

# **2015 IEEE International Conference on Computer Vision (ICCV 2015)**

**Santiago, Chile  
7-13 December 2015**

**Pages 1-791**



**IEEE Catalog Number: CFP15198-POD  
ISBN: 978-1-4673-8392-9**

**Copyright © 2015 by the Institute of Electrical and Electronic Engineers, Inc  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\*This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP15198-POD
ISBN (Print-On-Demand):	978-1-4673-8392-9
ISBN (Online):	978-1-4673-8391-2
ISSN:	1550-5499

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2015 IEEE International Conference on Computer Vision

## ICCV 2015

### Table of Contents

Message from the General Chair and Program Chairs.....	xxxvi
Organizing Committee.....	xxxviii
ICCV 2015 Area Chairs.....	xl
ICCV 2015 Reviewers.....	xli
Sponsors.....	xlii

---

#### **O-1A: Vision and Language**

Ask Your Neurons: A Neural-Based Approach to Answering Questions about Images .....	1
<i>Mateusz Malinowski, Marcus Rohrbach, and Mario Fritz</i>	
Segment-Phrase Table for Semantic Segmentation, Visual Entailment and Paraphrasing .....	10
<i>Hamid Izadinia, Fereshteh Sadeghi, Santosh K. Divvala, Hannaneh Hajishirzi, Yejin Choi, and Ali Farhadi</i>	
Aligning Books and Movies: Towards Story-Like Visual Explanations by Watching Movies and Reading Books .....	19
<i>Yukun Zhu, Ryan Kiros, Rich Zemel, Ruslan Salakhutdinov, Raquel Urtasun, Antonio Torralba, and Sanja Fidler</i>	
Learning Query and Image Similarities with Ranking Canonical Correlation Analysis .....	28
<i>Ting Yao, Tao Mei, and Chong-Wah Ngo</i>	

#### **P-1A: Recognition, Low-Level Vision, and Biomedical Image Analysis**

Learning to See by Moving .....	37
<i>Pulkit Agrawal, João Carreira, and Jitendra Malik</i>	
Object Detection Using Generalization and Efficiency Balanced Co-Occurrence Features .....	46
<i>Haoyu Ren and Ze-Nian Li</i>	
Mining And-Or Graphs for Graph Matching and Object Discovery .....	55
<i>Quanshi Zhang, Ying Nian Wu, and Song-Chun Zhu</i>	

Pose Induction for Novel Object Categories .....	64
<i>Shubham Tulsiani, João Carreira, and Jitendra Malik</i>	
Dynamic Texture Recognition via Orthogonal Tensor Dictionary Learning .....	73
<i>Yuhui Quan, Yan Huang, and Hui Ji</i>	
Convolutional Channel Features .....	82
<i>Bin Yang, Junjie Yan, Zhen Lei, and Stan Z. Li</i>	
Local Convolutional Features with Unsupervised Training for Image Retrieval .....	91
<i>Mattis Paulin, Matthijs Douze, Zaid Harchaoui, Julien Mairal, Florent Perronin, and Cordelia Schmid</i>	
RIDE: Reversal Invariant Descriptor Enhancement .....	100
<i>Lingxi Xie, Jingdong Wang, Weiyao Lin, Bo Zhang, and Qi Tian</i>	
Discrete Tabu Search for Graph Matching .....	109
<i>Kamil Adamczewski, Yumin Suh, and Kyoung Mu Lee</i>	
Discriminative Learning of Deep Convolutional Feature Point Descriptors .....	118
<i>Edgar Simo-Serra, Eduard Trulls, Luis Ferraz, Iasonas Kokkinos, Pascal Fua, and Francesc Moreno-Noguer</i>	
Amodal Completion and Size Constancy in Natural Scenes .....	127
<i>Abhishek Kar, Shubham Tulsiani, João Carreira, and Jitendra Malik</i>	
Learning Where to Position Parts in 3D .....	136
<i>Marco Pedersoli and Tinne Tuytelaars</i>	
Query Adaptive Similarity Measure for RGB-D Object Recognition .....	145
<i>Yanhua Cheng, Rui Cai, Chi Zhang, Zhiwei Li, Xin Zhao, Kaiqi Huang, and Yong Rui</i>	
Listening with Your Eyes: Towards a Practical Visual Speech Recognition System Using Deep Boltzmann Machines .....	154
<i>Chao Sui, Mohammed Bennamoun, and Roberto Togneri</i>	
Cluster-Based Point Set Saliency .....	163
<i>Flora Ponjou Tasse, Jiri Kosinka, and Neil Dodgson</i>	
A Comprehensive Multi-Illuminant Dataset for Benchmarking of the Intrinsic Image Algorithms .....	172
<i>Shida Beigpour, Andreas Kolb, and Sven Kunz</i>	
PatchMatch-Based Automatic Lattice Detection for Near-Regular Textures .....	181
<i>Siyang Liu, Tian-Tsong Ng, Kalyan Sunkavalli, Minh N. Do, Eli Shechtman, and Nathan Carr</i>	
A Data-Driven Metric for Comprehensive Evaluation of Saliency Models .....	190
<i>Jia Li, Changqun Xia, Yafei Song, Shu Fang, and Xiaowu Chen</i>	
A Matrix Decomposition Perspective to Multiple Graph Matching .....	199
<i>Junchi Yan, Hongteng Xu, Hongyuan Zha, Xiaokang Yang, Huanxi Liu, and Stephen Chu</i>	
Fast and Effective L0 Gradient Minimization by Region Fusion .....	208
<i>Rang M. H. Nguyen and Michael S. Brown</i>	
Generic Promotion of Diffusion-Based Salient Object Detection .....	217
<i>Peng Jiang, Nuno Vasconcelos, and Jingliang Peng</i>	

Nighttime Haze Removal with Glow and Multiple Light Colors .....	226
<i>Yu Li, Robby T. Tan, and Michael S. Brown</i>	
Conformal and Low-Rank Sparse Representation for Image Restoration .....	235
<i>Jianwei Li, Xiaowu Chen, Dongqing Zou, Bo Gao, and Wei Teng</i>	
Patch Group Based Nonlocal Self-Similarity Prior Learning for Image Denoising .....	244
<i>Jun Xu, Lei Zhang, Wangmeng Zuo, David Zhang, and Xiangchu Feng</i>	
Automatic Thumbnail Generation Based on Visual Representativeness and Foreground Recognizability .....	253
<i>Jingwei Huang, Huarong Chen, Bin Wang, and Stephen Lin</i>	
SALICON: Reducing the Semantic Gap in Saliency Prediction by Adapting Deep Neural Networks .....	262
<i>Xun Huang, Chengyao Shen, Xavier Boix, and Qi Zhao</i>	
A Novel Sparsity Measure for Tensor Recovery .....	271
<i>Qian Zhao, Deyu Meng, Xu Kong, Qi Xie, Wenfei Cao, Yao Wang, and Zongben Xu</i>	
Oriented Object Proposals .....	280
<i>Shengfeng He and Rynson W. H. Lau</i>	
Learning Nonlinear Spectral Filters for Color Image Reconstruction .....	289
<i>Michael Moeller, Julia Diebold, Guy Gilboa, and Daniel Cremers</i>	
Beyond White: Ground Truth Colors for Color Constancy Correction .....	298
<i>Dongliang Cheng, Brian Price, Scott Cohen, and Michael S. Brown</i>	
RGB-Guided Hyperspectral Image Upsampling .....	307
<i>Hyeokhyen Kwon and Yu-Wing Tai</i>	
Projection onto the Manifold of Elongated Structures for Accurate Extraction .....	316
<i>Amos Sironi, Vincent Lepetit, and Pascal Fua</i>	
Naive Bayes Super-Resolution Forest .....	325
<i>Jordi Salvador and Eduardo Pérez-Pellitero</i>	
POP Image Fusion — Derivative Domain Image Fusion without Reintegration .....	334
<i>Graham D. Finlayson and Alex E. Hayes</i>	
Adaptive Spatial-Spectral Dictionary Learning for Hyperspectral Image Denoising .....	343
<i>Ying Fu, Antony Lam, Imari Sato, and Yoichi Sato</i>	
Fully Connected Guided Image Filtering .....	352
<i>Longquan Dai, Mengke Yuan, Feihu Zhang, and Xiaopeng Zhang</i>	
Segment Graph Based Image Filtering: Fast Structure-Preserving Smoothing .....	361
<i>Feihu Zhang, Longquan Dai, Shiming Xiang, and Xiaopeng Zhang</i>	
Deep Networks for Image Super-Resolution with Sparse Prior .....	370
<i>Zhaowen Wang, Ding Liu, Jianchao Yang, Wei Han, and Thomas Huang</i>	
Convolutional Color Constancy .....	379
<i>Jonathan T. Barron</i>	
Learning Ordinal Relationships for Mid-Level Vision .....	388
<i>Daniel Zoran, Phillip Isola, Dilip Krishnan, and William T. Freeman</i>	

Thin Structure Estimation with Curvature Regularization .....	397
<i>Dmitrii Marin, Yuchen Zhong, Maria Drangova, and Yuri Boykov</i>	
HARF: Hierarchy-Associated Rich Features for Salient Object Detection .....	406
<i>Wenbin Zou and Nikos Komodakis</i>	
Deep Colorization .....	415
<i>Zezhou Cheng, Qingxiong Yang, and Bin Sheng</i>	
Image Matting with KL-Divergence Based Sparse Sampling .....	424
<i>Levent Karacan, Aykut Erdem, and Erkut Erdem</i>	
Intrinsic Decomposition of Image Sequences from Local Temporal Variations .....	433
<i>Pierre-Yves Laffont and Jean-Charles Bazin</i>	
Low-Rank Tensor Approximation with Laplacian Scale Mixture Modeling for Multiframe	
Image Denoising .....	442
<i>Weisheng Dong, Guangyu Li, Guangming Shi, Xin Li, and Yi Ma</i>	
Learning Parametric Distributions for Image Super-Resolution: Where Patch Matching	
Meets Sparse Coding .....	450
<i>Yongbo Li, Weisheng Dong, Guangming Shi, and Xuemei Xie</i>	
Improving Image Restoration with Soft-Rounding .....	459
<i>Xing Mei, Honggang Qi, Bao-Gang Hu, and Siwei Lyu</i>	
See the Difference: Direct Pre-Image Reconstruction and Pose Estimation	
by Differentiating HOG .....	468
<i>Wei-Chen Chiu and Mario Fritz</i>	
An Efficient Statistical Method for Image Noise Level Estimation .....	477
<i>Guangyong Chen, Fengyuan Zhu, and Pheng Ann Heng</i>	
Contour Detection and Characterization for Asynchronous Event Sensors .....	486
<i>Francisco Barranco, Ching L. Teo, Cornelia Fermüller, and Yiannis Aloimonos</i>	
Class-Specific Image Deblurring .....	495
<i>Saeed Anwar, Cong Phuoc Huynh, and Fatih Porikli</i>	
High-for-Low and Low-for-High: Efficient Boundary Detection from Deep Object	
Features and Its Applications to High-Level Vision .....	504
<i>Gedas Bertasius, Jianbo Shi, and Lorenzo Torresani</i>	
Variational Depth Superresolution Using Example-Based Edge Representations .....	513
<i>David Ferstl, Matthias Rüdter, and Horst Bischof</i>	
Conditioned Regression Models for Non-blind Single Image Super-Resolution .....	522
<i>Gernot Riegler, Samuel Schulter, Matthias Rüdter, and Horst Bischof</i>	
Video Super-Resolution via Deep Draft-Ensemble Learning .....	531
<i>Renjie Liao, Xin Tao, Ruiyu Li, Ziyang Ma, and Jiaya Jia</i>	
Pan-Sharpener with a Hyper-Laplacian Penalty .....	540
<i>Yiyong Jiang, Xinghao Ding, Delu Zeng, Yue Huang, and John Paisley</i>	
Video Restoration Against Yin-Yang Phasing .....	549
<i>Xiaolin Wu, Zhenhao Li, and Xiaowei Deng</i>	

