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Welcome to Lake Tahoe, and to the 18th edition of the Winter Conference on Applications of Computer Vision (WACV), jointly sponsored by the IEEE Computer Society and the IEEE Biometrics Council. WACV is the premier outlet for research advances in applications of computer vision technology, and this year's meeting is the largest WACV ever, following the continued growth of the field.

WACV 2018 spans four days, with a three-day, two-track, main conference program in which authors will present each accepted paper as a short oral and a poster. Starting with WACV 2016, the conference adopted a two-track core program, with two parallel oral sessions. In addition, we have several co-located events, including two workshops, two tutorials, and a Ph.D. forum. The main conference also includes three keynote speakers, who will start each day's program: Prof. Tal Arbel (McGill University), Prof. Kavita Bala (Cornell University and GrockStyle), and Dr. Christopher Boehnen (IARPA).

The review process involved researchers from both academia and industry, in a multi-round, multi-track process. The two tracks were "Algorithms" and "Systems & Applications," with the former emphasizing novel algorithmic components and the latter vision systems for real-world applications. Reviewers and Area Chairs (ACs) were instructed to consider papers with respect to the criteria of the track to which the paper was submitted. In addition to acceptance or rejection, ACs and Program Co-Chairs could recommend that first round papers be re-submitted to the second round after authors address reviewer comments. As in past multi-round WACVs, this allowed both advanced acceptance of papers and a chance for borderline papers to be improved and re-evaluated by the same reviewers. In addition, authors were invited to provide a rebuttal of reviews during the second round. Area chairs made recommendations based on the reviews, rebuttals, and reviewer discussions; PCs made finial decisions based on these recommendations.

While the multi-round review process provides constructive feedback and consistent reviewing for authors, it is not without additional effort. For this, we're thankful to the 241 reviewers, 41 area chairs, and the four Program Co-Chairs (PCs), selected from among active researchers in both academia and industry. We used Microsoft's Conference Management Toolkit (CMT) to manage the submission and selection of papers. ACs were excluded from handling papers from their research groups, affiliated institutions, or collaborators. The PCs, and other members of the committee who had privileged access to the CMT, agreed not to submit papers to the conference to further avoid conflicts of interest.

In the first round, we received 239 submissions, of which 80 (37%) were accepted and another 84 invited for re-submission. In the second round, 68 re-submissions were received, of which 44 were accepted (65%). In addition, the second round received 245 new submissions, of which 98 (40%) were accepted. As intended, authors who respond to reviewers' concerns significantly improve their chances of acceptance, and have the assurance of a consistent set of reviewers in both rounds.

We wish to thank all members of the Organizing Committee, the Area Chairs, reviewers, and authors for the immense amount of hard work and professionalism that went into making WACV 2018 a first-rate conference.

We are grateful to our sponsors: Cognex, Google, Honeywell, Kitware, Netflix, SAP, Amazon, Perceptive Automata, and Verisk Analytics. Through their generous financial contributions, we were able to keep the registration costs down, and support PhD forum travel grants to students from non-US academic institutions.

Enjoy the conference.

Anthony Hoogs, Scott McCloskey, Gérard Medioni (General Co-Chairs)
Kristin Dana, Tal Hassner, Xiaoming Liu, Rahul Sukthankar (Program Co-Chairs)
Organizing Committee & Area Chairs

WACV 2018 Organizing Committee

General Chairs:  Gérard Medioni  Anthony Hoogs  Scott McCloskey
Program Chairs:  Rahul Sukthankar  Xiaoming Liu  Tal Hassner  Kristin Dana
Workshops Chair:  Peter Carr

Tutorials Chair:  Adriana Kovashka
Finance Chair:  Kevin Bowyer
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Doctoral Consortium Chair:  Nathan Jacobs
Industrial Relations Chair:  Maneesh Singh
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WACV 2018 Area Chairs

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Sek Chai  Jongwoo Lim  Zhaozheng Yin  Mayank Vatsa
Minsu Cho  Zhe Lin  Vishal Patel  Ruiping Wang
David Crandall  Giuseppe Lisanti  Liliana Lo Presti  Yang Wang
Sergio Escalera  Ming-Yu Liu  Bogdan Raducanu  Jan Dirk Wegner
Guoliang Fan  Jiwen Lu  Conrad Sanderson  Tianzhu Zhang
Andrew Gallagher  Shijian Lu  William Robson Schwartz  Zhigang Zhu
Boqing Gong  Vijay Mahadevan  Yale Song
Jia-Bin Huang  Mohammad Mahoor  Yi-Zhe Song
Jan Kautz  Iacopo Masi  Vitomir Štruc

QR Codes for the IEEE CPS Mobile App

Apple iTunes App Store (iOS)

Google Play (Android)
Monday, March 12

0730–0900 Registration (Sand Harbor – Harrah’s)

0730–0900 Breakfast (Sand Harbor – Harrah’s)

0900–1430 Free Time (Nothing scheduled)

1200–1400 PhD Forum (Sand Harbor – Harrah’s)
(by invitation only)

