bergamo, Lorenzo Torresani*
24. On the Regularization of Image Semantics by Modal Expansion, *Jose Costa Pereira, Nuno Vasconcelos*
25. Randomized Visual Phrases for Object Search, *Yuning Jiang, Jingjing Meng, Junsong Yuan*
26. Fast Search in Hamming Space with Multi-Index Hashing, *Mohammad Norouzi, Ali Punjani, David J. Fleet*
27. Augmenting Deformable Part Models with Irregular-shaped Object Patches, *Roozbeh Mottaghi*
28. Multi-Pedestrian Detection in Crowded Scenes: A Global View, *Junjie Yan, Zhen Lei, Dong Yi, Stan Z. Li*
29. Learning Shared Body Plans, *Ian Endres, Vivek Srikumar, Ming-Wei Chang, Derek Hoiem*
30. Efficient Object Detection Using Cascades of Nearest Convex Model Classifiers, *Hakan Cevikalp, Bill Triggs*
31. Occlusion Reasoning for Object Detection under Arbitrary Viewpoint, *Edward Hsiao, Martial Hebert*
32. Articulated Pose Estimation with Parts Connectivity using Discriminative Local Oriented Contours, *Norimichi Ukita*
33. Active Learning for Semantic Segmentation with Expected Change, *Alexander Vezhnevets, Joachim M. Buhmann, Vittorio Ferrari*
34. Learning an Object Class Representation on a Continuous Viewsphere, *Johannes Schels, Joerg Liebelt, Rainer Lienhart*
35. Articulated People Detection and Pose Estimation: Reshaping the Future, *Leonid Pishchulin, Arjun Jain, Mykhaylo Andriluka, Thorsten Thormählen, Bernt Schiele*

36. Vector Array based Multi-view Face Detection with Compound Exemplars, *Kai Ma, Jezekiel Ben-Arie*
37. Salient Object Detection for Searched Web Images via Global Saliency, *Peng Wang, Jingdong Wang, Gang Zeng, Jie Feng, Hongbin Zha, Shipeng Li*
38. Large-scale Knowledge Transfer for Object Localization in ImageNet, *Matthieu Guillaumin, Vittorio Ferrari*
39. Foreground Detection Using Spatiotemporal Projection Kernels, *Yair Moshe, Hagit Hel-Or, Yacov Hel-Or*
40. Unsupervised Object Class Discovery via Saliency-Guided Multiple Class Learning, *Jun-Yan Zhu, Jiajun Wu, Yichen Wei, Eric Chang, Zhuowen Tu*
41. Steerable Part Models, *Hamed Pirsiavash, Deva Ramanan*
42. Visual Stem Mapping and Geometric Tense Coding for Augmented Visual Vocabulary, *Ke Gao, Yongdong Zhang, Ping Luo, Wei Zhangi, Junhai Xia, Shouxun Lin*
43. Interactive Object Detection, *Angela Yao, Juergen Gall, Christian Leistner, Luc Van Gool*
44. Shrink Boost for Selecting Multi-LBP Histogram Features in Object Detection, *Cher Keng Heng, Sumio Yokomitsu, Yuichi Matsumoto, Hajime Tamura*
45. A Discriminative Deep Model for Pedestrian Detection with Occlusion Handling, *Wanli Ouyang, Xiaogang Wang*
46. Superedge Grouping for Object Localization by Combining Appearance and Shape Information, *Zhiqi Zhang, Sanja Fidler, Jarrell Waggoner, Yu Cao, Sven Dickinson, Jeffrey Mark Siskind, Song Wang*
47. Transferring a Generic Pedestrian Detector Towards Specific Scenes, *Meng Wang, Wei Li, Xiaogang Wang*
48. Learning Object Class Detectors from Weakly Annotated Video, *Alessandro Prest, Christian Leistner, Javier Civera, Cordelia Schmid, Vittorio Ferrari*
49. Mobile Object Detection through Client-Server based Vote Transfer, *Shyam Sunder Kumar, Min Sun, Silvio Savarese*
50. Unsupervised Incremental Learning for Improved Object Detection in a Video, *Pramod Sharma, Chang Huang, Ram Nevatia*
51. Color Attributes for Object Detection, *Fahad Shahbaz Khan, Rao Muhammad Anwer, Joost van de Weijer, Andrew D. Bagdanov, Maria Vanrell, Antonio M. López*
52. A Data Driven Method for Feature Transformation, *Mert Dikmen, Derek Hoiem, Thomas S. Huang*
53. Learning to Localize Detected Objects, *Qieyun Dai, Derek Hoiem*