Rolling Shutter Super-Resolution .....	558
<i>Abhijith Punnappurath, Vijay Rengarajan, and A. N. Rajagopalan</i>	
Learning Large-Scale Automatic Image Colorization .....	567
<i>Aditya Deshpande, Jason Rock, and David Forsyth</i>	
Compression Artifacts Reduction by a Deep Convolutional Network .....	576
<i>Chao Dong, Yubin Deng, Chen Change Loy, and Xiaoou Tang</i>	
Multiple-Hypothesis Affine Region Estimation with Anisotropic LoG Filters .....	585
<i>Takahiro Hasegawa, Mitsuru Ambai, Kohta Ishikawa, Gou Koutaki, Yuji Yamauchi, Takayoshi Yamashita, and Hironobu Fujiyoshi</i>	
A Self-Paced Multiple-Instance Learning Framework for Co-Saliency Detection .....	594
<i>Dingwen Zhang, Deyu Meng, Chao Li, Lu Jiang, Qian Zhao, and Junwei Han</i>	
External Patch Prior Guided Internal Clustering for Image Denoising .....	603
<i>Fei Chen, Lei Zhang, and Huimin Yu</i>	
Self-Calibration of Optical Lenses .....	612
<i>Michael Hirsch and Bernhard Schölkopf</i>	
Illumination Robust Color Naming via Label Propagation .....	621
<i>Yuanliu Liu, Zejian Yuan, Badong Chen, Jianru Xue, and Nanning Zheng</i>	
Unsupervised Cross-Modal Synthesis of Subject-Specific Scans .....	630
<i>Raviteja Vemulapalli, Hien Van Nguyen, and Shaohua Kevin Zhou</i>	
Learning to Boost Filamentary Structure Segmentation .....	639
<i>Lin Gu and Li Cheng</i>	
Weakly-Supervised Structured Output Learning with Flexible and Latent Graphs Using High-Order Loss Functions .....	648
<i>Gustavo Carneiro, Tingying Peng, Christine Bayer, and Nassir Navab</i>	
Efficient Classifier Training to Minimize False Merges in Electron Microscopy Segmentation .....	657
<i>Toufiq Parag, Dan C. Ciresan, and Alessandro Giusti</i>	
On Statistical Analysis of Neuroimages with Imperfect Registration .....	666
<i>Won Hwa Kim, Sathya N. Ravi, Sterling C. Johnson, Ozioma C. Okonkwo, and Vikas Singh</i>	

## **S-1A: Plenary Session**

Convex Optimization with Abstract Linear Operators .....	675
<i>Steven Diamond and Stephen Boyd</i>	

## **P-1B: Recognition and 3D Computer Vision I**

Building Dynamic Cloud Maps from the Ground Up .....	684
<i>Calvin Murdock, Nathan Jacobs, and Robert Pless</i>	
A Versatile Learning-Based 3D Temporal Tracker: Scalable, Robust, Online .....	693
<i>David Joseph Tan, Federico Tombari, Slobodan Ilic, and Nassir Navab</i>	
Realtime Edge-Based Visual Odometry for a Monocular Camera .....	702
<i>Juan José Tarrío and Sol Pedre</i>	

Fill and Transfer: A Simple Physics-Based Approach for Containability Reasoning .....	711
<i>Lap-Fai Yu, Noah Duncan, and Sai-Kit Yeung</i>	
On Linear Structure from Motion for Light Field Cameras .....	720
<i>Ole Johannsen, Antonin Sulc, and Bastian Goldluecke</i>	
3D Object Reconstruction from Hand-Object Interactions .....	729
<i>Dimitrios Tzionas and Juergen Gall</i>	
Minimal Solvers for 3D Geometry from Satellite Imagery .....	738
<i>Enliang Zheng, Ke Wang, Enrique Dunn, and Jan-Michael Frahm</i>	
An Efficient Minimal Solution for Multi-camera Motion .....	747
<i>Jonathan Ventura, Clemens Arth, and Vincent Lepetit</i>	
Learning Shape, Motion and Elastic Models in Force Space .....	756
<i>Antonio Agudo and Francesc Moreno-Noguer</i>	
A Versatile Scene Model with Differentiable Visibility Applied to Generative Pose Estimation .....	765
<i>Helge Rhodin, Nadia Robertini, Christian Richardt, Hans-Peter Seidel, and Christian Theobalt</i>	
Semantic Pose Using Deep Networks Trained on Synthetic RGB-D .....	774
<i>Jeremie Papon and Markus Schoeler</i>	
Exploiting High Level Scene Cues in Stereo Reconstruction .....	783
<i>Simon Hadfield and Richard Bowden</i>	
Point Triangulation through Polyhedron Collapse Using the $\ell^\infty$ Norm .....	792
<i>Simon Donné, Bart Goossens, and Wilfried Philips</i>	
Optimizing the Viewing Graph for Structure-from-Motion .....	801
<i>Chris Sweeney, Torsten Sattler, Tobias Höllerer, Matthew Turk, and Marc Pollefeys</i>	
Intrinsic Scene Decomposition from RGB-D Images .....	810
<i>Mohammed Hachama, Bernard Ghanem, and Peter Wonka</i>	
3D Hand Pose Estimation Using Randomized Decision Forest with Segmentation Index Points .....	819
<i>Peiyi Li, Haibin Ling, Xi Li, and Chunyuan Liao</i>	
Accurate Camera Calibration Robust to Defocus Using a Smartphone .....	828
<i>Hyowon Ha, Yunsu Bok, Kyungdon Joo, Jiyoung Jung, and In So Kweon</i>	
High Quality Structure from Small Motion for Rolling Shutter Cameras .....	837
<i>Sunghoon Im, Hyowon Ha, Gyeongmin Choe, Hae-Gon Jeon, Kyungdon Joo, and In So Kweon</i>	
Photogeometric Scene Flow for High-Detail Dynamic 3D Reconstruction .....	846
<i>Paulo F. U. Gotardo, Tomas Simon, Yaser Sheikh, and Iain Matthews</i>	
Blur-Aware Disparity Estimation from Defocus Stereo Images .....	855
<i>Ching-Hui Chen, Hui Zhou, and Timo Ahonen</i>	
Global Structure-from-Motion by Similarity Averaging .....	864
<i>Zhaopeng Cui and Ping Tan</i>	



Massively Parallel Multiview Stereopsis by Surface Normal Diffusion .....	873
<i>Silvano Galliani, Katrin Lasinger, and Konrad Schindler</i>	
Variational PatchMatch MultiView Reconstruction and Refinement .....	882
<i>Philipp Heise, Brian Jensen, Sebastian Klose, and Alois Knoll</i>	
As-Rigid-as-Possible Volumetric Shape-from-Template .....	891
<i>Shaifali Parashar, Daniel Pizarro, Adrien Bartoli, and Toby Collins</i>	
General Dynamic Scene Reconstruction from Multiple View Video .....	900
<i>Armin Mustafa, Hansung Kim, Jean-Yves Guillemaut, and Adrian Hilton</i>	
The Joint Image Handbook .....	909
<i>Matthew Trager, Martial Hebert, and Jean Ponce</i>	
Direct, Dense, and Deformable: Template-Based Non-rigid 3D Reconstruction from RGB Video .....	918
<i>Rui Yu, Chris Russell, Neill D. F. Campbell, and Lourdes Agapito</i>	
Single Image Pop-Up from Discriminatively Learned Parts .....	927
<i>Menglong Zhu, Xiaowei Zhou, and Kostas Daniilidis</i>	
Learning Informative Edge Maps for Indoor Scene Layout Prediction .....	936
<i>Arun Mallya and Svetlana Lazebnik</i>	
Multi-view Convolutional Neural Networks for 3D Shape Recognition .....	945
<i>Hang Su, Subhransu Maji, Evangelos Kalogerakis, and Erik Learned-Miller</i>	
Learning Analysis-by-Synthesis for 6D Pose Estimation in RGB-D Images .....	954
<i>Alexander Krull, Eric Brachmann, Frank Michel, Michael Ying Yang, Stefan Gumhold, and Carsten Rother</i>	
3D Surface Profilometry Using Phase Shifting of De Bruijn Pattern .....	963
<i>Matea Đonlić, Tomislav Petković, and Tomislav Pribanić</i>	
A Deep Visual Correspondence Embedding Model for Stereo Matching Costs .....	972
<i>Zhuoyuan Chen, Xun Sun, Liang Wang, Yinan Yu, and Chang Huang</i>	
Learning Concept Embeddings with Combined Human-Machine Expertise .....	981
<i>Michael J. Wilber, Iljung S. Kwak, David Kriegman, and Serge Belongie</i>	
Deep Multi-patch Aggregation Network for Image Style, Aesthetics, and Quality Estimation .....	990
<i>Xin Lu, Zhe Lin, Xiaohui Shen, Radomir Měch, and James Z. Wang</i>	
Towards Computational Baby Learning: A Weakly-Supervised Approach for Object Detection .....	999
<i>Xiaodan Liang, Si Liu, Yunchao Wei, Luoqi Liu, Liang Lin, and Shuicheng Yan</i>	
Improving Image Classification with Location Context .....	1008
<i>Kevin Tang, Manohar Paluri, Li Fei-Fei, Rob Fergus, and Lubomir Bourdev</i>	
HICO: A Benchmark for Recognizing Human-Object Interactions in Images .....	1017
<i>Yu-Wei Chao, Zhan Wang, Yugeng He, Jiaxuan Wang, and Jia Deng</i>	
Delving Deep into Rectifiers: Surpassing Human-Level Performance on ImageNet Classification .....	1026
<i>Kaiming He, Xiangyu Zhang, Shaoqing Ren, and Jian Sun</i>	

Continuous Pose Estimation with a Spatial Ensemble of Fisher Regressors .....	1035
<i>Michele Fenzi, Laura Leal-Taixé, Jörn Ostermann, and Tinne Tuytelaars</i>	
Adaptive Hashing for Fast Similarity Search .....	1044
<i>Fatih Cakir and Stan Sclaroff</i>	
Single Image 3D without a Single 3D Image .....	1053
<i>David F. Fouhey, Wajahat Hussain, Abhinav Gupta, and Martial Hebert</i>	
Cross-Domain Image Retrieval with a Dual Attribute-Aware Ranking Network .....	1062
<i>Junshi Huang, Rogerio Feris, Qiang Chen, and Shuicheng Yan</i>	
Attribute-Graph: A Graph Based Approach to Image Ranking .....	1071
<i>Nikita Prabhu and R. Venkatesh Babu</i>	
Contextual Action Recognition with R <sup>*</sup> CNN .....	1080
<i>Georgia Gkioxari, Ross Girshick, and Jitendra Malik</i>	
What Makes an Object Memorable? .....	1089
<i>Rachit Dubey, Joshua Peterson, Aditya Khosla, Ming-Hsuan Yang, and Bernard Ghanem</i>	
kNN Hashing with Factorized Neighborhood Representation .....	1098
<i>Kun Ding, Chunlei Huo, Bin Fan, and Chunhong Pan</i>	
Multi-View Complementary Hash Tables for Nearest Neighbor Search .....	1107
<i>Xianglong Liu, Lei Huang, Cheng Deng, Jiwen Lu, and Bo Lang</i>	
Scalable Person Re-identification: A Benchmark .....	1116
<i>Liang Zheng, Liyue Shen, Lu Tian, Shengjin Wang, Jingdong Wang, and Qi Tian</i>	
MMSS: Multi-modal Sharable and Specific Feature Learning for RGB-D Object Recognition .....	1125
<i>Anran Wang, Jianfei Cai, Jiwen Lu, and Tat-Jen Cham</i>	
Object Detection via a Multi-region and Semantic Segmentation-Aware CNN Model .....	1134
<i>Spyros Gidaris and Nikos Komodakis</i>	
Neural Activation Constellations: Unsupervised Part Model Discovery with Convolutional Networks .....	1143
<i>Marcel Simon and Erik Rodner</i>	
Cascaded Sparse Spatial Bins for Efficient and Effective Generic Object Detection .....	1152
<i>David Novotny and Jiri Matas</i>	
Probabilistic Label Relation Graphs with Ising Models .....	1161
<i>Nan Ding, Jia Deng, Kevin P. Murphy, and Hartmut Neven</i>	
Predicting Good Features for Image Geo-Localization Using Per-Bundle VLAD .....	1170
<i>Hyo Jin Kim, Enrique Dunn, and Jan-Michael Frahm</i>	
Task-Driven Feature Pooling for Image Classification .....	1179
<i>Guo-Sen Xie, Xu-Yao Zhang, Xiangbo Shu, Shuicheng Yan, and Cheng-Lin Liu</i>	
Cutting Edge: Soft Correspondences in Multimodal Scene Parsing .....	1188
<i>Sarah Taghavi Namin, Mohammad Najafi, Mathieu Salzmann, and Lars Petersson</i>	
One Shot Learning via Compositions of Meaningful Patches .....	1197
<i>Alex Wong and Alan Yuille</i>	