- Svati Dhamija (Univ. of Colorado at Colorado Springs)
- Sarfaraz Hussein (Univ. of Central Florida)
- Dinesh Khandelwal (Indian Inst. of Technology Delhi)
- Naman Kohli (West Virginia Univ.)
- Nili Krausz (Northwestern Univ.)
- Chunchun Li (Univ. of Colorado at Colorado Springs)
- Huangjing Lin (Chinese Univ. of Hong Kong)
- Aakarsh Malhotra (Indian Inst. of Technology Delhi)
- Roey Mechrez (Technion – Israel Inst. of Technology)
- Niluthpol Mithun (Univ. of California, Riverside)
- Deepak Mittal (Indian Inst. Of Technology Madras)
- Greg Olmschenk (City Univ. of New York)
- Suvam Patra (Indian Inst. of Technology Delhi)
- Rafael Roberto (Federal Univ. of Pernambuco)
- Lars Sommer (Karlsruhe Inst. of Technology)
- Arulkumar Subramaniam (Indian Inst. of Technology Madras)
- Lokender Tiwari (Indian Inst. of Technology Delhi)
- Xiang Xiang (Johns Hopkins Univ.)
- Daksha Yadav (West Virginia Univ.)
- Fariba Zohrizadeh (Univ. of Texas at Arlington)

1415–1430 Welcome by the General Chairs
(Emerald Bay A – Harvey’s)

1430–1530 Keynote Session (Emerald Bay A – Harvey’s)

- **Keynote Talk:** Probabilistic Machine Learning for Lesion and Tumour Detection, Segmentation and Disease Prediction in Patient Brain Images, Tal Arbel (McGill Univ.)

  **Abstract:** This research focuses on developing probabilistic machine learning techniques for medical image analysis, with a wide range of applications in neurology and neurosurgery. This talk will describe recent work developing probabilistic graphical models for brain tumour/lesion detection and segmentation, which were successfully applied to the MICCAI BRaTs brain tumour segmentation challenge datasets and to large-scale, multi-scanner, multi-center clinical trial datasets of patients with Multiple Sclerosis. Additional graphical models were developed for accurate detection and segmentation of active lesions in contrast-enhanced images, and for new lesions in longitudinal patient MRI acquired over several timepoints, both of which are important markers of new disease activity and for assessing treatment effects in clinical trials. Tools developed have been integrated into the software analysis pipeline of an industrial partner for usage in clinical trial drug development, where the methods have assisted in the analysis of almost all the new MS treatments currently being used worldwide. This talk will describe recent work for the prediction of future new lesion activity based on baseline MRI, and for automatically identifying potential responders to treatment, leading to the possibility of personalized medicine.

1530–1720 Oral 1A: Faces / Biometrics (Emerald Bay B – Harvey’s)

**Chair:** Walter Scheirer (Univ. of Notre Dame)

**Format** (5 min. short presentation)
1. Multilinear Autoencoder for 3D Face Model Learning, Victoria Fernández Abrevaya, Stefanie Wuhrer, Edmond Boyer
2. Emotion Analysis Using Audio/Video, EMG and EEG: A Dataset and Comparison Study, Farnaz Abtahi, Tony Ro, Wei Li, Zhigang Zhu
3. To Frontalize or Not to Frontalize: Do We Really Need Elaborate Pre-Processing to Improve Face Recognition? Sandipan Banerjee, Joel Brogan, Janez Krizaj, Aparna Bharati, Brandon Richard Webster, Vitomir Štruc, Patrick J. Flynn, Walter J. Scheirer

4. Thermal to Visible Synthesis of Face Images Using Multiple Regions, Benjamin S. Riggan, Nathaniel J. Short, Shuowen Hu

5. Face and Body Association for Video-Based Face Recognition, KangGeon Kim, Zhenheng Yang, Iacopo Masi, Ramakant Nevatia, Gérard Medioni

6. Face Liveness Detection Based on Perceptual Image Quality Assessment Features With Multi-Scale Analysis, Chun-Hsiao Yeh, Herng-Hua Chang

7. Multiple Anthropological Fisher Kernel Framework and Its Application to Kinship Verification, Ajit Puthenputhussery, Qingfeng Liu, Chengjun Liu

8. Micro-Expression Spotting Using the Riesz Pyramid, Carlos Arango, Olivier Alata, Rémi Emonet, Anne-Claire Legrand, Hubert Konik

9. 3D Head Pose Estimation Enhanced Through SURF-Based Key-Frames, Francisco Madrigal, Frederic Lerasle, André Monin

10. Predicting Facial Attributes in Video Using Temporal Coherence and Motion-Attention, Emily M. Hand, Carlos D. Castillo, Rama Chellappa


12. Identity-Preserving Face Recovery From Portraits, Fatemeh Shiri, Xin Yu, Fatih Porikli, Richard Hartley, Piotr Koniusz


14. Face-MagNet: Magnifying Feature Maps to Detect Small Faces, Pouya Samangouei, Mahyar Najibi, Larry S. Davis, Rama Chellappa

15. ECLIPSE: Ensembles of Centroids Leveraging Iteratively Processed Spatial Eclipse Clustering, Chunchun Li, Manuel Günther, Terrance E. Boult

16. HoloFace: Augmenting Human-to-Human Interactions on HoloLens, Marek Kowalski, Zbigniew Nasarzewski, Grzegorz Galinski, Piotr Garbat

17. Word Spotting in Silent Lip Videos, Abhishek Jha, Vinay P. Namboodiri, C. V. Jawahar

18. Learning to Generate 3D Stylized Character Expressions From Humans, Deepali Aneja, Bindita Chaudhuri, Alex Colburn, Gary Faigin, Linda Shapiro, Barbara Mones

1530–1720 Oral 1B: Vision for X / Industrial / Documents (Emerald Bay A – Harvey’s)

Chair: Vishal Patel (Rutgers Univ.)