### 1500–1530 Afternoon Break

### 1530-1650 Orals 3C: Vision Systems (Exhibit Hall A)

**Chairs :** Fatih Porikli *(MERL)*
Rahul Sukthankar *(Google Research & CMU)*

Format (17 min. for presentation + 3 min. for questions)

1. Street-to-Shop: Cross-Scenario Clothing Retrieval via Parts Alignment and Auxiliary Set, *Si Liu, Zheng Song, Guangcan Liu, Changsheng Xu, Hanqing Lu, Shuicheng Yan*
2. Autonomous Cleaning of Corrupted Scanned Documents - A Generative Modeling Approach, *Zhenwen Dai, Jörg Lücke*
3. A Theory of Multi-Layer Flat Refractive Geometry, *Amit Agrawal, Srikumar Ramalingam, Yuichi Taguchi, Visesh Chari*
4. Are We Ready for Autonomous Driving? The KITTI Vision Benchmark Suite, *Andreas Geiger, Philip Lenz, Raquel Urtasun*

### 1530-1650 Orals 3D: Object Recognition (Exhibit Hall B)

**Chairs :** Ales Leonardis *(Univ. of Ljubljana)*
Sinisa Todorovic *(Oregon State Univ.)*

Format (17 min. for presentation + 3 min. for questions)

1. Teaching 3D Geometry to Deformable Part Models, *Bojan Pepik, Michael Stark, Peter Gehler, Bernt Schiele*
2. Beyond Spatial Pyramids: Receptive Field Learning for Pooled Image Features, *Yangqing Jia, Chang Huang, Trevor Darrell*
3. Semantic Segmentation using Regions and Parts, *Pablo Arbeláez, Bharath Hariharan, Chunhui Gu, Saurabh Gupta, Lubomir Bourdev, Jitendra Malik*
4. Large-scale Image Classification with Trace-norm Regularization, *Zaid Harchaoui, Matthijs Douze, Mattis Paulin, Miroslav Dudik, Jérôme Malick*

## 1650-1900 Posters 3C: Object Recognition, Performance Evaluation (Ballrooms B-C & D-E: Rooms 555 & 556)

1. Conditional Regression Forests for Human Pose Estimation, *Min Sun, Pushmeet Kohli, Jamie Shotton*
2. Contour-Based Recognition, *Yong Xu, Yuhui Quan, Zhuming Zhang, Hui Ji, Cornelia Fermüller, Morimichi Nishigaki, Daniel Dementhon*
3. Estimating the Aspect Layout of Object Categories, *Yu Xiang, Silvio Savarese*
4. Submodular Dictionary Learning for Sparse Coding, *Zhuolin Jiang, Guangxiao Zhang, Larry S. Davis*
5. Hierarchical Matching with Side Information for Image Classification, *Qiang Chen, Zheng Song, Yang Hua, Zhongyang Huang, Shuicheng Yan*
6. Discriminative Feature Fusion for Image Classification, *Basura Fernando, Elisa Fromont, Damien Muselet, Marc Sebban*
7. Building a Dictionary of Image Fragments, *Zicheng Liao, Ali Farhadi, Yang Wang, Ian Endres, David Forsyth*
8. Hedging Your Bets: Optimizing Accuracy-Specificity Trade-offs in Large Scale Visual Recognition, *Jia Deng, Jonathan Krause, Alexander C. Berg, Li Fei-Fei*
9. SURFing the Point Clouds: Selective 3D Spatial Pyramids for Category-level Object Recognition, *Carolina Redondo-Cabrera, Roberto J. López-Sastre, Javier Acevedo-Rodríguez, Saturnino Maldonado-Bascón*
10. A Codebook-Free and Annotation-Free Approach for Fine-Grained Image Categorization, *Bangpeng Yao, Gary Bradski, Li Fei-Fei*
11. Discovering Localized Attributes for Fine-grained Recognition, *Kun Duan, Devi Parikh, David Crandall, Kristen Grauman*
12. Towards Good Practice in Large-scale Learning for Image Classification, *Florent Perronnin, Zeynep Akata, Zaid Harchaoui, Cordelia Schmid*
13. Learning Inter-related Visual Dictionary for Object Recognition, *Ning Zhou, Yi Shen, Jinye Peng, Jianping Fan*
14. Cats and Dogs, *Omkar M. Parkhi, Andrea Vedaldi, Andrew Zisserman, C. B. Jawahar*
15. Discriminative Spatial Saliency for Image Classification, *Gaurav Sharma, Frédéric Jurie, Cordelia Schmid*
16. Omni-Range Spatial Contexts for Visual Recognition, *Bingbing Ni, Mengdi Xu, Jinhui Tang, Shuicheng Yan, Pierre Moulin*
17. Recognizing Proxemics in Personal Photos, *Yi Yang, Simon Baker, Anitha Kannan, Deva Ramanan*
18. Structured Local Predictors for Image Labelling, *Samuel Rota Bulò, Peter Kontschieder, Marcello Pelillo, Horst Bischof*
19. Real-Time Scene Text Localization and Recognition, *Lukáš Neumann, Jiří Matas*
20. From Pictorial Structures to Deformable Structures, *Silvia Zuffi, Oren Freifeld, Michael J. Black*
21. DCMSVM: Distributed Parallel Training For Single-Machine Multiclass Classifiers, *Xufeng Han, Alexander C. Berg*
22. Understanding and Predicting Importance in Images, *Alexander C. Berg, Tamara L. Berg, Hal Daumé III, Jesse Dodge, Amit Goyal, Xufeng Han, Alyssa Mensch, Margaret Mitchell, Aneesh Sood, Karl Stratos, Kota Yamaguchi*
23. Parsing Clothing in Fashion Photographs, *Kota Yamaguchi, M. Hadi Kiapour, Luis E. Ortiz, Tamara L. Berg*
24. Weakly Supervised Sparse Coding with Geometric Consistency Pooling, *Liujuan Cao, Rongrong Ji, Yue Gao, Yi Yang, Qi Tian*
25. What Has My Classifier Learned? Visualizing the Classification Rules of Bag-of-Feature Model by Support Region Detection, *Lingqiao Liu, Lei Wang*
26. 3D Visual Phrases for Landmark Recognition, *Qiang Hao, Rui Cai, Zhiwei Li, Lei Zhang, Yanwei Pang , Feng Wu*
27. Connecting the Dots in Multi-Class Classification: From Nearest Subspace to Collaborative Representation, *Yuejie Chi, Fatih Porikli*
28. Convex Reduction of High-Dimensional Kernels for Visual Classification, *Efstratios Gavves, Cees G. M. Snoek, Arnold W. M. Smeulders*
29. Locality-constrained and Spatially Regularized Coding for Scene Categorization, *Aymen Shabou, Hervé Le Borgne*
30. RALF: A Reinforced Active Learning Formulation for Object Class Recognition, *Sandra Ebert, Mario Fritz, Bernt Schiele*