FASText: Efficient Unconstrained Scene Text Detector .....	1206
<i>Michal Buřta, Lukáš Neumann, and Jiří Matas</i>	
Multi-scale Recognition with DAG-CNNs .....	1215
<i>Songfan Yang and Deva Ramanan</i>	
Relaxed Multiple-Instance SVM with Application to Object Discovery .....	1224
<i>Xinggang Wang, Zhuotun Zhu, Cong Yao, and Xiang Bai</i>	
Im2Calories: Towards an Automated Mobile Vision Food Diary .....	1233
<i>Austin Myers, Nick Johnston, Vivek Rathod, Anoop Korattikara, Alex Gorban, Nathan Silberman, Sergio Guadarrama, George Papandreou, Jonathan Huang, and Kevin Murphy</i>	
LEWIS: Latent Embeddings for Word Images and Their Semantics .....	1242
<i>Albert Gordo, Jon Almazán, Naila Murray, and Florent Perronin</i>	
Per-Sample Kernel Adaptation for Visual Recognition and Grouping .....	1251
<i>Borislav Antic and Björn Ommer</i>	
Fine-Grained Change Detection of Misaligned Scenes with Varied Illuminations .....	1260
<i>Wei Feng, Fei-Peng Tian, Qian Zhang, Nan Zhang, Liang Wan, and Jizhou Sun</i>	
Aggregating Local Deep Features for Image Retrieval .....	1269
<i>Artem Babenko Yandex and Victor Lempitsky</i>	
Learning Deep Object Detectors from 3D Models .....	1278
<i>Xingchao Peng, Baochen Sun, Karim Ali, and Kate Saenko</i>	
Harvesting Discriminative Meta Objects with Deep CNN Features for Scene Classification .....	1287
<i>Ruobing Wu, Baoyuan Wang, Wenping Wang, and Yizhou Yu</i>	
Scalable Nonlinear Embeddings for Semantic Category-Based Image Retrieval .....	1296
<i>Gaurav Sharma and Bernt Schiele</i>	
Person Re-Identification Ranking Optimisation by Discriminant Context Information Analysis .....	1305
<i>Jorge García, Niki Martinel, Christian Micheloni, and Alfredo Gardel</i>	
Unsupervised Generation of a View Point Annotated Car Dataset from Videos .....	1314
<i>Nima Sedaghat and Thomas Brox</i>	
<b>O-1B: 3D Vision</b>	
Structured Indoor Modeling .....	1323
<i>Satoshi Ikehata, Hang Yang, and Yasutaka Furukawa</i>	
3D Time-Lapse Reconstruction from Internet Photos .....	1332
<i>Ricardo Martin-Brualla, David Gallup, and Steven M. Seitz</i>	
Global, Dense Multiscale Reconstruction for a Billion Points .....	1341
<i>Benjamin Ummenhofer and Thomas Brox</i>	
On the Visibility of Point Clouds .....	1350
<i>Sagi Katz and Ayellet Tal</i>	

## **O-2A: Segmentation, Edges and Saliency**

Weakly Supervised Graph Based Semantic Segmentation by Learning Communities of Image-Parts .....	1359
<i>Niloufar Pourian, S. Karthikeyan, and B. S. Manjunath</i>	
Piecewise Flat Embedding for Image Segmentation .....	1368
<i>Yizhou Yu, Chaowei Fang, and Zicheng Liao</i>	
Semantic Image Segmentation via Deep Parsing Network .....	1377
<i>Ziwei Liu, Xiaoxiao Li, Ping Luo, Chen-Change Loy, and Xiaoou Tang</i>	
Human Parsing with Contextualized Convolutional Neural Network .....	1386
<i>Xiaodan Liang, Chunyan Xu, Xiaohui Shen, Jianchao Yang, Si Liu, Jinhui Tang, Liang Lin, and Shuicheng Yan</i>	
Holistically-Nested Edge Detection .....	1395
<i>Saining Xie and Zhuowen Tu</i>	
Minimum Barrier Salient Object Detection at 80 FPS .....	1404
<i>Jianming Zhang, Stan Sclaroff, Zhe Lin, Xiaohui Shen, Brian Price, and Radomír Měch</i>	

## **O-2B: Learning Representations and Attributes**

Learning Image Representations Tied to Ego-Motion .....	1413
<i>Dinesh Jayaraman and Kristen Grauman</i>	
Unsupervised Visual Representation Learning by Context Prediction .....	1422
<i>Carl Doersch, Abhinav Gupta, and Alexei A. Efros</i>	
Webly Supervised Learning of Convolutional Networks .....	1431
<i>Xinlei Chen and Abhinav Gupta</i>	
Fast R-CNN .....	1440
<i>Ross Girshick</i>	
Bilinear CNN Models for Fine-Grained Visual Recognition .....	1449
<i>Tsung-Yu Lin, Aruni RoyChowdhury, and Subhansu Maji</i>	
Discovering the Spatial Extent of Relative Attributes .....	1458
<i>Fanyi Xiao and Yong Jae Lee</i>	

## **O-2C: Statistical Methods and Learning**

Deep Neural Decision Forests .....	1467
<i>Peter Kotschieder, Madalina Fiterau, Antonio Criminisi, and Samuel Rota Bulò</i>	
Deep Fried Convnets .....	1476
<i>Zichao Yang, Marcin Moczulski, Misha Denil, Nando de Freitas, Alex Smola, Le Song, and Ziyu Wang</i>	
Semantic Component Analysis .....	1484
<i>Calvin Murdock and Fernando De la Torre</i>	

Low-Rank Matrix Factorization under General Mixture Noise Distributions .....	1493
<i>Xiangyong Cao, Yang Chen, Qian Zhao, Deyu Meng, Yao Wang, Dong Wang, and Zongben Xu</i>	
Web-Scale Image Clustering Revisited .....	1502
<i>Yannis Avrithis, Yannis Kalantidis, Evangelos Anagnostopoulos, and Ioannis Z. Emiris</i>	
Learning Discriminative Reconstructions for Unsupervised Outlier Removal .....	1511
<i>Yan Xia, Xudong Cao, Fang Wen, Gang Hua, and Jian Sun</i>	
<b>P-2A: Optimization, Segmentation, and Recognition</b>	
Learning Deconvolution Network for Semantic Segmentation .....	1520
<i>Hyeonwoo Noh, Seunghoon Hong, and Bohyung Han</i>	
Conditional Random Fields as Recurrent Neural Networks .....	1529
<i>Shuai Zheng, Sadeep Jayasumana, Bernardino Romera-Paredes, Vibhav Vineet, Zhizhong Su, Dalong Du, Chang Huang, and Philip H. S. Torr</i>	
The One Triangle Three Parallelograms Sampling Strategy and Its Application in Shape Regression .....	1538
<i>Mikael Nilsson</i>	
Boosting Object Proposals: From Pascal to COCO .....	1546
<i>Jordi Pont-Tuset and Luc Van Gool</i>	
Secrets of GrabCut and Kernel K-Means .....	1555
<i>Meng Tang, Ismail Ben Ayed, Dmitrii Marin, and Yuri Boykov</i>	
Video Matting via Sparse and Low-Rank Representation .....	1564
<i>Dongqing Zou, Xiaowu Chen, Guangying Cao, and Xiaogang Wang</i>	
Joint Object and Part Segmentation Using Deep Learned Potentials .....	1573
<i>Peng Wang, Xiaohui Shen, Zhe Lin, Scott Cohen, Brian Price, and Alan Yuille</i>	
Low-Rank Tensor Constrained Multiview Subspace Clustering .....	1582
<i>Changqing Zhang, Huazhu Fu, Si Liu, Guangcan Liu, and Xiaochun Cao</i>	
BodyPrint: Pose Invariant 3D Shape Matching of Human Bodies .....	1591
<i>Jiangping Wang, Kai Ma, Vivek Kumar Singh, Thomas Huang, and Terrence Chen</i>	
The Middle Child Problem: Revisiting Parametric Min-Cut and Seeds for Object Proposals .....	1600
<i>Ahmad Humayun, Fuxin Li, and James M. Rehg</i>	
Contour Guided Hierarchical Model for Shape Matching .....	1609
<i>Yuanqi Su, Yuehu Liu, Bonan Cuan, and Nanning Zheng</i>	
Robust Image Segmentation Using Contour-Guided Color Palettes .....	1618
<i>Xiang Fu, Chien-Yi Wang, Chen Chen, Changhu Wang, and C.-C. Jay Kuo</i>	
Joint Optimization of Segmentation and Color Clustering .....	1626
<i>Ekaterina Lobacheva, Olga Veksler, and Yuri Boykov</i>	
BoxSup: Exploiting Bounding Boxes to Supervise Convolutional Networks for Semantic Segmentation .....	1635
<i>Jifeng Dai, Kaiming He, and Jian Sun</i>	

Detection and Segmentation of 2D Curved Reflection Symmetric Structures .....	1644
<i>Ching L. Teo, Cornelia Fermüller, and Yiannis Aloimonos</i>	
Unsupervised Tube Extraction Using Transductive Learning and Dense Trajectories .....	1653
<i>Mihai Marian Puscas, Enver Sangineto, Dubravko Culibrk, and Nicu Sebe</i>	
Compositional Hierarchical Representation of Shape Manifolds for Classification of Non-manifold Shapes .....	1662
<i>Mete Ozay, Umit Rusen Aktas, Jeremy L. Wyatt, and Aleš Leonardis</i>	
Shell PCA: Statistical Shape Modelling in Shell Space .....	1671
<i>Chao Zhang, Behrend Heeren, Martin Rumpf, and William A. P. Smith</i>	
Learning to Combine Mid-Level Cues for Object Proposal Generation .....	1680
<i>Tom Lee, Sanja Fidler, and Sven Dickinson</i>	
Enhancing Road Maps by Parsing Aerial Images Around the World .....	1689
<i>Gellért Mátyus, Shenlong Wang, Sanja Fidler, and Raquel Urtasun</i>	
Probabilistic Appearance Models for Segmentation and Classification .....	1698
<i>Julia Krüger, Jan Ehrhardt, and Heinz Handels</i>	
A Randomized Ensemble Approach to Industrial CT Segmentation .....	1707
<i>Hyojin Kim, Jayaraman J. Thiagarajan, and Peer-Timo Bremer</i>	
Semi-Supervised Normalized Cuts for Image Segmentation .....	1716
<i>Selene E. Chew and Nathan D. Cahill</i>	
StereoSnakes: Contour Based Consistent Object Extraction for Stereo Images .....	1724
<i>Ran Ju, Tongwei Ren, and Gangshan Wu</i>	
Semantic Segmentation of RGBD Images with Mutex Constraints .....	1733
<i>Zhuo Deng, Sinisa Todorovic, and Longin Jan Latecki</i>	
Weakly- and Semi-Supervised Learning of a Deep Convolutional Network for Semantic Image Segmentation .....	1742
<i>George Papandreou, Liang-Chieh Chen, Kevin P. Murphy, and Alan L. Yuille</i>	
Efficient Decomposition of Image and Mesh Graphs by Lifted Multicuts .....	1751
<i>M. Keuper, E. Levinkov, N. Bonneel, G. Lavoué, T. Brox, and B. Andres</i>	
Parsimonious Labeling .....	1760
<i>Puneet K. Dokania and M. Pawan Kumar</i>	
Volumetric Bias in Segmentation and Reconstruction: Secrets and Solutions .....	1769
<i>Yuri Boykov, Hossam Isack, Carl Olsson, and Ismail Ben Ayed</i>	
Entropy Minimization for Convex Relaxation Approaches .....	1778
<i>Mohamed Souiai, Martin R. Oswald, Youngwook Kee, Junmo Kim, Marc Pollefeys, and Daniel Cremers</i>	
Adaptively Unified Semi-Supervised Dictionary Learning with Active Points .....	1787
<i>Xiaobo Wang, Xiaojie Guo, and Stan Z. Li</i>	
Constrained Convolutional Neural Networks for Weakly Supervised Segmentation .....	1796
<i>Deepak Pathak, Philipp Krähenbühl, and Trevor Darrell</i>	
A Multiscale Variable-Grouping Framework for MRF Energy Minimization .....	1805
<i>Omer Meir, Meirav Galun, Stav Yagev, Ronen Basri, and Irad Yavneh</i>	