Format (5 min. short presentation)

1. Image2GIF: Generating Cinemagraphs Using Recurrent Deep Q-Networks, Yipin Zhou, Yale Song, Tamara L. Berg

2. Large Scale Novel Object Discovery in 3D, Siddharth Srivastava, Gaurav Sharma, Brejesh Lall

3. Towards Automated Transcription of Label Text From Pinned Insect Collections, Nitin Agarwal, Nicola Ferrier, Mark Hereld

4. Generating Handwritten Chinese Characters Using CycleGAN, Bo Chang, Qiong Zhang, Shenyi Pan, Lili Meng


6. Confidence Prediction for Lexicon-Free OCR, Noam Mor, Lior Wolf

7. Efficient Training for Automatic Defect Classification by Image Augmentation, Naoaki Kondo, Minoru Harada, Yuji Takagi

8. Visual Weather Temperature Prediction, Wei-Ta Chu, Kai-Chia Ho, Ali Borji

9. Robust and Accurate Text Stroke Segmentation, Siyang Qin, Peng Ren, Seongdo Kim, Roberto Manduchi

10. Classification of Crop Lodging With Gray Level Co-Occurrence Matrix, Sajith Rajapaksa, Mark Eramian, Hema Duddu, Menglu Wang, Steve Shirliffe, Seungbum Ryu, Anique Josuttes, Ti Zhang, Sally Vail, Curtis Pozniak, Isobel Parkin

1620–1630 Short Break
11. Automated Action Units vs. Expert Raters: Face Off, Svati Dhamija, Terrance E. Boult
12. Recommending Outfits From Personal Closet, Pongsate Tangseng, Kota Yamaguchi, Takayuki Okatani
17. Recognition of Pollen-Bearing Bees From Video Using Convolutional Neural Network, Iván F. Rodriguez, Rémi Mégrret, Edgar Acuña, José L. Agosto-Rivera, Tugrul Giray

1720–1740 Afternoon Break (Emerald Bay – Harvey’s)

1740–1930 Oral 1C: Action / Pose / Biometrics (Emerald Bay B – Harvey’s)

Chair: Gaurav Sharma (NEC Labs America)

Format (5 min. short presentation)
1. Generic Tubelet Proposals for Action Localization, Jiawei He, Zhiwei Deng, Mostafa S. Ibrahim, Greg Mori
2. A Temporal Sequence Learning for Action Recognition and Prediction, Sangwoo Cho, Hassan Foroosh
3. ReHAR: Robust and Efficient Human Activity Recognition, Xin Li, Mooi Choo Chua
5. Learning to Detect Human-Object Interactions, Yu-Wei Chao, Yunfan Liu, Xieyang Liu, Huayi Zeng, Jia Deng
6. Human Shape Capture and Tracking at Home, Gaurav Mishra, Saurabh Saini, Kiran Varanasi, P. J. Narayanan
7. Recognizing Visual Signatures of Spontaneous Head Gestures, Mohit Sharma, Dragan Ahmetovic, László A. Jeni, Kris M. Kitani
8. Person Authentication Using Head Images, Aakarsh Malhotra, Richa Singh, Mayank Vatsa, Vishal M. Patel
9. A Greedy Part Assignment Algorithm for Real-Time Multi-Person 2D Pose Estimation, Sreivivas Varadarajan, Parul Datta, Omesh Tickoo
18. Iris Presentation Attack via Textured Contact Lens in Unconstrained Environment, Daksha Yadav, Naman Kohli, Shivangi Yadav, Mayank Vatsa, Richa Singh, Afzel Noore

1740–1930 Oral 1D: Medical / Vehicles / Multimedia (Emerald Bay A – Harvey’s)

Chair: Maneesh Singh (Verisk Analytics)

Format (5 min. short presentation)

1. Learning to See Through Turbulent Water, Zhengqin Li, Zachary Murez, Ravi Ramamoorthi, David Kriegman, Manmohan Chandraker
2. FARSA: Fully Automated Roadway Safety Assessment, Weilian Song, Scott Workman, Armin Hadzic, Xu Zhang, Eric Green, Mei Chen, Reginald Souleyrette, Nathan Jacobs
3. Robust Adaptive Heart-Rate Monitoring Using Face Videos, Puneet Gupta, Brojeshwar Bhowmick, Arpan Pal
7. Wide-Slice Residual Networks for Food Recognition, Niki Martinel, Gian Luca Foresti, Christian Micheloni
8. Path Reducing Watershed for the GPU, Varduhi Yeghiazaryan, Irina Voiculescu

1830–1840 Short Break

11. From Pixels to Actions: Learning to Drive a Car With Deep Neural Networks, Jonas Heylen, Seppe Iven, Bert De Brabandere, Jose Oramas M., Luc Van Gool, Tinne Tuytelaars

13. Semantic Labeling Based Vehicle Detection in Aerial Imagery, Kun Nie, Lars Sommer, Arne Schumann, Jürgen Beyerer
14. Multi Feature Deconvolutional Faster R-CNN for Precise Vehicle Detection in Aerial Imagery, Lars Sommer, Arne Schumann, Tobias Schuchert, Jürgen Beyerer
16. Vehicle Re-Identification by Adversarial Bi-Directional LSTM Network, Yi Zhou, Ling Shao
17. Learning to Segment Breast Biopsy Whole Slide Images, Sachin Mehta, Ezgi Mercan, Jamen Bartlett, Donald Weaver, Joann Elmore, Linda Shapiro
19. Learning Generative Models of Tissue Organization With Supervised GANs, Ligong Han, Robert F. Murphy, Deva Ramanan
20. Tool Detection and Operative Skill Assessment in Surgical Videos Using Region-Based Convolutional Neural Networks, Amy Jin, Serena Yeung, Jeffrey Jopling, Jonathan Krause, Dan Azagury, Arnold Milstein, Li Fei-Fei

1930–2130 Exhibits (Sand Harbor – Harrah’s)
- Perceptive Automata
- Verisk Analytics
- Percipient.ai

1930–2130 Poster Session 1 (Sand Harbor – Harrah’s)

Posters for Oral Sessions 1A, 1B, 1C, and 1D.