31. A 3D Extension to Cortex Like Mechanisms for 3D Object Class Recognition, *Greg Flitton, Toby P. Breckon, Najla Megherbi Bouallagui*
32. Multi-column Deep Neural Networks for Image Classification, *Dan Cireşan, Ueli Meier, Jürgen Schmidhuber*
33. Local Naive Bayes Nearest Neighbor for Image Classification, *Sancho McCann, David G. Lowe*
34. Online Incremental Attribute-based Zero-shot Learning , *Pichai Kankuekul, Aram Kawewong, Sirinart Tangruamsub, Osamu Hasegawa*
35. Pose Pooling Kernels for Sub-category Recognition, *Ning Zhang, Ryan Farrell, Trevor Darrell*
36. Cache-efficient Graph Cuts on Structured Grids, *Ondřej Jamriška, Daniel Sýkora, Alexander Hornung*
37. Evaluation of Low-Level Features and their Combinations for Complex Event Detection in Open Source Videos, *Amir Tamrakar, Saad Ali, Qian Yu, Jingen Liu, Omar Javed, Ajay Divakaran, Hui Cheng, Harpreet Sawhney*
38. Fast Recursive Ensemble Convolution of Haar-like Features, *Daniel Wesierski, Maher Mkhinini, Patrick Horain, Anna Jezierska*

**1930–2130 Cognex Open House**
(Reservation required)

Buses depart conference center at 6:00 PM and return immediately following the event.

# Thursday, June 21

**0730–1730 Registration** (Prefunction)

**0730–1730 Computer Room** (Room 558-B)

**0730–0830 Breakfast** (Prefunction/Rotunda)

**1230–1330 Box Lunch** (Prefunction, Rotunda, 4th Floor Lobby/Café)

## Human Activity Understanding from 3D Data

**Organizers:** Zhengyou Zhang
Wanqing Li
Adrian Hilton
Zicheng Liu
Philip Ogunbona
Junsong Yuan

**Location:** Ballroom C

**Schedule:** Full day

0900 **Keynote Talk:** A Minimalist Action Grammar: Theory & Applications, *Yiannis Aloimonos (Univ. of Maryland)*

**1000 Morning Break**

1030 An Online HDP-HMM for Joint Action Segmentation and Classification in Motion Capture Data, *Ava Bargi, Yi Da Xu, Massimo Piccardi*