Inferring M-Best Diverse Labelings in a Single One .....	1814
<i>Alexander Kirillov, Bogdan Savchynskyy, Dmitriy Schlesinger, Dmitry Vetrov, and Carsten Rother</i>	
Convolutional Sparse Coding for Image Super-Resolution .....	1823
<i>Shuhang Gu, Wangmeng Zuo, Qi Xie, Deyu Meng, Xiangchu Feng, and Lei Zhang</i>	
A Wavefront Marching Method for Solving the Eikonal Equation on Cartesian Grids .....	1832
<i>B. Cancela, M. Ortega, and M. G. Penedo</i>	
A Projection Free Method for Generalized Eigenvalue Problem with a Nonsmooth Regularizer .....	1841
<i>Seong Jae Hwang, Maxwell D. Collins, Sathya N. Ravi, Vamsi K. Ithapu, Nagesh Adluru, Sterling C. Johnson, and Vikas Singh</i>	
Optimizing Expected Intersection-Over-Union with Candidate-Constrained CRFs .....	1850
<i>Faruk Ahmed, Dany Tarlow, and Dhruv Batra</i>	
Higher-Order Inference for Multi-class Log-Supermodular Models .....	1859
<i>Jian Zhang, Josip Djolonga, and Andreas Krause</i>	
Depth-Based Hand Pose Estimation: Data, Methods, and Challenges .....	1868
<i>James S. Supančič III, Grégory Rogez, Yi Yang, Jamie Shotton, and Deva Ramanan</i>	
Adaptive Dither Voting for Robust Spatial Verification .....	1877
<i>Xiaomeng Wu and Kunio Kashino</i>	
Alternating Co-Quantization for Cross-Modal Hashing .....	1886
<i>Go Irie, Hiroyuki Arai, and Yukinobu Taniguchi</i>	
Learning Deep Representation with Large-Scale Attributes .....	1895
<i>Wanli Ouyang, Hongyang Li, Xingyu Zeng, and Xiaogang Wang</i>	
Deep Learning Strong Parts for Pedestrian Detection .....	1904
<i>Yonglong Tian, Ping Luo, Xiaogang Wang, and Xiaoou Tang</i>	
Flowing ConvNets for Human Pose Estimation in Videos .....	1913
<i>Tomas Pfister, James Charles, and Andrew Zisserman</i>	
Top Rank Supervised Binary Coding for Visual Search .....	1922
<i>Dongjin Song, Wei Liu, Rongrong Ji, David A. Meyer, and John R. Smith</i>	
BubbLeNet: Foveated Imaging for Visual Discovery .....	1931
<i>Kevin Matzen and Noah Snavely</i>	
PQTable: Fast Exact Asymmetric Distance Neighbor Search for Product Quantization Using Hash Tables .....	1940
<i>Yusuke Matsui, Toshihiko Yamasaki, and Kiyoharu Aizawa</i>	
Lending A Hand: Detecting Hands and Recognizing Activities in Complex Egocentric Interactions .....	1949
<i>Sven Bambach, Stefan Lee, David J. Crandall, and Chen Yu</i>	
Fast and Accurate Head Pose Estimation via Random Projection Forests .....	1958
<i>Donghoon Lee, Ming-Hsuan Yang, and Songhwai Oh</i>	
An MRF-Poselets Model for Detecting Highly Articulated Humans .....	1967
<i>Duc Thanh Nguyen, Minh-Khoi Tran, and Sai-Kit Yeung</i>	

Beyond Tree Structure Models: A New Occlusion Aware Graphical Model for Human Pose Estimation .....	1976
<i>Lianrui Fu, Junge Zhang, and Kaiqi Huang</i>	
Relaxing from Vocabulary: Robust Weakly-Supervised Deep Learning for Vocabulary-Free Image Tagging .....	1985
<i>Jianlong Fu, Yue Wu, Tao Mei, Jinqiao Wang, Hanqing Lu, and Yong Rui</i>	
Visual Phrases for Exemplar Face Detection .....	1994
<i>Vijay Kumar, Anoop Namboodiri, and C. V. Jawahar</i>	
Spatial Semantic Regularisation for Large Scale Object Detection .....	2003
<i>Damian Mrowca, Marcus Rohrbach, Judy Hoffman, Ronghang Hu, Kate Saenko, and Trevor Darrell</i>	
Human Pose Estimation in Videos .....	2012
<i>Dong Zhang and Mubarak Shah</i>	
Contour Box: Rejecting Object Proposals without Explicit Closed Contours .....	2021
<i>Cewu Lu, Shu Liu, Jiaya Jia, and Chi-Keung Tang</i>	

### **O-3A: Registration, Alignment and Stereo**

Registering Images to Untextured Geometry Using Average Shading Gradients .....	2030
<i>Tobias Plötz and Stefan Roth</i>	
Robust Nonrigid Registration by Convex Optimization .....	2039
<i>Qifeng Chen and Vladlen Koltun</i>	
Robust and Optimal Sum-of-Squares-Based Point-to-Plane Registration of Image Sets and Structured Scenes .....	2048
<i>Danda Pani Paudel, Adlane Habed, Cédric Demonceaux, and Pascal Vasseur</i>	
MeshStereo: A Global Stereo Model with Mesh Alignment Regularization for View Interpolation .....	2057
<i>Chi Zhang, Zhiwei Li, Yanhua Cheng, Rui Cai, Hongyang Chao, and Yong Rui</i>	
CV-HAZOP: Introducing Test Data Validation for Computer Vision .....	2066
<i>Oliver Zendel, Markus Murschitz, Martin Humenberger, and Wolfgang Herzner</i>	

### **P-3A: Recognition and 3D Computer Vision II**

Structure from Motion Using Structure-Less Resection .....	2075
<i>Enliang Zheng and Changchang Wu</i>	
Joint Camera Clustering and Surface Segmentation for Large-Scale Multi-view Stereo .....	2084
<i>Runze Zhang, Shiwei Li, Tian Fang, Siyu Zhu, and Long Quan</i>	
Higher-Order CRF Structural Segmentation of 3D Reconstructed Surfaces .....	2093
<i>Jingbo Liu, Jinglu Wang, Tian Fang, Chiew-Lan Tai, and Long Quan</i>	
Hyperpoints and Fine Vocabularies for Large-Scale Location Recognition .....	2102
<i>Torsten Sattler, Michal Havlena, Filip Radenović, Konrad Schindler, and Marc Pollefeys</i>	
Globally Optimal 2D-3D Registration from Points or Lines without Correspondences .....	2111
<i>Mark Brown, David Windridge, and Jean-Yves Guillemaut</i>	



The HCI Stereo Metrics: Geometry-Aware Performance Analysis of Stereo Algorithms .....	2120
<i>Katrin Honauer, Lena Maier-Hein, and Daniel Kondermann</i>	
Merging the Unmatchable: Stitching Visually Disconnected SfM Models .....	2129
<i>Andrea Cohen, Torsten Sattler, and Marc Pollefeys</i>	
3D Fragment Reassembly Using Integrated Template Guidance and Fracture-Region Matching .....	2138
<i>Kang Zhang, Wuyi Yu, Mary Manhein, Warren Waggenspack, and Xin Li</i>	
Procedural Editing of 3D Building Point Clouds .....	2147
<i>Ilke Demir, Daniel G. Aliaga, and Bedrich Benes</i>	
Semantically-Aware Aerial Reconstruction from Multi-modal Data .....	2156
<i>Randi Cabezas, Julian Straub, and John W. Fisher III</i>	
Guaranteed Outlier Removal for Rotation Search .....	2165
<i>Álvaro Parra Bustos and Tat-Jun Chin</i>	
Peeking Template Matching for Depth Extension .....	2174
<i>Simon Korman, Eyal Ofek, and Shai Avidan</i>	
Deformable 3D Fusion: From Partial Dynamic 3D Observations to Complete 4D Models .....	2183
<i>Weipeng Xu, Mathieu Salzmann, Yongtian Wang, and Yue Liu</i>	
Non-parametric Structure-Based Calibration of Radially Symmetric Cameras .....	2192
<i>Federico Camposeco, Torsten Sattler, and Marc Pollefeys</i>	
Exploiting Object Similarity in 3D Reconstruction .....	2201
<i>Chen Zhou, Fatma Güney, Yizhou Wang, and Andreas Geiger</i>	
You are Here: Mimicking the Human Thinking Process in Reading Floor-Plans .....	2210
<i>Hang Chu, Dong Ki Kim, and Tsuhan Chen</i>	
MAP Disparity Estimation Using Hidden Markov Trees .....	2219
<i>Eric T. Psota, Jędrzej Kowalczyk, Mateusz Mittek, and Lance C. Pérez</i>	
Wide Baseline Stereo Matching with Convex Bounded Distortion Constraints .....	2228
<i>Meirav Galun, Tal Amir, Tal Hassner, Ronen Basri, and Yaron Lipman</i>	
Interactive Visual Hull Refinement for Specular and Transparent Object Surface Reconstruction .....	2237
<i>Xinxin Zuo, Chao Du, Sen Wang, Jiangbin Zheng, and Ruigang Yang</i>	
Hierarchical Higher-Order Regression Forest Fields: An Application to 3D Indoor Scene Labelling .....	2246
<i>Trung T. Pham, Ian Reid, Yasir Latif, and Stephen Gould</i>	
Classical Scaling Revisited .....	2255
<i>Gil Shamaï, Yonathan Aflalo, Michael Zibulevsky, and Ron Kimmel</i>	
Dense Continuous-Time Tracking and Mapping with Rolling Shutter RGB-D Cameras .....	2264
<i>Christian Kerl, Jörg Stückler, and Daniel Cremers</i>	
Dense Image Registration and Deformable Surface Reconstruction in Presence of Occlusions and Minimal Texture .....	2273
<i>Dat Tien Ngo, Sanghyuk Park, Anne Jorstad, Alberto Crivellaro, Chang D. Yoo, and Pascal Fua</i>	

The Likelihood-Ratio Test and Efficient Robust Estimation .....	2282
<i>Andrea Cohen and Christopher Zach</i>	
Reflection Modeling for Passive Stereo .....	2291
<i>Rahul Nair, Andrew Fitzgibbon, Daniel Kondermann, and Carsten Rother</i>	
Detailed Full-Body Reconstructions of Moving People from Monocular RGB-D Sequences .....	2300
<i>Federica Bogo, Michael J. Black, Matthew Loper, and Javier Romero</i>	
Efficient Solution to the Epipolar Geometry for Radially Distorted Cameras .....	2309
<i>Zuzana Kukelova, Jan Heller, Martin Bujnak, Andrew Fitzgibbon, and Tomas Pajdla</i>	
Learning a Descriptor-Specific 3D Keypoint Detector .....	2318
<i>Samuele Salti, Federico Tombari, Riccardo Spezialetti, and Luigi Di Stefano</i>	
Component-Wise Modeling of Articulated Objects .....	2327
<i>Valsamis Ntouskos, Marta Sanzari, Bruno Cafaro, Federico Nardi, Fabrizio Natola, Fiora Pirri, and Manuel Ruiz</i>	
A Collaborative Filtering Approach to Real-Time Hand Pose Estimation .....	2336
<i>Chiho Choi, Ayan Sinha, Joon Hee Choi, Sujin Jang, and Karthik Ramani</i>	
On the Equivalence of Moving Entrance Pupil and Radial Distortion for Camera Calibration .....	2345
<i>Avinash Kumar and Narendra Ahuja</i>	
A Linear Generalized Camera Calibration from Three Intersecting Reference Planes .....	2354
<i>Mai Nishimura, Shohei Nobuhara, Takashi Matsuyama, Shinya Shimizu, and Kensaku Fujii</i>	
Towards Pointless Structure from Motion: 3D Reconstruction and Camera Parameters from General 3D Curves .....	2363
<i>Irina Nurutdinova and Andrew Fitzgibbon</i>	
Attributed Grammars for Joint Estimation of Human Attributes, Part and Pose .....	2372
<i>Seyoung Park and Song-Chun Zhu</i>	
Real-Time Pose Estimation Piggybacked on Object Detection .....	2381
<i>Roman Juránek, Adam Herout, Markéta Dubská, and Pavel Zemčik</i>	
Understanding and Predicting Image Memorability at a Large Scale .....	2390
<i>Aditya Khosla, Akhil S. Raju, Antonio Torralba, and Aude Oliva</i>	
Multiple Granularity Descriptors for Fine-Grained Categorization .....	2399
<i>Dequan Wang, Zhiqiang Shen, Jie Shao, Wei Zhang, Xiangyang Xue, and Zheng Zhang</i>	
Guiding the Long-Short Term Memory Model for Image Caption Generation .....	2407
<i>Xu Jia, Efstratios Gavves, Basura Fernando, and Tinne Tuytelaars</i>	
Just Noticeable Differences in Visual Attributes .....	2416
<i>Aron Yu and Kristen Grauman</i>	
VQA: Visual Question Answering .....	2425
<i>Stanislaw Antol, Aishwarya Agrawal, Jiasen Lu, Margaret Mitchell, Dhruv Batra, C. Lawrence Zitnick, and Devi Parikh</i>	
Localize Me Anywhere, Anytime: A Multi-task Point-Retrieval Approach .....	2434
<i>Guoyu Lu, Yan Yan, Li Ren, Jingkuan Song, Nicu Sebe, and Chandra Kambhamettu</i>	