1930–2130 Dinner (Sand Harbor – Harrah’s)
Tuesday, March 13

0730–1130 Registration (Sand Harbor – Harrah’s)

0730–0900 Breakfast (Sand Harbor – Harrah’s)

0830–1200 Tutorial (Emerald Bay A – Harvey’s)

Title: Optimization Methods for Deep Learning – Theory and Practice

Organizers: Sathya N. Ravi, Yunyang Xiong (Univ. of Wisconsin Madison)

Description: The impact of numerical optimization on modern data analysis has been quite significant. Today, these methods lie at the heart of most computer vision and statistical machine learning applications in domains spanning genomics, finance and medicine. The expanding scope of these applications, and the complexity of the associated data, has continued to raise the expectations of various criteria associated with the underlying algorithms. Thus it is important for practitioners working on developing mission-critical systems in our community to have hands-on experience with some of the popular numerical algorithms used to train deep networks. The goal of this tutorial is twofold: (i) Present the basic mathematical underpinnings of popular training algorithms in deep learning (DL); and (ii) Implement and test these algorithms in a standard DL framework in the sessions. The tutorial is divided into three parts: Introduction to Optimization Methods, Introduction to DL, and Applications of DL. We believe that this will enable participants to solve exciting and difficult problems in their domain in a more methodical and streamlined manner.

1200–1430 Free Time (Nothing scheduled)

1400–1700 Registration (Sand Harbor – Harrah’s)

1430–1530 Keynote Session (Emerald Bay A – Harvey’s)

• Keynote Talk: Materials in the Wild: Recognition, Editing, and Stylization, Kavita Bala (Cornell Univ. and GrockStyle)

Abstract: A rich range of materials contribute to the visual appearance and aesthetics of the environments we live in. But materials are often not treated as first-class citizens, even though consumers have strong preferences on visual appearance and style that drive their purchasing decisions. In this talk I will describe our work on material recognition in the wild, fine-grained product recognition, material editing, and image stylization. This research has broad applications in e-commerce and retail, in virtual and augmented reality, and in industrial and interior design.

1530–1720 Oral 2A: Machine Learning for Vision 1 (Emerald Bay B – Harvey’s)

Chair: Fatih Porikli (Australian National Univ.)

Format (5 min. short presentation)

1. Decoupled Learning for Conditional Adversarial Networks, Zhifei Zhang, Yang Song, Hairong Qi
2. Learning to Prune Filters In Convolutional Neural Networks, Qiangui Huang, Kevin Zhou, Suya You, Ulrich Neumann
3. Structured GANs, Irad Peleg, Lior Wolf
4. Neural Algebra of Classifiers, Rodrigo Santa Cruz, Basura Fernando, Anoop Cherian, Stephen Gould
5. SHADHO: Massively Scalable Hardware-Aware Distributed Hyperparameter Optimization, Jeffery Kinnison, Nathaniel Kremer-Herman, Douglas Thain, Walter Scheirer
6. Deep Cosine Metric Learning for Person Re-Identification, Nicolai Wojke, Alex Bewley
7. Iterative Cross Learning on Noisy Labels, Bodi Yuan, Jianyu Chen, Weidong Zhang, Hung-Shuo Tai, Sara McMains
8. A Simple Yet Effective Model for Zero-Shot Learning, Xi Hang Cao, Zoran Obradovic, Kyungnam Kim
9. Fading Affect Bias: Improving the Trade-Off Between Accuracy and Efficiency in Feature Clustering, Ziyin Wang, Sepehr Farhand, Gavriil Tsechpenakis

1615–1630 Short Break
10. A Rotationally-Invariant Convolution Module by Feature Map Back-Rotation, Patrick Follmann, Tobias Böttger
11. Learning Image Representations by Completing Damaged Jigsaw Puzzles, Dahun Kim, Donghyeon Cho, Donggeun Yoo, In So Kweon
12. Towards Robust Deep Neural Networks With BANG, Andras Rozsa, Manuel Günther, Terrance E. Boult
13. Learning Higher Order Potentials for MRFs, Dinesh Khandelwal, Parag Singla, Chetan Arora
15. Distribution-Aware Binarization of Neural Networks for Sketch Recognition, Ameya Prabhu, Vishal Batchu, Sri Aurobindo Munagala, Rohit Gajawada, Anoop Namboodiri
17. Recovering From Random Pruning: On the Plasticity of Deep Convolutional Neural Networks, Deepak Mittal, Shweta Bhardwaj, Mitesh M. Khapra, Balaraman Ravindran

1530–1720 Oral 2B: 3D / Geometry (Emerald Bay A – Harvey’s)

Chair: Lior Wolf (Tel Aviv Univ.)