1050 Sequence of the Most Informative Joints (SMIJ): A New Representation for Human Skeletal Action Recognition, *Ferda Ofli, Rizwan Chaudhry, Gregorij Kurillo, René Vidal, Ruzena Bajcsy*

1110 EigenJoints-based Action Recognition Using Naïve-Bayes-Nearest-Neighbor, *Xiaodong Yang, YingLi Tian*

1130 View Invariant Human Action Recognition Using Histograms of 3D Joints, *Lu Xia, Chia-Chih Chen, J.K. Aggarwal*

1150 Two-person Interaction Detection Using Body-Pose Features and Multiple Instance Learning, *Kiwon Yun, Jean Honorio, Debaleena Chattopadhyay, Tamara L. Berg, Dimitris Samaras*

**1210 Lunch Break**

1340 **Keynote Talk:** One-shot Human Pose Estimation by Inferring Dense Correspondences to the Vitruvian Manifold, *Jamie Shotton (Microsoft Research, Cambridge)*

1440 Human Pose Tracking by Parametric Annealing, *Prabhu Kaliamoorthi, Ramakrishna Kakarala*

**1500 Afternoon Break**

1530 Head Pose Estimation on Depth Data Based on Particle Swarm Optimization, *Pashalis Padeleris, Xenophon Zabulis, Antonis A. Argyros*

1550 Scene Flow by Tracking in Intensity and Depth Data, *Julian Quiroga, Frédéric Devernay, James Crowley*

1610 3D Skeletal Reconstruction from Low-resolution Multi-view Images, *Mayank Rana, Graham Taylor, Ian Spriro, Christoph Bregler*

1630 Fast Quality-guided Phase Unwrapping Algorithm for 3D Profilometry Based on Object Image Edge Detection, *Ke Chen, Jiangtao Xi, Yanguang Yu*

## Medical Computer Vision

**Organizers:** Le Lu
Yiqiang Zhan
Georg Langs
Bjoern Menze
Zhuowen Tu

**Location:** 551-A

**Schedule:** Full day

0830 **Opening Remarks**

0835 **Invited Talk:** TBA, *Linda Shapiro (Univ. of Washington)*

0920 **Invited Talk:** TBA, *Kevin Zhou (Siemens Corporate Research & Technology)*

**1005 Morning Break**

1020 Object Localization in Medical Images based on Graphical Model with Contrast and Interest-Region Terms, *Yang Song, Weidong Cai, Heng Huang, Yue Wang, David Dagan Feng*

1040 Color-Based Hybrid Reconstruction for Endoscopy, *Haluk N. Tokgozoglu, Eric M. Meisner, Michael Kazhdan, Gregory D. Hager*

1100 Randomness and Sparsity Induced Codebook Learning with Application to Cancer Image Classification, *Quannan Li, Cong Yao, Liwei Wang, Zhuowen Tu*

1120 Segmentation and Removal of Pulmonary Arteries, Veins and Left Atrial Appendage for Visualizing Coronary and Bypass Arteries, *Hua Zhong, Yefeng Zheng, Gareth Funka-Lea, Fernando Vega-Higuera*

1135 Automatic Detection of Liver Lesion from 3D Computed Tomography Images, *Dijia Wu, David Liu, Michael Suehling, Christian Tietjen, Grzegorz Soza, Kevin S. Zhou*

1150 Learning Features on Robotic Surgical Tools, *Austin Reiter, Peter K. Allen, Tao Zhao*

1205 Atlas-based Segmentation of Brain Magnetic Resonance Imaging using Random Walks, *Jean-Philippe Morin, Christian Desrosiers, Luc Duong*

**1220 Lunch Break**

1340 **Invited Talk:** TBA, *Greg Hager (Johns Hopkins Univ.)*

1425 **Invited Talk:** TBA, *Zhuowen Tu (Microsoft Research Asia & UCLA)*

**1510 Afternoon Break**

1530 Fast and Accurate Global Geodesic Registrations using Knee MRI from the Osteoarthritis Initiative, *Claire R. Donoghue, Anil Rao, Luis Pizarro, Anthony M. J. Bull, Daniel Rueckert*

1550 Fully Automated 3D Colon Segmentation for Early Detection of Colorectal Cancer based on Convex Formulation of the Active Contour Model, *Marwa Ismail, Shireen Elhabian, Aly Farag, Gerald Dryden, Albert Seow*

1610 Realistic 3D Reconstruction of the Human Teeth using Shape from Shading with Shape Priors, *Aly S. Abdelrahim, Moumen T. El-Melegy, Aly A. Farag*

1625 Combining Laplacian Eigenmaps and Vesselness FIters for Vessel Segmentation in X-ray Angiography, *Faten M'hiri, Luc Duong, Christian Desrosiers*

1640 Multiple Kernel Learning Based Modality Classification for Medical Images, *Viktor Gál, Etienne Kerre, Mike Nachtegael*

1655 Temporally Consistent Diffeomorphic Motion Estimation with Mutual Information: Application to Echocardiographic Sequences, *Zhijun Zhang, David J. Sahn, Xubo Song*

1710 **Panel Discussion:** How computer vision can help solve better medical imaging problems, or meaningful challenging medical applications for computer vision?