Dense Optical Flow Prediction from a Static Image .....	2443
<i>Jacob Walker, Abhinav Gupta, and Martial Hebert</i>	
Unsupervised Domain Adaptation for Zero-Shot Learning .....	2452
<i>Elyor Kodirov, Tao Xiang, Zhenyong Fu, and Shaogang Gong</i>	
Visual Madlibs: Fill in the Blank Description Generation and Question Answering .....	2461
<i>Licheng Yu, Eunbyung Park, Alexander C. Berg, and Tamara L. Berg</i>	
Actions and Attributes from Wholes and Parts .....	2470
<i>Georgia Gkioxari, Ross Girshick, and Jitendra Malik</i>	
DeepBox: Learning Objectness with Convolutional Networks .....	2479
<i>Weicheng Kuo, Bharath Hariharan, and Jitendra Malik</i>	
Active Object Localization with Deep Reinforcement Learning .....	2488
<i>Juan C. Caicedo and Svetlana Lazebnik</i>	
Scene-Domain Active Part Models for Object Representation .....	2497
<i>Zhou Ren, Chaohui Wang, and Alan Yuille</i>	
A Unified Multiplicative Framework for Attribute Learning .....	2506
<i>Kongming Liang, Hong Chang, Shiguang Shan, and Xilin Chen</i>	
Contractive Rectifier Networks for Nonlinear Maximum Margin Classification .....	2515
<i>Senjian An, Munawar Hayat, Salman H. Khan, Mohammed Bennamoun, Farid Boussaid, and Ferdous Sohel</i>	
Augmenting Strong Supervision Using Web Data for Fine-Grained Categorization .....	2524
<i>Zhe Xu, Shaoli Huang, Ya Zhang, and Dacheng Tao</i>	
Learning Like a Child: Fast Novel Visual Concept Learning from Sentence Descriptions of Images .....	2533
<i>Junhua Mao, Xu Wei, Yi Yang, Jiang Wang, Zhiheng Huang, and Alan L. Yuille</i>	
Learning Common Sense through Visual Abstraction .....	2542
<i>Ramakrishna Vedantam, Xiao Lin, Tanmay Batra, C. Lawrence Zitnick, and Devi Parikh</i>	
Domain Generalization for Object Recognition with Multi-task Autoencoders .....	2551
<i>Muhammad Ghifary, W. Bastiaan Kleijn, Mengjie Zhang, and David Balduzzi</i>	
Square Localization for Efficient and Accurate Object Detection .....	2560
<i>Cewu Lu, Yongyi Lu, Hao Chen, and Chi-Keung Tang</i>	
Box Aggregation for Proposal Decimation: Last Mile of Object Detection .....	2569
<i>Shu Liu, Cewu Lu, and Jiaya Jia</i>	
DeepProposal: Hunting Objects by Cascading Deep Convolutional Layers .....	2578
<i>Amir Ghodrati, Ali Diba, Marco Pedersoli, Tinne Tuytelaars, and Luc Van Gool</i>	
Semantic Segmentation with Object Clique Potential .....	2587
<i>Xiaojuan Qi, Jianping Shi, Shu Liu, Renjie Liao, and Jiaya Jia</i>	
Automatic Concept Discovery from Parallel Text and Visual Corpora .....	2596
<i>Chen Sun, Chuang Gan, and Ram Nevatia</i>	
Simpler Non-Parametric Methods Provide as Good or Better Results to Multiple-Instance Learning .....	2605
<i>Ragav Venkatesan, Parag Shridhar Chandakkar, and Baoxin Li</i>	

Monocular Object Instance Segmentation and Depth Ordering with CNNs .....	2614
<i>Ziyu Zhang, Alexander G. Schwing, Sanja Fidler, and Raquel Urtasun</i>	
Multimodal Convolutional Neural Networks for Matching Image and Sentence .....	2623
<i>Lin Ma, Zhengdong Lu, Lifeng Shang, and Hang Li</i>	
Structural Kernel Learning for Large Scale Multiclass Object Co-detection .....	2632
<i>Zeeshan Hayder, Xuming He, and Mathieu Salzmann</i>	
Flickr30k Entities: Collecting Region-to-Phrase Correspondences for Richer Image-to-Sentence Models .....	2641
<i>Bryan A. Plummer, Liwei Wang, Chris M. Cervantes, Juan C. Caicedo, Julia Hockenmaier, and Svetlana Lazebnik</i>	
Predicting Depth, Surface Normals and Semantic Labels with a Common Multi-scale Convolutional Architecture .....	2650
<i>David Eigen and Rob Fergus</i>	
AttentionNet: Aggregating Weak Directions for Accurate Object Detection .....	2659
<i>Donggeun Yoo, Sunggyun Park, Joon-Young Lee, Anthony S. Paek, and In So Kweon</i>	
Common Subspace for Model and Similarity: Phrase Learning for Caption Generation from Images .....	2668
<i>Yoshitaka Ushiku, Masataka Yamaguchi, Yusuke Mukuta, and Tatsuya Harada</i>	
 <b>O-3B: Representations for Recognition and Localization</b>	
3D-Assisted Feature Synthesis for Novel Views of an Object .....	2677
<i>Hao Su, Fan Wang, Eric Yi, and Leonidas Guibas</i>	
Render for CNN: Viewpoint Estimation in Images Using CNNs Trained with Rendered 3D Model Views .....	2686
<i>Hao Su, Charles R. Qi, Yangyan Li, and Leonidas J. Guibas</i>	
Lost Shopping! Monocular Localization in Large Indoor Spaces .....	2695
<i>Shenlong Wang, Sanja Fidler, and Raquel Urtasun</i>	
Camera Pose Voting for Large-Scale Image-Based Localization .....	2704
<i>Bernhard Zeisl, Torsten Sattler, and Marc Pollefeys</i>	
 <b>P-3B: Statistical Methods and Learning, Motion and Tracking, and Video Analysis I</b>	
MANTRA: Minimum Maximum Latent Structural SVM for Image Classification and Ranking .....	2713
<i>Thibaut Durand, Nicolas Thome, and Matthieu Cord</i>	
DeepDriving: Learning Affordance for Direct Perception in Autonomous Driving .....	2722
<i>Chenyi Chen, Ari Seff, Alain Kornhauser, and Jianxiong Xiao</i>	
Active Transfer Learning with Zero-Shot Priors: Reusing Past Datasets for Future Tasks .....	2731
<i>E. Gavves, T. Mensink, T. Tommasi, C. G. M. Snoek, and T. Tuytelaars</i>	

HD-CNN: Hierarchical Deep Convolutional Neural Networks for Large Scale Visual Recognition .....	2740
<i>Zhicheng Yan, Hao Zhang, Robinson Piramuthu, Vignesh Jagadeesh, Dennis DeCoste, Wei Di, and Yizhou Yu</i>	
Learning the Structure of Deep Convolutional Networks .....	2749
<i>Jiashi Feng and Trevor Darrell</i>	
FlowNet: Learning Optical Flow with Convolutional Networks .....	2758
<i>Alexey Dosovitskiy, Philipp Fischery, Eddy Ilg, Philip Häusser, Caner Hazırbaş, Vladimir Golkov, Patrick van der Smagt, Daniel Cremers, and Thomas Brox</i>	
Learning Semi-Supervised Representation Towards a Unified Optimization Framework for Semi-Supervised Learning .....	2767
<i>Chun-Guang Li, Zhouchen Lin, Honggang Zhang, and Jun Guo</i>	
Context-Guided Diffusion for Label Propagation on Graphs .....	2776
<i>Kwang In Kim, James Tompkin, Hanspeter Pfister, and Christian Theobalt</i>	
Learning to Rank Based on Subsequences .....	2785
<i>Basura Fernando, Efstratios Gavves, Damien Muselet, and Tinne Tuytelaars</i>	
Unsupervised Learning of Visual Representations Using Videos .....	2794
<i>Xiaolong Wang and Abhinav Gupta</i>	
A Nonparametric Bayesian Approach toward Stacked Convolutional Independent Component Analysis .....	2803
<i>Sotirios P. Chatzis and Dimitrios Kosmopoulos</i>	
Robust Principal Component Analysis on Graphs .....	2812
<i>Nauman Shahid, Vassilis Kalofolias, Xavier Bresson, Michael Bronstein, and Pierre Vandergheynst</i>	
Projection Bank: From High-Dimensional Data to Medium-Length Binary Codes .....	2821
<i>Li Liu, Mengyang Yu, and Ling Shao</i>	
Robust Optimization for Deep Regression .....	2830
<i>Vasileios Belagiannis, Christian Rupprecht, Gustavo Carneiro, and Nassir Navab</i>	
Multi-class Multi-annotator Active Learning with Robust Gaussian Process for Visual Recognition .....	2839
<i>Chengjiang Long and Gang Hua</i>	
Maximum-Margin Structured Learning with Deep Networks for 3D Human Pose Estimation .....	2848
<i>Sijin Li, Weichen Zhang, and Antoni B. Chan</i>	
An Exploration of Parameter Redundancy in Deep Networks with Circulant Projections .....	2857
<i>Yu Cheng, Felix X. Yu, Rogerio S. Feris, Sanjiv Kumar, Alok Choudhary, and Shi-Fu Chang</i>	
Additive Nearest Neighbor Feature Maps .....	2866
<i>Zhenzhen Wang, Xiao-Tong Yuan, Qingshan Liu, and Shuicheng Yan</i>	
Understanding Deep Features with Computer-Generated Imagery .....	2875
<i>Mathieu Aubry and Bryan C. Russell</i>	