Format (5 min. short presentation)
1. DeformNet: Free-Form Deformation Network for 3D Shape Reconstruction From a Single Image, Andrey Kurenkov, Jingwei Ji, Animesh Garg, Viraj Mehta, JunYoung Gwak, Christopher Choy, Silvio Savarese
2. Multi-View Stereo 3D Edge Reconstruction, Andrea Bignoli, Andrea Romanoni, Matteo Matteucci
3. Vector Graph Representation for Deformation Transfer Using Poisson Interpolation, Prashant Domadiya, Pratik Shah, Suman K. Mitra
4. Real-Time Simultaneous 3D Reconstruction and Optical Flow Estimation, Menandro Roxas, Takeshi Oishi
5. Object-Centric Photometric Bundle Adjustment With Deep Shape Prior, Rui Zhu, Chaoyang Wang, Chen-Hsuan Lin, Ziyan Wang, Simon Lacey
6. Minimal Solvers for Monocular Rolling Shutter Compensation Under Ackermann Motion, Pulak Purkait, Christopher Zach
7. Real-Time Variational Range Image Fusion and Visualization for Large-Scale Scenes Using GPU Hash Tables, Nico Marniok, Bastian Goldluecke
8. Multi-Pattern Embedded Phase Shifting Using a High-Speed Projector for Fast and Accurate Dynamic 3D Measurement, Michika Maruyama, Satoshi Tabata, Yoshihiro Watanabe, Masatoshi Ishikawa
9. Robust and User Friendly 3D Re-Construction of Neutron Tomographic Images, Hao Song, Mark Eramian, Emil Hallin, Blanche Leyeza, Paul G. Arnison, Ronald Rogge

1615–1630 Short Break
10. Supervised Deep-Autoencoder for Depth Image-Based 3D Model Retrieval, Ayesha Siddiqua, Guoliang Fan
11. Minimal Non-Linear Camera Pose Estimation Method Using Lines for SLAM Applications, Yu Cao, Haishu Tan, Fuqiang Zhou
12. Incremental Structural Modeling Based on Geometric and Statistical Analyses, Rafael Roberto, João Paulo Lima, Hideaki Uchiyama, Clemens Arth, Veronica Teichrieb, Rintaro Taniguchi, Dieter Schmalstieg
13. Reliability Map Estimation for CNN-Based Camera Model Attribution, David Güera, Sri Kalyan Yarlagadda, Paolo Bestagini, Fengqing Zhu, Stefano Tubaro, Edward J. Delp
14. DGSAC: Density Guided SAmpling and Consensus, Lokender Tiwari, Saket Anand
15. An Epipolar Line From a Single Pixel, Tavi Halperin, Michael Werman
16. Efficient Map Compression for Collaborative Visual SLAM, Dominik Van Opdenbosch, Tamay Aykut, Martin Oelsch, Nicolas Alt, Eckehard Steinbach
18. Improvement of Extrinsic Parameters From a Single Stereo Pair, Andreas Kuhn, Lukas Roth, Jan-Michael Frahm, Helmut Mayer

1720–1740 Afternoon Break (Emerald Bay – Harvey’s)
1740–1930 Oral 2C: Tracking / Detection
(Emerald Bay B – Harvey’s)

Chair: Vivek Kwatra (Google)

Format (5 min. short presentation)
1. Object Detection in Real-Time Systems: Going Beyond Precision, Anupam Sobti, Chetan Arora, M. Balakrishnan
2. Graph-Based Correlated Topic Model for Trajectory Clustering in Crowded Videos, Manal Al Ghamdi, Yoshihiko Gotoh
3. Dynamic Visual Sequence Prediction With Motion Flow Networks, Dinghuang Ji, Zheng Wei, Enrique Dunn, Jan Michael Frahm
4. Rotation Adaptive Visual Object Tracking With Motion Consistency, Litu Rout, Siddhartha Singh, Deepak Mishra, Rama Krishna Sai Subrahmanyam Gorti
5. SceneFlowFields: Dense Interpolation of Sparse Scene Flow Correspondences, René Schuster, Oliver Wasenmüller, Georg Kuschk, Christian Bailer, Didier Stricker
6. LBP Channels for Pedestrian Detection, Remi Trichet, Francois Bremond
7. An Animal Detection Pipeline for Identification, Jason Parham, Jonathan Crall, Daniel Rubenstein, Jason Holmberg, Tanya Berger-Wolf, Charles Stewart
9. StairNet: Top-Down Semantic Aggregation for Accurate One Shot Detection, Sanghyun Woo, Soonmin Hwang, In So Kweon
10. SmartPartNet: Part-Informed Person Detection for Body-Worn Smartphones, Heng Yu, Eshed Ohn-Bar, Dongyun Yoo, Kris M. Kitani

1830–1840 Short Break
11. Crowd Counting via Scale-Adaptive Convolutional Neural Network, Lu Zhang, Miaojing Shi, Qiaobo Chen
12. Tracking by Prediction: A Deep Generative Model for Multi-Person Localisation and Tracking, Tharindu Fernando, Simon Denman, Sritha Sridharan, Clinton Fookes
13. EnKCF: Ensemble of Kernelized Correlation Filters for High-Speed Object Tracking, Burak Uzkent, YoungWoo Seo
15. Crowd Counting With Minimal Data Using Generative Adversarial Networks for Multiple Target Regression, Greg Olmschenk, Hao Tang, Zhigang Zhu
17. Salient Region-Based Online Object Tracking, Hyemin Lee, Daijin Kim
19. SS-LSTM: A Hierarchical LSTM Model for Pedestrian Trajectory Prediction, Hao Xue, Du Q. Huynh, Mark Reynolds

1740–1930 Oral 2D: Machine Learning for Vision
2 (Emerald Bay A – Harvey’s)

Chair: Terry Boult (Univ. of Colorado)