## Large-Scale Video Search and Mining

**Organizers:** Junsong Yuan
Shih-Fu Chang
John Smith

**Location:** 551-B

**Schedule:** Full day

0830 **Invited Talk:** TBA, *Mubarak Shah (Univ. of Central Florida)*

0920 **Invited Talk:** TBA, *Irfan Essa (Georgia Tech)*

**1010 Morning Break**

1030 **Invited Talk:** TBA, *Apostol Natsev (Google)*

1120 Multi-Video Browsing and Summarization, *Kevin Dale, Eli Shechtman, Shai Avidan, Hanspeter Pfister*

1140 Video Object Proposals, *Gilad Sharir, Tinne Tuytelaars*

**1200 Lunch Break**

1340 **Invited Talk:** TBA, *Anthony Hoogs (Kitware)*

1430 **Invited Talk:** TBA, *John Smith (IBM)*

**1520 Afternoon Break**

1540 Automatic Collection of Web Video Shots Corresponding to Specific Actions using Web Images, *Do Hang Nga, Keiji Yanai*

1600 A Content-based Video Copy Detection Method with Randomly Projected Binary Features, *Chenxia Wu, Jianke Zhu, Jiemi Zhang*

1620 Learning Codebook Weights for Action Detection, *Vijay Kumar B G, Ioannis Patras*

1640 Spatio-temporal Enhanced Sparse Feature Selection for Video Saliency Estimation, *Ye Luo, Qi Tian*

1700 A Consumer Video Search System by Audio-Visual Concept Classification, *Wei Jiang, Alexander C. Loui, Phoury Lei*

1720 Beyond Mahalanobis Distance: Learning Second-Order Discriminant Function for People Verification, *Zhen Li, Liangliang Cao, shiyu Chang, John R. Smith, Thomas S. Huang*

## Socially Intelligent Surveillance and Monitoring

**Organizers:** Vittorio Murino
Marco Cristani
Alessandro Vinciarelli

**Location:** 556-B

**Schedule:** Full day

0845 **Opening**

0900 **Invited Talk:** From the Recognition of Visual Focus of Attention in Group Conversation to the Extraction of Head and Body Pose Cues in Open Spaces, *Jean-Marc Odobez (Idiap Research Institute & EPFL)*

**1000 Morning Break**

1030 Violent Flows: Real-Time Detection of Violent Crowd Behavior, *Tal Hassner, Yossi Itcher, Orit Kliper-Gross*

1100 Parameterizing Interpersonal Behaviour with Laban Movement Analysis—A Bayesian Approach, *Kamrad Khoshhal Roudposhti, Luís Santos, Hadi Aliakbarpour, Jorge Miranda Dias*

1130 A Dynamic Curvature Based Approach For Facial Activity Analysis in 3D Space, *Shaun Canavan, Yi Sun, Xing Zhang, Lijun Yin*

**1230 Lunch Break**

1400 **Invited Talk:** Intelligent Space—Evolutionary Considerations of Human-Environment Interactions, *Elisabeth Oberzaucher (Univ. of Vienna)*

**1500 Afternoon Break**

1530 Understanding Dyadic Interactions Applying Proxemic Theory on Videosurveillance Trajectories, *Simone Calderara, Rita Cucchiara*

1600 Urban Tribes: Analyzing Group Photos from a Social Perspective., *Ana C. Murillo, Iljung S. Kwak, Lubomir Bourdev, David kriegman, Serge Belongie*

1630 **Invited Talk:** Behavior Imaging and the Study of Autism, *James M. Rehg (Georgia Tech)*

1730 **Panel Discussion**

1800 **Closing**

## Computational Cameras and Displays

**Organizers:** Gordon Wetzstein
Douglas Lanman
Ramesh Raskar
Kyros Kutulakos

**Location:** 556-A

**Schedule:** Full day

0830 **Opening Remarks**

0845 **Keynote Talk:** Visible Light Tomography in Computer Graphics, *Wolfgang Heidrich (University of British Columbia)*