Interpolation on the Manifold of K Component GMMs .....	2884
<i>Hyunwoo J. Kim, Nagesh Adluru, Monami Banerjee, Baba C. Vemuri, and Vikas Singh</i>	
Context-Aware CNNs for Person Head Detection .....	2893
<i>Tuan-Hung Vu, Anton Osokin, and Ivan Laptev</i>	
Mode-Seeking on Hypergraphs for Robust Geometric Model Fitting .....	2902
<i>Hanzi Wang, Guobao Xiao, Yan Yan, and David Suter</i>	
Highly-Expressive Spaces of Well-Behaved Transformations: Keeping it Simple .....	2911
<i>Oren Freifeld, Søren Hauberg, Kayhan Batmanghelich, and John W. Fisher III</i>	
Entropy-Based Latent Structured Output Prediction .....	2920
<i>Diane Bouchacourt, Sebastian Nowozin, and M. Pawan Kumar</i>	
Fast Orthogonal Projection Based on Kronecker Product .....	2929
<i>Xu Zhang, Felix X. Yu, Ruiqi Guo, Sanjiv Kumar, Shengjin Wang, and Shi-Fu Chang</i>	
PoseNet: A Convolutional Network for Real-Time 6-DOF Camera Relocalization .....	2938
<i>Alex Kendall, Matthew Grimes, and Roberto Cipolla</i>	
Predicting Multiple Structured Visual Interpretations .....	2947
<i>Debadeepta Dey, Varun Ramakrishna, Martial Hebert, and J. Andrew Bagnell</i>	
Look and Think Twice: Capturing Top-Down Visual Attention with Feedback Convolutional Neural Networks .....	2956
<i>Chunshui Cao, Xianming Liu, Yi Yang, Yinan Yu, Jiang Wang, Zilei Wang, Yongzhen Huang, Liang Wang, Chang Huang, Wei Xu, Deva Ramanan, and Thomas S. Huang</i>	
Matrix Backpropagation for Deep Networks with Structured Layers .....	2965
<i>Catalin Ionescu, Orestis Vantzos, and Cristian Sminchisescu</i>	
Introducing Geometry in Active Learning for Image Segmentation .....	2974
<i>Ksenia Konyushkova, Raphael Sznitman, and Pascal Fua</i>	
Joint Fine-Tuning in Deep Neural Networks for Facial Expression Recognition .....	2983
<i>Heechul Jung, Sihaeng Lee, Junho Yim, Sunjeong Park, and Junmo Kim</i>	
Direct Intrinsic: Learning Albedo-Shading Decomposition by Convolutional Regression .....	2992
<i>Takuya Narihira, Michael Maire, and Stella X. Yu</i>	
Face Flow .....	2993
<i>Patrick Snape, Anastasios Roussos, Yannis Panagakis, and Stefanos Zafeiriou</i>	
Discriminative Low-Rank Tracking .....	3002
<i>Yao Sui, Yafei Tang, and Li Zhang</i>	
SOWP: Spatially Ordered and Weighted Patch Descriptor for Visual Tracking .....	3011
<i>Han-UI Kim, Dae-Youn Lee, Jae-Young Sim, and Chang-Su Kim</i>	
Live Repetition Counting .....	3020
<i>Ofir Levy and Lior Wolf</i>	
Near-Online Multi-target Tracking with Aggregated Local Flow Descriptor .....	3029
<i>Wongun Choi</i>	
Multi-kernel Correlation Filter for Visual Tracking .....	3038
<i>Ming Tang and Jiayi Feng</i>	

Joint Probabilistic Data Association Revisited .....	3047
<i>Seyed Hamid Rezatofghi, Anton Milan, Zhen Zhang, Qinfeng Shi, Anthony Dick, and Ian Reid</i>	
Tracking-by-Segmentation with Online Gradient Boosting Decision Tree .....	3056
<i>Jeany Son, Ilchae Jung, Kayoung Park, and Bohyung Han</i>	
Exploring Causal Relationships in Visual Object Tracking .....	3065
<i>Karel Lebeda, Simon Hadfield, and Richard Bowden</i>	
Hierarchical Convolutional Features for Visual Tracking .....	3074
<i>Chao Ma, Jia-Bin Huang, Xiaokang Yang, and Ming-Hsuan Yang</i>	
Robust Non-rigid Motion Tracking and Surface Reconstruction Using L0 Regularization .....	3083
<i>Kaiwen Guo, Feng Xu, Yangang Wang, Yebin Liu, and Qionghai Dai</i>	
Online Object Tracking with Proposal Selection .....	3092
<i>Yang Hua, Karteek Alahari, and Cordelia Schmid</i>	
Understanding and Diagnosing Visual Tracking Systems .....	3101
<i>Naiyan Wang, Jianping Shi, Dit-Yan Yeung, and Jiaya Jia</i>	
Integrating Dashcam Views through Inter-Video Mapping .....	3110
<i>Hsin-I Chen, Yi-Ling Chen, Wei-Tse Lee, Fan Wang, and Bing-Yu Chen</i>	
Visual Tracking with Fully Convolutional Networks .....	3119
<i>Lijun Wang, Wanli Ouyang, Xiaogang Wang, and Huchuan Lu</i>	
Multiple Feature Fusion via Weighted Entropy for Visual Tracking .....	3128
<i>Lin Ma, Jiwen Lu, Jianjiang Feng, and Jie Zhou</i>	
Pedestrian Travel Time Estimation in Crowded Scenes .....	3137
<i>Shuai Yi, Hongsheng Li, and Xiaogang Wang</i>	
Unsupervised Synchrony Discovery in Human Interaction .....	3146
<i>Wen-Sheng Chu, Jiabei Zeng, Fernando De la Torre, Jeffrey F. Cohn, and Daniel S. Messinger</i>	
Efficient Video Segmentation Using Parametric Graph Partitioning .....	3155
<i>Chen-Ping Yu, Hieu Le, Gregory Zelinsky, and Dimitris Samaras</i>	
Learning to Track for Spatio-Temporal Action Localization .....	3164
<i>Philippe Weinzaepfel, Zaid Harchaoui, and Cordelia Schmid</i>	
Unsupervised Object Discovery and Tracking in Video Collections .....	3173
<i>Suha Kwak, Minsu Cho, Ivan Laptev, Jean Ponce, and Cordelia Schmid</i>	
Car that Knows Before You Do: Anticipating Maneuvers via Learning Temporal Driving Models .....	3182
<i>Ashesh Jain, Hema S. Koppula, Bharad Raghavan, Shane Soh, and Ashutosh Saxena</i>	
Activity Auto-Completion: Predicting Human Activities from Partial Videos .....	3191
<i>Zhen Xu, Laiyun Qing, and Jun Miao</i>	
Person Re-Identification with Correspondence Structure Learning .....	3200
<i>Yang Shen, Weiyao Lin, Junchi Yan, Mingliang Xu, Jianxin Wu, and Jingdong Wang</i>	
Adaptive Exponential Smoothing for Online Filtering of Pixel Prediction Maps .....	3209
<i>Kang Dang, Jiong Yang, and Junsong Yuan</i>	

P-CNN: Pose-Based CNN Features for Action Recognition .....	3218
<i>Guilhem Chéron, Ivan Laptev, and Cordelia Schmid</i>	
Fully Connected Object Proposals for Video Segmentation .....	3227
<i>Federico Perazzi, Oliver Wang, Markus Gross, and Alexander Sorkine-Hornung</i>	
Video Segmentation with Just a Few Strokes .....	3235
<i>Naveen Shankar Nagaraja, Frank R. Schmidt, and Thomas Brox</i>	
Actionness-Assisted Recognition of Actions .....	3244
<i>Ye Luo, Loong-Fah Cheong, and An Tran</i>	
COUNT Forest: CO-Voting Uncertain Number of Targets Using Random Forest for Crowd Density Estimation .....	3253
<i>Viet-Quoc Pham, Tatsuo Kozakaya, Osamu Yamaguchi, and Ryuzo Okada</i>	
Multi-cue Structure Preserving MRF for Unconstrained Video Segmentation .....	3262
<i>Sae-hoon Yi and Vladimir Pavlovic</i>	
Motion Trajectory Segmentation via Minimum Cost Multicuts .....	3271
<i>Margret Keuper, Bjoern Andres, and Thomas Brox</i>	
Action Localization in Videos through Context Walk .....	3280
<i>Khurram Soomro, Haroon Idrees, and Mubarak Shah</i>	
RGB-W: When Vision Meets Wireless .....	3289
<i>Alexandre Alahi, Albert Haque, and Li Fei-Fei</i>	
Action Detection by Implicit Intentional Motion Clustering .....	3298
<i>Wei Chen and Jason J. Corso</i>	
Simultaneous Foreground Detection and Classification with Hybrid Features .....	3307
<i>Jaemyun Kim, Adin Ramirez Rivera, Byungyong Ryu, and Oksam Chae</i>	
 <b>O-3C: Vision and People</b>	
Training a Feedback Loop for Hand Pose Estimation .....	3316
<i>Markus Oberweger, Paul Wohlhart, and Vincent Lepetit</i>	
Opening the Black Box: Hierarchical Sampling Optimization for Estimating Human Hand Pose .....	3325
<i>Danhang Tang, Jonathan Taylor, Pushmeet Kohli, Cem Keskin, Tae-Kyun Kim, and Jamie Shotton</i>	
Panoptic Studio: A Massively Multiview System for Social Motion Capture .....	3334
<i>Hanbyul Joo, Hao Liu, Lei Tan, Lin Gui, Bart Nabbe, Iain Matthews, Takeo Kanade, Shohei Nobuhara, and Yaser Sheikh</i>	
Where to Buy It: Matching Street Clothing Photos in Online Shops .....	3343
<i>M. Hadi Kiapour, Xufeng Han, Svetlana Lazebnik, Alexander C. Berg, and Tamara L. Berg</i>	
Multi-task Recurrent Neural Network for Immediacy Prediction .....	3352
<i>Xiao Chu, Wanli Ouyang, Wei Yang, and Xiaogang Wang</i>	
Learning Complexity-Aware Cascades for Deep Pedestrian Detection .....	3361
<i>Zhaowei Cai, Mohammad Saberian, and Nuno Vasconcelos</i>	



## **O-4A: Computational Photography and Image Enhancement**

Polarized 3D: High-Quality Depth Sensing with Polarization Cues .....	3370
<i>Achuta Kadambi, Vage Taamazyan, Boxin Shi, and Ramesh Raskar</i>	
Airborne Three-Dimensional Cloud Tomography .....	3379
<i>Aviad Levis, Yoav Y. Schechner, Amit Aides, and Anthony B. Davis</i>	
Leave-One-Out Kernel Optimization for Shadow Detection .....	3388
<i>Tomás F. Yago Vicente, Minh Hoai, and Dimitris Samaras</i>	
Removing Rain from a Single Image via Discriminative Sparse Coding .....	3397
<i>Yu Luo, Yong Xu, and Hui Ji</i>	
Mutual-Structure for Joint Filtering .....	3406
<i>Xiaoyong Shen, Chao Zhou, Li Xu, and Jiaya Jia</i>	

## **P-4A: Computational Photography, Face and Gesture, and Vision for X**

Photometric Stereo in a Scattering Medium .....	3415
<i>Zak Murez, Tali Treibitz, Ravi Ramamoorthi, and David Kriegman</i>	
Resolving Scale Ambiguity via XSlit Aspect Ratio Analysis .....	3424
<i>Wei Yang, Haiting Lin, Sing Bing Kang, and Jingyi Yu</i>	
Single-Shot Specular Surface Reconstruction with Gonio-Plenoptic Imaging .....	3433
<i>Lingfei Meng, Liyang Lu, Noah Bedard, and Kathrin Berkner</i>	
TransCut: Transparent Object Segmentation from a Light-Field Image .....	3442
<i>Yichao Xu, Hajime Nagahara, Atsushi Shimada, and Rin-ichiro Taniguchi</i>	
Depth Recovery from Light Field Using Focal Stack Symmetry .....	3451
<i>Haiting Lin, Can Chen, Sing Bing Kang, and Jingyi Yu</i>	
Depth Map Estimation and Colorization of Anaglyph Images Using Local Color Prior and Reverse Intensity Distribution .....	3460
<i>Williem, Ramesh Raskar, and In Kyu Park</i>	
Learning Data-Driven Reflectance Priors for Intrinsic Image Decomposition .....	3469
<i>Tinghui Zhou, Philipp Krähenbühl, and Alexei A. Efros</i>	
Photometric Stereo with Small Angular Variations .....	3478
<i>Jian Wang, Yasuyuki Matsushita, Boxin Shi, and Aswin C. Sankaranarayanan</i>	
Occlusion-Aware Depth Estimation Using Light-Field Cameras .....	3487
<i>Ting-Chun Wang, Alexei A. Efros, and Ravi Ramamoorthi</i>	
Oriented Light-Field Windows for Scene Flow .....	3496
<i>Pratul P. Srinivasan, Michael W. Tao, Ren Ng, and Ravi Ramamoorthi</i>	
Extended Depth of Field Catadioptric Imaging Using Focal Sweep .....	3505
<i>Ryunosuke Yokoya and Shree K. Nayar</i>	
Intrinsic Depth: Improving Depth Transfer with Intrinsic Images .....	3514
<i>Naejin Kong and Michael J. Black</i>	