Format (5 min. short presentation)
1. Channel-Recent Autoencoding for Image Modeling, Wenling Shang, Kihyuk Sohn, Yuandong Tian
3. A Semi-Supervised Two-Stage Approach to Learning From Noisy Labels, Yifan Ding, Liqiang Wang, Deliang Fan, Boqing Gong
4. Look-Up Table Unit Activation Function for Deep Convolutional Neural Networks, Min Wang, Baoyuan Liu, Hassan Foroosh
5. Soft-Cascade Learning With Explicit Computation Time Considerations, Francisco Rodolfo Barbosa-Anda, Frédéric Lerasle, Cyril Briand, Alhayat Ali Mekonnen
6. BranchConnect: Image Categorization With Learned Branch Connections, Karim Ahmed, Lorenzo Torresani
7. Gabor Convolutional Networks, Shangzhen Luan, Baochang Zhang, Siyue Zhou, Chen Chen, Jungong Han, Wankou Yang, Jianzhuan Liu
8. QRkit: Sparse, Composable QR Decompositions for Efficient and Stable Solutions to Problems in Computer Vision, *Jan Svoboda, Thomas Cashman, Andrew Fitzgibbon*


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11. A Deep Four-Stream Siamese Convolutional Neural Network With Joint Verification and Identification Loss for Person Re-Detection, *Amena Khatun, Simon Denman, Sridha Sridharan, Clinton Fookes*

12. Robust Subspace Clustering by Bi-Sparsity Pursuit: Guarantees and Sequential Algorithm, *Ashkan Panahi, Xiao Bian, Hamid Krim, Liyi Dai*


14. Learning Confidence Measures by Multi-Modal Convolutional Neural Networks, *Zehua FU, Mohsen Ardabilian Fard*

15. A Compact Convolutional Neural Network for Textured Surface Anomaly Detection, *Domen Rački, Dejan Tomaževič, Danijel Skočaj*


17. Balancing Content and Style With Two-Stream FCNs for Style Transfer, *Duc Minh Vo, Trung-Nghia Le, Akihiro Sugimoto*

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Wednesday, March 14

0730–1130 Registration (Sand Harbor – Harrah’s)

0730–0900 Breakfast (Sand Harbor – Harrah’s)

0830–1200 Tutorial (Emerald Bay A – Harvey’s)

Title: When Blockchain Meets Computer Vision: Opportunities and Challenges

Organizers: Karthik Nandakumar, Sharathchandra Pankanti, Nalini Ratha (IBM Singapore Lab; IBM Thomas J. Watson Research Center)

Description: It is widely acknowledged that blockchain is foundational technology that will revolutionize the way transactions are conceived, executed, managed, and monetized. While the technological benefits of the blockchain infrastructure are imminent, the underlying technological problems need significant attention from researchers. Of specific interest to computer vision researchers and application developers is the opportunity to make a connection to these emerging infrastructure capabilities, and realize how their skills can be leveraged to make an impact. As the camera-based infrastructure is becoming ubiquitous and compute power is becoming pervasively available, the business world is going to look to camera as a default sensor, and camera-based analytics as a de facto information channel to improve the integrity of transactions. For instance, many complex practical challenges such as usability, compliance with regulations, integrity of transaction artifacts, and protecting privacy of sensitive information, can be effectively addressed using blockchain technology. The tutorial is aimed as a gentle introduction to the broader world of distributed transaction environment, and specifically blockchain technology. The tutorial will first introduce the blockchain technical concepts and capabilities in the context of real computer vision applications. The tutorial will subsequently review real application scenarios, where blockchain has tremendous potential to accelerate its use as an enterprise transaction infrastructure. The key technical challenges will be concretely couched in real mainstream use-cases such as privacy of end-users, scalability and cost-effectiveness, and user friendliness. Solving these problems requires multi-disciplinary research effort at the intersection of blockchain, artificial intelligence, and user behavior modeling.

1200–1430 Free Time (Nothing scheduled)

1400–1700 Registration (Sand Harbor – Harrah’s)

1430–1530 Keynote Session (Emerald Bay A – Harvey’s)

- Keynote Talk: Prize Challenges in Computer Vision, Christopher Boehnen (IARPA)

Abstract: Challenge problems within computer vision play a critical role in advancing research. IARPA has led or is leading challenge problems looking into face recognition, fingerprint capture, facial feature fusion, facial disguise, and improving UAV image quality. This talk will provide an overview of the importance of prize challenges and results for some of the different challenges I have run.

1530–1720 Oral 3A: Segmentation / Saliency / Super-Resolution (Emerald Bay B – Harvey’s)

Chair: Carla Pagliari (Instituto Militar de Engenharia)

Format (5 min. short presentation)

1. DARN: A Deep Adversarial Residual Network for Intrinsic Image Decomposition, Louis Lettry, Kenneth Vanhoey, Luc van Gool
2. Saliency Driven Image Manipulation, Roey Mechrez, Eli Shechtman, Lihi Zelnik-Manor
3. Depth Map Completion by Jointly Exploiting Blurry Color Images and Sparse Depth Maps, Liyuan Pan, Yuchao Dai, Miaomiao Liu, Fatih Porikli
4. Learning to Detect Multiple Photographic Defects, Ning Yu, Xiaohui Shen, Zhe Lin, Radomír Měch, Connelly Barnes
6. Stabilizing First Person 360 Degree Videos, Chetan Arora, Vivek Kwatra
7. Super-Resolution for Overhead Imagery Using DenseNets and Adversarial Learning, **Marc Bosch, Christopher M. Gifford, Pedro A. Rodriguez**

8. CT-SRCNN: Cascade Trained and Trimmed Deep Convolutional Neural Networks for Image Super Resolution, **Haoyu Ren, Mostafa El-Khamy, Jungwon Lee**

9. Towards the Success Rate of One: Real-Time Unconstrained Salient Object Detection, **Mahyar Najibi, Fan Yang, Qiaosong Wang, Robinson Piramuthu**

10. Effective Use of Dilated Convolutions for Segmenting Small Object Instances in Remote Sensing Imagery, **Ryuhei Hamaguchi, Aito Fujita, Keisuke Nemoto, Tomoyuki Imaizumi, Shuhei Hikosaka**