0945 **Papers and Posters Fast Forward**

**1000 Morning Break**

**Paper Session I (1030-1130)**

1030 Recovering Spectral Reflectance under Commonly Available Lighting Conditions, *Jun Jiang, Jinwei Gu*

1050 Geometry-Corrected Light Field Rendering for Creating a Holographic Stereogram, *Joel Jurik, Thomas Burnett, Michael Klug, Paul Debevec*

1110 Capturing Relightable Images using Computer Monitors, *Prabath Gunawardane, Steven Scher, James Davis*

1130 **Keynote Talk:** TBA, *Marty Banks (UC Berkeley)*

**1230 Lunch Break**

**Paper Session II (1330-1410)**

1330 Light Field Processing Using GMM Patch Prior, *Kaushik Mitra, Ashok Veeraraghavan*

1350 A Kaleidoscopic Approach to Surround Geometry and Reflectance Acquisition, *Ivo Ihrke, Ilya Reshetouski, Alkhazur Manakov, Art Tevs, Michael Wand, Hans-Peter Seidel*

**Poster Session (1410-1500)**

- Photometric Modeling for Active Scenes, *Wenjia Yuan, Kristin Dana*
- Spatio-Temporal Mixing to Increase Intensity Resolution on a Single Display, *Pawan Harish, Parikshit Sakurikar, P.J. Narayanan*
- Motion-Invariant Coding Using a Programmble Apertrue Camera, *Toshiki Sonoda, Hajime Nagahara, Rin-ichiro Taniguchi*
- Personal to Shared Moments with Angled Graphs of Pictures, *Aydin Arpa, Otkrist Gupta, Gabriel Taubin, Rahul Sukthankar, Ramesh Raskar*
- Focal Length Modulation of Projection Lens for Defocus Blur Compensation, *David Samuel, Daisuke Iwai, Kosuke Sato*
- The Parabolic Multi-Mirror Camera, *Stephan Wenger, Stefan John, Marcus Magnor*
- Low-Power Mobile LCD Displays using Backlight Dimming with 2D Gradient Histogram Equalization, *Steven Scher, Dick McCartney, James Davis*
- Dynamic Reflectance Control of Photochromic Compounds for 3D High Dynamic Range Display , *Naoto Hino, Daisuke Iwai, Kosuke Sato*

**1500 Afternoon Break**

1530 **Keynote Talk:** Light Field Display in Perspective, *Michael Klug (Zebra Imaging)*

1630 **Closing Remarks and Best Paper Award**

## Frontiers in Computer Vision: Outreach and Core

**Organizers:** Alan Yuille
Anand Rangarajan
Andrew Zisserman
Serge Belongie

**Location:** Ballroom B

**Schedule:** Full day

Detailed workshop program will be provided at CVPR.

**Invited Speakers** (in alphabetical order):

- Serge Belongie (Univ. of California, San Diego)
- Jim Duncan (Yale Univ.)
- Rob Fergus (New York Univ.)
- Jitendra Malik (Univ. of California, Berkeley)
- Hartmut Neven (Google)
- Anand Rangarajan (Univ. of Florida)
- Stefano Soatto (Univ. of California, Los Angeles)
- Rick Szeliski (Microsoft Research)
- Sinisa Todorovic (Oregon State Univ.)
- Alan Yuille (Univ. of California, Los Angeles)

**Description:** This workshop addresses the outreach of computer vision to non-traditional areas and the core techniques required to make this outreach successful. The workshop combines these two topics which inspired considerable discussion at the Frontiers of Computer Vision workshop (MIT, August 2011). The growing maturity and practicality of computer vision gives considerable opportunity for outreach to science (e.g., astronomy, biology), industry, and to other disciplines (e.g., medical image processing, robotics, machine learning). But the success of this outreach, and the expansion of computer vision outside its traditional application areas, relies on the development and dissemination of core computer vision techniques. Unfortunately the complexity of computer vision, and its interdisciplinary nature, means that it currently lacks a core of vision techniques which are known to all computer vision researchers. Hence one component of this workshop is to discuss and help identify those twenty-plus vision techniques which are of use to outreach applications (and to traditional computer vision tasks) and discuss ways to disseminate them more effectively. This workshop is novel but it builds off sessions at the Frontiers of Computer Vision workshop and initiatives for establishing a core of computer vision techniques.

## Python for MATLAB Users: Promoting Open Source Computer Vision Research

**Organizers:** Matt Leotta
Amitha Perera
Eran Swears
Patrick Reynolds
Yong Zhao
Varun Ganapathi

**Time:** 0830-1700 (Full Day)

**Location:** 552-A

**Description:** This tutorial is a hands-on introduction to using Python for rapid prototyping and computer vision research. Python is presented from a MATLAB user's point of view, showing how to directly map the familiar MATLAB syntax and workflow to a very similar syntax and workflow in Python. The goal of the tutorial is to provide a free and open source alternative to MATLAB to promote open science and to better prepare students for careers outside of academia.