Separating Fluorescent and Reflective Components by Using a Single Hyperspectral Image .....	3523
<i>Yinqiang Zheng, Ying Fu, Antony Lam, Imari Sato, and Yoichi Sato</i>	
Frequency-Based Environment Matting by Compressive Sensing .....	3532
<i>Yiming Qian, Minglun Gong, and Yee-Hong Yang</i>	
Complementary Sets of Shutter Sequences for Motion Deblurring .....	3541
<i>Hae-Gon Jeon, Joon-Young Lee, Yudeog Han, Seon Joo Kim, and In So Kweon</i>	
Hyperspectral Compressive Sensing Using Manifold-Structured Sparsity Prior .....	3550
<i>Lei Zhang, Wei Wei, Yanning Zhang, Fei Li, Chunhua Shen, and Qinfeng Shi</i>	
A Gaussian Process Latent Variable Model for BRDF Inference .....	3559
<i>Stamatios Georgoulis, Vincent Vanweddigen, Marc Proesmans, and Luc Van Gool</i>	
Active One-Shot Scan for Wide Depth Range Using a Light Field Projector Based on Coded Aperture .....	3568
<i>Hiroshi Kawasaki, Satoshi Ono, Yuki Horita, Yuki Shiba, Ryo Furukawa, and Shinsaku Hiura</i>	
Model-Based Tracking at 300Hz Using Raw Time-of-Flight Observations .....	3577
<i>Jan Stühmer, Sebastian Nowozin, Andrew Fitzgibbon, Richard Szeliski, Travis Perry, Sunil Acharya, Daniel Cremers, and Jamie Shotton</i>	
Hyperspectral Super-Resolution by Coupled Spectral Unmixing .....	3586
<i>Charis Lanaras, Emmanuel Baltsavias, and Konrad Schindler</i>	
Depth Selective Camera: A Direct, On-Chip, Programmable Technique for Depth Selectivity in Photography .....	3595
<i>Ryuichi Tadano, Adithya Kumar Pediredla, and Ashok Veeraraghavan</i>	
A Groupwise Multilinear Correspondence Optimization for 3D Faces .....	3604
<i>Timo Bolkart and Stefanie Wuhrer</i>	
Selective Encoding for Recognizing Unreliably Localized Faces .....	3613
<i>Ang Li, Vlad I. Morariu, and Larry S. Davis</i>	
Confidence Preserving Machine for Facial Action Unit Detection .....	3622
<i>Jiabei Zeng, Wen-Sheng Chu, Fernando De la Torre, Jeffrey F. Cohn, and Zhang Xiong</i>	
Learning Social Relation Traits from Face Images .....	3631
<i>Zhanpeng Zhang, Ping Luo, Chen-Change Loy, and Xiaoou Tang</i>	
Robust Heart Rate Measurement from Video Using Select Random Patches .....	3640
<i>Antony Lam and Yoshinori Kuno</i>	
Robust Model-Based 3D Head Pose Estimation .....	3649
<i>Gregory P. Meyer, Shalini Gupta, Iuri Frosio, Dikpal Reddy, and Jan Kautz</i>	
Robust Facial Landmark Detection Under Significant Head Poses and Occlusion .....	3658
<i>Yue Wu and Qiang Ji</i>	
Conditional Convolutional Neural Network for Modality-Aware Face Recognition .....	3667
<i>Chao Xiong, Xiaowei Zhao, Danhang Tang, Karlekar Jayashree, Shuicheng Yan, and Tae-Kyun Kim</i>	
From Facial Parts Responses to Face Detection: A Deep Learning Approach .....	3676
<i>Shuo Yang, Ping Luo, Chen-Change Loy, and Xiaoou Tang</i>	

Efficient PSD Constrained Asymmetric Metric Learning for Person Re-Identification .....	3685
<i>Shengcai Liao and Stan Z. Li</i>	
Pose-Invariant 3D Face Alignment .....	3694
<i>Amin Jourabloo and Xiaoming Liu</i>	
From Emotions to Action Units with Hidden and Semi-Hidden-Task Learning .....	3703
<i>Adria Ruiz, Joost Van de Weijer, and Xavier Binefa</i>	
Automated Facial Trait Judgment and Election Outcome Prediction: Social Dimensions of Face .....	3712
<i>Jungseock Joo, Francis F. Steen, and Song-Chun Zhu</i>	
Simultaneous Local Binary Feature Learning and Encoding for Face Recognition .....	3721
<i>Jiwen Lu, Venice Erin Liong, and Jie Zhou</i>	
Deep Learning Face Attributes in the Wild .....	3730
<i>Ziwei Liu, Ping Luo, Xiaogang Wang, and Xiaoou Tang</i>	
Multi-Task Learning with Low Rank Attribute Embedding for Person Re-Identification .....	3739
<i>Chi Su, Fan Yang, Shiliang Zhang, Qi Tian, Larry S. Davis, and Wen Gao</i>	
Regressing a 3D Face Shape from a Single Image .....	3748
<i>Sergey Tulyakov and Nicu Sebe</i>	
Rendering of Eyes for Eye-Shape Registration and Gaze Estimation .....	3756
<i>Erroll Wood, Tadas Baltrušaitis, Xucong Zhang, Yusuke Sugano, Peter Robinson, and Andreas Bulling</i>	
Multi-Scale Learning for Low-Resolution Person Re-Identification .....	3765
<i>Xiang Li, Wei-Shi Zheng, Xiaojuan Wang, Tao Xiang, and Shaogang Gong</i>	
Learning to Transfer: Transferring Latent Task Structures and Its Application to Person-Specific Facial Action Unit Detection .....	3774
<i>Timur Almaev, Brais Martinez, and Michel Valstar</i>	
Pairwise Conditional Random Forests for Facial Expression Recognition .....	3783
<i>Arnaud Dapogny, Kevin Bailly, and Séverine Dubuisson</i>	
Multi-conditional Latent Variable Model for Joint Facial Action Unit Detection .....	3792
<i>Stefanos Eleftheriadis, Ognjen Rudovic, and Maja Pantic</i>	
Leveraging Datasets with Varying Annotations for Face Alignment via Deep Regression Network .....	3801
<i>Jie Zhang, Meina Kan, Shiguang Shan, and Xilin Chen</i>	
A Spatio-Temporal Appearance Representation for Video-Based Pedestrian Re-Identification .....	3810
<i>Kan Liu, Bingpeng Ma, Wei Zhang, and Rui Huang</i>	
Two Birds, One Stone: Jointly Learning Binary Code for Large-Scale Face Image Retrieval and Attributes Prediction .....	3819
<i>Yan Li, Ruiping Wang, Haomiao Liu, Huajie Jiang, Shiguang Shan, and Xilin Chen</i>	
An Accurate Iris Segmentation Framework Under Relaxed Imaging Constraints Using Total Variation Model .....	3828
<i>Zijing Zhao and Ajay Kumar</i>	

Discriminative Pose-Free Descriptors for Face and Object Matching .....	3837
<i>Soubhik Sanyal, Sivaram Prasad Mudunuri, and Soma Biswas</i>	
Bi-Shifting Auto-Encoder for Unsupervised Domain Adaptation .....	3846
<i>Meina Kan, Shiguang Shan, and Xilin Chen</i>	
Regressive Tree Structured Model for Facial Landmark Localization .....	3855
<i>Gee-Sern (Jison) Hsu, Kai-Hsiang Chang, and Shih-Chieh Huang</i>	
Person Recognition in Personal Photo Collections .....	3862
<i>Seong Joon Oh, Rodrigo Benenson, Mario Fritz, and Bernt Schiele</i>	
Robust Statistical Face Frontalization .....	3871
<i>Christos Sagonas, Yannis Panagakis, Stefanos Zafeiriou, and Maja Pantic</i>	
PIEFA: Personalized Incremental and Ensemble Face Alignment .....	3880
<i>Xi Peng, Shaoting Zhang, Yu Yang, and Dimitris N. Metaxas</i>	
Understanding Everyday Hands in Action from RGB-D Images .....	3889
<i>Grégory Rogez, James S. Supančič III, and Deva Ramanan</i>	
Example-Based Modeling of Facial Texture from Deficient Data .....	3898
<i>Arnaud Dessein, William A. P. Smith, Richard C. Wilson, and Edwin R. Hancock</i>	
Learning to Predict Saliency on Face Images .....	3907
<i>Mai Xu, Yun Ren, and Zulin Wang</i>	
Group Membership Prediction .....	3916
<i>Ziming Zhang, Yuting Chen, and Venkatesh Saligrama</i>	
Extraction of Virtual Baselines from Distorted Document Images Using Curvilinear Projection .....	3925
<i>Gaofeng Meng, Zuming Huang, Yonghong Song, Shiming Xiang, and Chunhong Pan</i>	
Robust RGB-D Odometry Using Point and Line Features .....	3934
<i>Yan Lu and Dezhen Song</i>	
Learning a Discriminative Model for the Perception of Realism in Composite Images .....	3943
<i>Jun-Yan Zhu, Philipp Krähenbühl, Eli Shechtman, and Alexei A. Efros</i>	
What Makes Tom Hanks Look Like Tom Hanks .....	3952
<i>Supasorn Suwajanakorn, Steven M. Seitz, and Ira Kemelmacher-Shlizerman</i>	
Wide-Area Image Geolocalization with Aerial Reference Imagery .....	3961
<i>Scott Workman, Richard Souvenir, and Nathan Jacobs</i>	
Personalized Age Progression with Aging Dictionary .....	3970
<i>Xiangbo Shu, Jinhui Tang, Hanjiang Lai, Luoqi Liu, and Shuicheng Yan</i>	
FaceDirector: Continuous Control of Facial Performance in Video .....	3979
<i>Charles Malleson, Jean-Charles Bazin, Oliver Wang, Derek Bradley, Thabo Beeler, Adrian Hilton, and Alexander Sorkine-Hornung</i>	
Synthesizing Illumination Mosaics from Internet Photo-Collections .....	3988
<i>Dinghuang Ji, Enrique Dunn, and Jan-Michael Frahm</i>	
Hot or Not: Exploring Correlations between Appearance and Temperature .....	3997
<i>Daniel Glasner, Pascal Fua, Todd Zickler, and Lihl Zelnik-Manor</i>	

## **O-4B: Motion and Correspondence**

SPM-BP: Sped-Up PatchMatch Belief Propagation for Continuous MRFs .....	4006
<i>Yu Li, Dongbo Min, Michael S. Brown, Minh N. Do, and Jiangbo Lu</i>	
Flow Fields: Dense Correspondence Fields for Highly Accurate Large Displacement Optical Flow Estimation .....	4015
<i>Christian Bailer, Bertram Taetz, and Didier Stricker</i>	
Dense Semantic Correspondence Where Every Pixel is a Classifier .....	4024
<i>Hilton Bristow, Jack Valmadre, and Simon Lucey</i>	
Multi-image Matching via Fast Alternating Minimization .....	4032
<i>Xiaowei Zhou, Menglong Zhu, and Kostas Daniilidis</i>	

## **P-4B: Statistical Methods and Learning, Motion and Tracking, and Video Analysis II**

Differential Recurrent Neural Networks for Action Recognition .....	4041
<i>Vivek Veeriah, Naifan Zhuang, and Guo-Jun Qi</i>	
Similarity Gaussian Process Latent Variable Model for Multi-modal Data Analysis .....	4050
<i>Guoli Song, Shuhui Wang, Qingming Huang, and Qi Tian</i>	
Learning Ensembles of Potential Functions for Structured Prediction with Latent Variables .....	4059
<i>Hossein Hajimirsadeghi and Greg Mori</i>	
Simultaneous Deep Transfer Across Domains and Tasks .....	4068
<i>Eric Tzeng, Judy Hoffman, Trevor Darrell, and Kate Saenko</i>	
Low Dimensional Explicit Feature Maps .....	4077
<i>Ondřej Chum</i>	
Unsupervised Learning of Spatiotemporally Coherent Metrics .....	4086
<i>Ross Goroshin, Joan Bruna, Jonathan Tompson, David Eigen, and Yann LeCun</i>	
Multi-label Cross-Modal Retrieval .....	4094
<i>Viresh Ranjan, Nikhil Rasiwasia, and C. V. Jawahar</i>	
Improving Ferns Ensembles by Sparsifying and Quantising Posterior Probabilities .....	4103
<i>Antonio L. Rodriguez and Vitor Sequeira</i>	
Beyond Gauss: Image-Set Matching on the Riemannian Manifold of PDFs .....	4112
<i>Mehrtash Harandi, Mathieu Salzmann, and Mahsa Baktashmotlagh</i>	
Unsupervised Domain Adaptation with Imbalanced Cross-Domain Data .....	4121
<i>Tzu Ming Harry Hsu, Wei Yu Chen, Cheng-An Hou, Yao-Hung Hubert Tsai, Yi-Ren Yeh, and Yu-Chiang Frank Wang</i>	
Secrets of Matrix Factorization: Approximations, Numerics, Manifold Optimization and Random Restarts .....	4130
<i>Je Hyeong Hong and Andrew Fitzgibbon</i>	
Geometry-Aware Deep Transform .....	4139
<i>Jiaji Huang, Qiang Qiu, Robert Calderbank, and Guillermo Sapiro</i>	