1620–1630 Short Break

11. Understanding Convolution for Semantic Segmentation, **Panqu Wang, Pengfei Chen, Ye Yuan, Ding Liu, Zehua Huang, Xiaodi Hou, Garrison Cottrell**

12. Learning Semantic Segmentation With Diverse Supervision, **Linwei Ye, Zhi Liu, Yang Wang**

13. Image Segmentation Using Sparse Subset Selection, **Fariba Zohrizadeh, Mohsen Kheirandishfard, Farhad Kamangar**

14. Light-Field Surface Color Segmentation With an Application to Intrinsic Decomposition, **Elena Garces, Erik Reinhard**

15. Unsupervised Clustering Guided Semantic Segmentation, **Qin Huang, Chunyang Xia, Siyang Li, Ye Wang, Yuhang Song, C.-C. Jay Kuo**

16. Ensemble Knowledge Transfer for Semantic Segmentation, **Ishan Nigam, Chen Huang, Deva Ramanan**

17. Segmentation and Shape Extraction From Convolutional Neural Networks, **Mai Lan Ha, Gianni Franchi, Michael Möller, Andreas Kolb, Volker Blanz**

18. Where and Who? Automatic Semantic-Aware Person Composition, **Fuwen Tan, Crispin Bernier, Benjamin Cohen, Vicente Ordóñez Román, Connelly Barnes**

19. Saliency Prediction for Mobile User Interfaces, **Prakhar Gupta, Shubh Gupta, Ajaykrishnan Jayagopal, Sourav Pal, Ritwik Sinha**

20. Task Specific Visual Saliency Prediction With Memory Augmented Conditional Generative Adversarial Networks, **Tharindu Fernando, Simon Denman, Sridha Sridharan, Clinton Fookes**

1530–1720 Oral 3B: Action Recognition / Surveillance / Language (Emerald Bay A – Harvey’s)

**Chair:** C.-C. Jay Kuo (Univ. of Southern California)

**Format (5 min. short presentation)**

1. Modeling Temporal Structure With LSTM for Online Action Detection, **Roeland De Geest, Tinne Tuytelaars**

2. End-to-End Fine-Grained Action Segmentation and Recognition Using Conditional Random Field Models and Discriminative Sparse Coding, **Effrosyni Mavroudi, Divya Bhaskara, Shahin Sefati, Haider Ali, René Vidal**

3. Scaling Human-Object Interaction Recognition Through Zero-Shot Learning, **Liyue Shen, Serena Yeung, Judy Hoffman, Greg Mori, Li Fei-Fei**

4. Temporal Difference Networks for Video Action Recognition, **Joe Yue-Hei Ng, Larry S. Davis**


6. Fully-Coupled Two-Stream Spatiotemporal Networks for Extremely Low Resolution Action Recognition, **Mingze Xu, Aidean Sharghi, Xin Chen, David J. Crandall**

7. ActionFlowNet: Learning Motion Representation for Action Recognition, **Joe Yue-Hei Ng, Jonghyun Choi, Jan Neumann, Larry S. Davis**

8. Structural Recurrent Neural Network (SRNN) for Group Activity Analysis, **Sovan Biswas, Juergen Gall**

9. Instance-Aware Detailed Action Labeling in Videos, **Hongtao Yang, Xuming He, Fatih Porikli**

10. Learning Hierarchical Models of Complex Daily Activities From Annotated Videos, **Jawad Tayyub, Majd Hawasly, David C. Hogg, Anthony G. Cohn**

1620–1630 Short Break

11. ReMotENet: Efficient Relevant Motion Event Detection for Large-Scale Home Surveillance Videos, **Ruichi Yu, Hongcheng Wang, Larry S. Davis**

12. Foot Contact Timings and Step Length for Sprint Training, **Murray Evans, Steffi Colyer, Darren Cosker, Aki Salo**
13. Illumination-Invariant Robust Multiview 3D Human Motion Capture, Nadia Robertini, Florian Bernard, Weipeng Xu, Christian Theobalt
14. Efficient Multi-Attribute Similarity Learning Towards Attribute-Based Fashion Search, Kenan E. Ak, Joo Hwee Lim, Jo Yew Tham, Ashraf A. Kassim
15. CSVideoNet: A Real-Time End-to-End Learning Framework for High-Frame-Rate Video Compressive Sensing, Kai Xu, Fengbo Ren
17. Disjoint Multi-Task Learning Between Heterogeneous Human-Centric Tasks, Dong-Jin Kim, Jinsoo Choi, Tae-Hyun Oh, Youngjin Yoon, In So Kweon
18. Fine-Grained and Semantic-Guided Visual Attention for Image Captioning, Zongjian Zhang, Qiang Wu, Yang Wang, Fang Chen
19. Contextually Customized Video Summaries via Natural Language, Jinsoo Choi, Tae-Hyun Oh, In So Kweon

1720–1740 Afternoon Break (Emerald Bay – Harvey’s)

1740–1930 Oral 3C: Vision and Learning, Languages, Applications (Emerald Bay B – Harvey’s)

Chair: Hamid Krim (North Carolina State Univ.)