The target audience is students, professors, researchers, and software developers who are interested in using Python for computer vision research. In particular, there is an orientation toward developers who primarily use MATLAB for computer vision applications. While the focus is on replicating a MATLAB-like work flow using open source software, attendees are not strictly required to have MATLAB experience. Attendees are required to have some prior programming experience as well as basic familiarity with linear algebra and common computer vision algorithms.

This is a full day tutorial. The morning session provides an introduction to Python and focuses on migrating from MATLAB to Python for general scientific computing. The afternoon session focuses on applying Python to computer vision problems, using third party computer vision libraries, and other advanced topics.

Attendees who would like to participate should bring a laptop. Participating attendees will receive a USB stick containing a virtual appliance (VirtualBox) with the full scientific Python environment pre-configured, and will execute programming exercises ranging from the introductory level to the intermediate level. Attendees wishing to participate are strongly encouraged to attend both morning and afternoon sessions.

## Differential Geometric Methods for Shape Analysis and Activity Recognition

**Organizers:** Fatih Porikli
Anuj Srivastava
Pavan Turaga
Ashok Veeraraghavanition

**Time:** 0845-1215 (Half Day-Morning)

**Location:** 552-B

**Description:** Nonlinear manifolds have a special place in problem solutions where constraints of the problems restrict the domains to some interesting, structured sets. The differential geometry of these constrained spaces, or manifolds, guides us to reach more efficient solutions. Besides being mathematically appealing, the solutions based on the geometry of the underlying manifolds are often faster and more stable than their constrained optimization counterparts. This fact has been exploited in many branches of science and engineering, in developing methodologies, algorithms, and systems.

In this tutorial, we will focus on several manifolds including shape manifolds of planar closed curves, Grassmann manifolds, and manifolds of covariance matrices and affine transformations. In each case provide a mathematical background and demonstrate the use of these manifolds in shape analysis, activity classification, and pedestrian tracking applications.

## Graph Cut Based Optimization for Computer Vision

**Organizers:** Ľubor Ladický
Chris Russell
Philip H.S. Torr

**Time:** 1330-1700 (Half Day-Afternoon)

**Location:** 552-B

**Description:** Many of the problems in computer vision can be formulated as finding the max-a-posteriori (MAP) labelling of Random Field (RF) models. In these problems each pixel in an image or in a video may be associated with a unique random variable leading to very large optimization problems which can be efficiently solved using graph-cut based methods.

This tutorial will be divided into three parts. In the first, we will provide a detailed walk-through of the basic max-flow/min-cut (graph cut) algorithms, and show their direct application to problems of binary segmentation. In the second, we will show how several classes of computer vision problems can be transformed into an equivalent graph cut problem or into a series of such problems leading to an approximate solution. In the third part we present recent advances in this field and derive graph constructions for several higher order and hierarchical energies useful in computer vision and show applications in object-class segmentation, stereo reconstruction, and non-rigid structure from motion. The tutorial will be self-contained with the first two parts highly suitable for beginners, and advanced researchers should also benefit from the final section.

Discrete optimization techniques have been a usual tutorial topic at the computer vision conferences, drawing large audiences, as they are now a core part of computer vision. Within this tutorial we shall focus on new graph cut based methods, which have progressed rapidly over the past three years. We shall extensively cover all important aspects of the graph-cut methods from the basics up to the current state-of-the art.

## Structured Prediction and Learning in Computer Vision

**Organizers:** Sebastian Nowozin
Christoph Lampert

**Time:** 0830-1700 (Full Day)

**Location:** 555-A

**Description:** Powerful statistical models that can be learned efficiently from large amounts of data are currently revolutionizing computer vision. These models possess rich internal structure reflecting task-specific relations and constraints. This tutorial introduces the reader to the most popular classes of structured prediction models in computer vision. This includes discrete graphical models which we cover in detail together with a description of algorithms for both probabilistic inference and maximum *a posteriori* (MAP) inference. We discuss separately recently successful techniques for prediction in general structured models. In the second part of this tutorial we describe methods for parameter learning. We distinguish the classic maximum likelihood based methods, such as conditional random fields, from the more recent prediction-based parameter learning methods, such as structured output support vector machines. We highlight recent developments to enrich models such as kernelization and latent variable models. Throughout the tutorial we provide examples of successful application of the methods in the computer vision.