Learning Binary Codes for Maximum Inner Product Search .....	4148
<i>Fumin Shen, Wei Liu, Shaoting Zhang, Yang Yang, and Heng Tao Shen</i>	
ML-MG: Multi-label Learning with Missing Labels Using a Mixed Graph .....	4157
<i>Baoyuan Wu, Siwei Lyu, and Bernard Ghanem</i>	
Zero-Shot Learning via Semantic Similarity Embedding .....	4166
<i>Ziming Zhang and Venkatesh Saligrama</i>	
Bayesian Model Adaptation for Crowd Counts .....	4175
<i>Bo Liu and Nuno Vasconcelos</i>	
An NMF Perspective on Binary Hashing .....	4184
<i>Lopamudra Mukherjee, Sathya N. Ravi, Vamsi K. Ithapu, Tyler Holmes, and Vikas Singh</i>	
Multi-view Domain Generalization for Visual Recognition .....	4193
<i>Li Niu, Wen Li, and Dong Xu</i>	
Infinite Feature Selection .....	4202
<i>Giorgio Roffo, Simone Melzi, and Marco Cristani</i>	
Semi-Supervised Zero-Shot Classification with Label Representation Learning .....	4211
<i>Xin Li, Yuhong Guo, and Dale Schuurmans</i>	
A Supervised Low-Rank Method for Learning Invariant Subspaces .....	4220
<i>Farzad Siyahjani, Ranya Almohsen, Sinan Sabri, and Gianfranco Doretto</i>	
Recursive Fréchet Mean Computation on the Grassmannian and Its Applications to Computer Vision .....	4229
<i>Rudrasis Chakraborty and Baba C. Vemuri</i>	
Multi-view Subspace Clustering .....	4238
<i>Hongchang Gao, Feiping Nie, Xuelong Li, and Heng Huang</i>	
Predicting Deep Zero-Shot Convolutional Neural Networks Using Textual Descriptions .....	4247
<i>Jimmy Lei Ba, Kevin Swersky, Sanja Fidler, and Ruslan Salakhutdinov</i>	
Structured Feature Selection .....	4256
<i>Tian Gao, Ziheng Wang, and Qiang Ji</i>	
Conditional High-Order Boltzmann Machine: A Supervised Learning Model for Relation Learning .....	4265
<i>Yan Huang, Wei Wang, and Liang Wang</i>	
Learning Image and User Features for Recommendation in Social Networks .....	4274
<i>Xue Geng, Hanwang Zhang, Jingwen Bian, and Tat-Seng Chua</i>	
Dual-Feature Warping-Based Motion Model Estimation .....	4283
<i>Shiwei Li, Lu Yuan, Jian Sun, and Long Quan</i>	
An Adaptive Data Representation for Robust Point-Set Registration and Merging .....	4292
<i>Dylan Campbell and Lars Petersson</i>	
Local Subspace Collaborative Tracking .....	4301
<i>Lin Ma, Xiaoqin Zhang, Weiming Hu, Junliang Xing, Jiwen Lu, and Jie Zhou</i>	
Learning Spatially Regularized Correlation Filters for Visual Tracking .....	4310
<i>Martin Danelljan, Gustav Häger, Fahad Shahbaz Khan, and Michael Felsberg</i>	

SpeDo: 6 DOF Ego-Motion Sensor Using Speckle Defocus Imaging .....	4319
<i>Kensei Jo, Mohit Gupta, and Shree K. Nayar</i>	
Unsupervised Trajectory Clustering via Adaptive Multi-kernel-Based Shrinkage .....	4328
<i>Hongteng Xu, Yang Zhou, Weiyao Lin, and Hongyuan Zha</i>	
TRIC-track: Tracking by Regression with Incrementally Learned Cascades .....	4337
<i>Xiaomeng Wang, Michel Valstar, Brais Martinez, Muhammad Haris Khan, and Tony Pridmore</i>	
Recurrent Network Models for Human Dynamics .....	4346
<i>Katerina Fragkiadaki, Sergey Levine, Panna Felsen, and Jitendra Malik</i>	
Contour Flow: Middle-Level Motion Estimation by Combining Motion Segmentation and Contour Alignment .....	4355
<i>Huijun Di, Qingxuan Shi, Feng Lv, Ming Qin, and Yao Lu</i>	
FollowMe: Efficient Online Min-Cost Flow Tracking with Bounded Memory and Computation .....	4364
<i>Philip Lenz, Andreas Geiger, and Raquel Urtasun</i>	
Learning to Divide and Conquer for Online Multi-target Tracking .....	4373
<i>Francesco Solera, Simone Calderara, and Rita Cucchiara</i>	
Minimizing Human Effort in Interactive Tracking by Incremental Learning of Model Parameters .....	4382
<i>Arridhana Ciptadi and James M. Rehg</i>	
A Novel Representation of Parts for Accurate 3D Object Detection and Tracking in Monocular Images .....	4391
<i>Alberto Crivellaro, Mahdi Rad, Yannick Verdie, Kwang Moo Yi, Pascal Fua, and Vincent Lepetit</i>	
Linearization to Nonlinear Learning for Visual Tracking .....	4400
<i>Bo Ma, Hongwei Hu, Jianbing Shen, Yuping Zhang, and Fatih Porikli</i>	
Self-Occlusions and Disocclusions in Causal Video Object Segmentation .....	4408
<i>Yanchao Yang, Ganesh Sundaramoorthi, and Stefano Soatto</i>	
Large Displacement 3D Scene Flow with Occlusion Reasoning .....	4417
<i>Andrei Zanfir and Cristian Sminchisescu</i>	
Co-Interest Person Detection from Multiple Wearable Camera Videos .....	4426
<i>Yuewei Lin, Kareem Abdelfatah, Youjie Zhou, Xiaochuan Fan, Hongkai Yu, Hui Qian, and Song Wang</i>	
Sparse Dynamic 3D Reconstruction from Unsynchronized Videos .....	4435
<i>Enliang Zheng, Dinghuang Ji, Enrique Dunn, and Jan-Michael Frahm</i>	
Category-Blind Human Action Recognition: A Practical Recognition System .....	4444
<i>Wenbo Li, Longyin Wen, Mooi Choo Chuah, and Siwei Lyu</i>	
Temporal Subspace Clustering for Human Motion Segmentation .....	4453
<i>Sheng Li, Kang Li, and Yun Fu</i>	
Weakly-Supervised Alignment of Video with Text .....	4462
<i>P. Bojanowski, R. Lajugie, E. Grave, F. Bach, I. Laptev, J. Ponce, and C. Schmid</i>	

Learning Temporal Embeddings for Complex Video Analysis .....	4471
<i>Vignesh Ramanathan, Kevin Tang, Greg Mori, and Li Fei-Fei</i>	
Unsupervised Semantic Parsing of Video Collections .....	4480
<i>Ozan Sener, Amir R. Zamir, Silvio Savarese, and Ashutosh Saxena</i>	
Learning Spatiotemporal Features with 3D Convolutional Networks .....	4489
<i>Du Tran, Lubomir Bourdev, Rob Fergus, Lorenzo Torresani, and Manohar Paluri</i>	
Temporal Perception and Prediction in Ego-Centric Video .....	4498
<i>Yipin Zhou and Tamara L. Berg</i>	
Describing Videos by Exploiting Temporal Structure .....	4507
<i>Li Yao, Atousa Torabi, Kyunghyun Cho, Nicolas Ballas, Christopher Pal, Hugo Larochelle, and Aaron Courville</i>	
Person Re-Identification with Discriminatively Trained Viewpoint Invariant Dictionaries .....	4516
<i>Srikrishna Karanam, Yang Li, and Richard J. Radke</i>	
Storyline Representation of Egocentric Videos with an Applications to Story-Based Search .....	4525
<i>Bo Xiong, Gunhee Kim, and Leonid Sigal</i>	
Sequence to Sequence — Video to Text .....	4534
<i>Subhashini Venugopalan, Marcus Rohrbach, Jeffrey Donahue, Raymond Mooney, Trevor Darrell, and Kate Saenko</i>	
Context Aware Active Learning of Activity Recognition Models .....	4543
<i>Mahmudul Hasan and Amit K. Roy-Chowdhury</i>	
Action Recognition by Hierarchical Mid-Level Action Elements .....	4552
<i>Tian Lan, Yuke Zhu, Amir Roshan Zamir, and Silvio Savarese</i>	
Selecting Relevant Web Trained Concepts for Automated Event Retrieval .....	4561
<i>Bharat Singh, Xintong Han, Zhe Wu, Vlad I. Morariu, and Larry S. Davis</i>	
Beyond Covariance: Feature Representation with Nonlinear Kernel Matrices .....	4570
<i>Lei Wang, Jianjia Zhang, Luping Zhou, Chang Tang, and Wanqing Li</i>	
Multiresolution Hierarchy Co-Clustering for Semantic Segmentation in Sequences with Small Variations .....	4579
<i>David Varas, Mónica Alfaro, and Ferran Marques</i>	
Objects2action: Classifying and Localizing Actions without Any Video Example .....	4588
<i>Mihir Jain, Jan C. van Gemert, Thomas Mensink, and Cees G. M. Snoek</i>	
Human Action Recognition Using Factorized Spatio-Temporal Convolutional Networks .....	4597
<i>Lin Sun, Kui Jia, Dit-Yan Yeung, and Bertram E. Shi</i>	
Bayesian Non-parametric Inference for Manifold Based MoCap Representation .....	4606
<i>Fabrizio Natola, Valsamis Ntouskos, Marta Sanzari, and Fiara Pirri</i>	
Semantic Video Entity Linking Based on Visual Content and Metadata .....	4615
<i>Yuncheng Li, Xitong Yang, and Jiebo Luo</i>	
Love Thy Neighbors: Image Annotation by Exploiting Image Metadata .....	4624
<i>Justin Johnson, Lamberto Ballan, and Li Fei-Fei</i>	



Unsupervised Extraction of Video Highlights via Robust Recurrent Auto-Encoders .....	4633
<i>Huan Yang, Baoyuan Wang, Stephen Lin, David Wipf, Minyi Guo, and Baining Guo</i>	
Learning Visual Clothing Style with Heterogeneous Dyadic Co-Occurrences .....	4642
<i>Andreas Veit, Balazs Kovacs, Sean Bell, Julian McAuley, Kavita Bala, and Serge Belongie</i>	
Text Flow: A Unified Text Detection System in Natural Scene Images .....	4651
<i>Shangxuan Tian, Yifeng Pan, Chang Huang, Shijian Lu, Kai Yu, and Chew Lim Tan</i>	

## **O-4C: Video: Actions, Surveillance and Tracking**

Uncovering Interactions and Interactors: Joint Estimation of Head, Body Orientation and F-Formations from Surveillance Videos .....	4660
<i>Elisa Ricci, Jagannadan Varadarajan, Ramanathan Subramanian, Samuel Rota Bulò, Narendra Ahuja, and Oswald Lanz</i>	
Generating Notifications for Missing Actions: Don't Forget to Turn the Lights Off! .....	4669
<i>Bilge Soran, Ali Farhadi, and Linda Shapiro</i>	
Partial Person Re-Identification .....	4678
<i>Wei-Shi Zheng, Xiang Li, Tao Xiang, Shengcai Liao, Jianhuang Lai, and Shaogang Gong</i>	
Shape Interaction Matrix Revisited and Robustified: Efficient Subspace Clustering with Corrupted and Incomplete Data .....	4687
<i>Pan Ji, Mathieu Salzmann, and Hongdong Li</i>	
Multiple Hypothesis Tracking Revisited .....	4696
<i>Chanho Kim, Fuxin Li, Arridhana Ciptadi, and James M. Rehg</i>	
Learning to Track: Online Multi-object Tracking by Decision Making .....	4705
<i>Yu Xiang, Alexandre Alahi, and Silvio Savarese</i>	

## **Author Index**