## Looking at People: The past, The Present and The Future

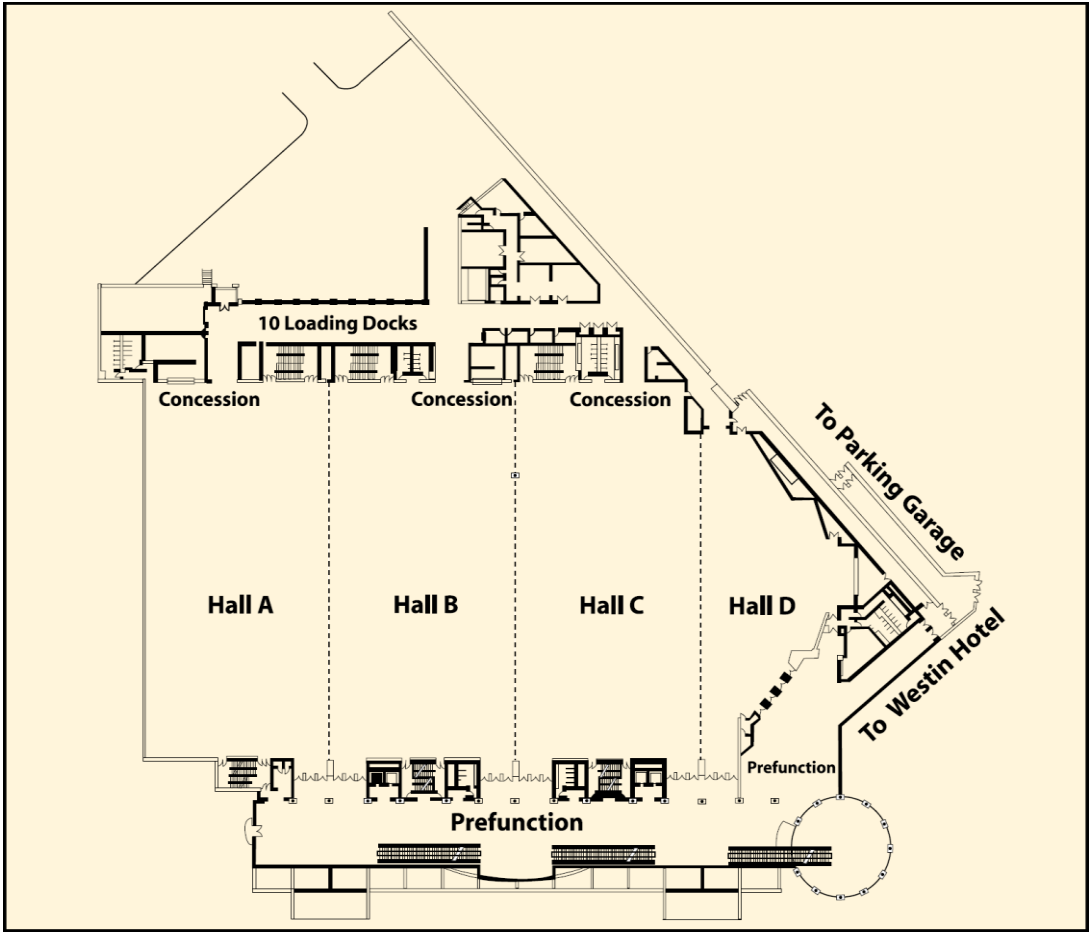
**Organizers:** Thomas B. Moeslund
Leonid Sigal
Adrian Hilton
Volker Krüger

**Time:** 0830-1700 (Full Day)

**Location:** 555-B

**Description:** Over the course of the last 10-20 years the field of computer vision has been preoccupied with the problem of looking at people. Hundreds, if not thousands, of papers have been published on the subject that span face detection, pose estimation, tracking, activity recognition, etc. This tutorial is designed to give an introduction to and assessment of state-of-the-art in this very active field. The tutorial builds on the book: Visual Analysis of Humans: Looking at People published by Springer in 2012. The book is a collection of chapters that are written by the top experts in the field; the organizers of the tutorial are also the editors of the upcoming book. The list of contributing authors and content of the book can be found here. The book is intended to serve the dual purpose of being a reference and a tutorial to the people entering the field. Because this tutorial is an extension of this idea, it will similarly consists of a series of talks by experts in the corresponding fields. Tutorial will be broken down into 4 parts: (1) detection and tracking, (2) articulated pose estimation and tracking, (3) activity recognition, and (4) applications. In each part we will have 2-3 invited lecturers. Each invited lecturer will give a talk on a focused subject within a larger context of looking at people lasting roughly 35 minutes. The lectures will be geared towards general CV audience and will outline the key advances and future challenges in the problems involved. The rough schedule, list of the proposed invited lecturers, and the topics covered are listed below.

# Exhibition Halls (Third Floor)



# Ballrooms & Meeting Rooms (Fifth Floor)