Format (5 min. short presentation)
1. Learning Video-Story Composition via Recurrent Neural Network, Guangyu Zhong, Yi-Hsuan Tsai, Sifei Liu, Zhixun Su, Ming-Hsuan Yang
2. Discriminative Cross-View Binary Representation Learning, Liu Liu, Hairong Qi
3. Unsupervised Object Discovery for Instance Recognition, Oriane Siméoni, Ahmet Iscen, Giorgos Tolias, Yannis Avrithis, Ondrěj Chum
4. Video Inpainting for Arbitrary Foreground Object Removal, Ashraf Siddique, Seungkyu Lee
5. Aesthetic Inference for Smart Mobile Devices, Michal Kucer, David W. Messinger
6. Improving Object Classification Performance via Confusing Categories Study, Shangwen Li, Chen Chen, Yuzhuo Ren, C.-C. Jay Kuo
7. Context-Aware Single-Shot Detector, Wei Xiang, Dong-Qing Zhang, Heather Yu, Vassilis Athitsos
8. The More You Look, the More You See: Towards General Object Understanding Through Recursive Refinement, Jingyan Wang, Olga Russakovsky, Deva Ramanan
9. ByLabel: A Boundary Based Semi-Automatic Image Annotation Tool, Xuebin Qin, Shida He, Zichen Zhang, Masood Dehghan, Martin Jagersand

1825–1840 Short Break

10. Object-Based Reasoning in VQA, Mikyas T. Desta, Larry Chen, Tomasz Kornuta
11. Generative and Discriminative Sparse Coding for Image Classification Applications, Ajit Puthenputhussery, Qingfeng Liu, Hao Liu, Chengjun Liu
12. Distributed Active Learning for Image Recognition, Shayok Chakraborty
13. Retweet Wars: Tweet Popularity Prediction via Dynamic Multimodal Regression, Ke Wang, Mohit Bansal, Jan-Michael Frahm
14. Semantically Guided Visual Question Answering, Handong Zhao, Quanfu Fan, Dan Gutfreund, Yun Fu
17. Improving Text-Based Person Search by Spatial Matching and Adaptive Threshold, Tianlang Chen, Chenliang Xu, Jiebo Luo
1740–1930 Oral 3D: Features / Detection / Shape / Non-RGB (Emerald Bay A – Harvey’s)

Chair: Zhigang Zhu (City College of New York)

Format (5 min. short presentation)
1. Chainlets: A New Descriptor for Detection and Recognition, Adil Ahmad, Daniel Lemmond, Terrance E. Boult
2. Image Copy-Move Forgery Detection via an End-to-End Deep Neural Network, Yue Wu, Wael Abd-Almageed, Prem Natarajan
3. Anomaly Explanation Using Metadata, Di Qi, Joshua Arfin, Mengxue Zhang, Tushar Mathew, Brendan Juba, Robert Pless
4. 3D Shape Processing by Convolutional Denoising Autoencoders on Local Patches, Kripasindhu Sarkar, Kiran Varanasi, Didier Stricker
5. Fast and Robust Curve Skeletonization for Real-World Elongated Objects, Amy Tabb, Henry Medeiros
6. NCC-Net: Normalized Cross Correlation Based Deep Matcher With Robustness to Illumination Variations, Arulkumar Subramaniam, Prashanth Balasubramanian, Anurag Mittal
7. Guided Filtering of Hyperspectral Images, Sanjay Ghosh, Naveen Tripathi
8. RGBD Camera Based Material Recognition via Surface Roughness Estimation, Jungjun Kim, Hwasup Lim, Sang Chul Ahn, Seungkyu Lee
9. General-Purpose Deep Point Cloud Feature Extractor, Miguel Dominguez, Rohan Dhamdhere, Atir Petkar, Saloni Jain, Shagan Sah, Raymond Ptucha

1825–1840 Short Break

10. Synthetic to Real Adaptation With Generative Correlation Alignment Networks, Xingchao Peng, Kate Saenko
11. Effective Combination of Vertical and Horizontal Stereo Vision, Jan Kallwies, Hans-Joachim Wuenschke
12. Chess Piece Recognition Using Oriented Chamfer Matching With a Comparison to CNN, Youye Xie, Gongguo Tang, William Hoff
13. Delay Compensation for Actuated Stereoscopic 360 Degree Telepresence Systems With Probabilistic Head Motion Prediction, Tamay Aykut, Christoph Burgmair, Mojtaba Karimi, Jingyi Xu, Eckehard Steinbach

14. Automatic Analysis of Sewer Pipes Based on Unrolled Monocular Fisheye Images, Johannes Künzel, Thomas Werner, Ronja Möller, Peter Eisert, Jan Waschnewski, Ralf Hilpert
15. Fusion of Infrared and Visible-Light Videos Using Motion-Compensated Temporal Sub-Band Decompositions, Jonathan N. Gois, Eduardo A. B. da Silva, Carla L. Pagliari, Marcelo M. Perez
16. Learning Long-Term Invariant Features for Vision-Based Localization, Niluthpol C. Mithun, Cody Simons, Robert Casey, Stefan Hilligardt, Amit Roy-Chowdhury
17. Will People Like Your Image? Learning the Aesthetic Space, Katharina Schwarz, Patrick Wieschollek, Hendrik P. A. Lensch
18. An Analysis of Human-Centered Geolocation, Kaili Wang, Yu-Hui Huang, Jose Oramas M., Luc Van Gool, Tinne Tuytelaars

1930–2130 Exhibits (Sand Harbor – Harrah’s)
   • Perceptive Automata
   • Verisk Analytics
   • Percipient.ai

1930–2130 Poster Session 3 (Sand Harbor – Harrah’s)
Posters for Oral Sessions 3A, 3B, 3C, and 3D.

1930–2130 Dinner (Sand Harbor – Harrah’s)

Notes:
Thursday, March 15

0730–1130 Registration (Emerald Bay – Harvey’s)

0730–0900 Breakfast (Emerald Bay – Harvey’s)

1030–1100 Morning Break (Emerald Bay – Harvey’s)

1200–1400 Lunch (on your own)

1330–1600 Registration (Emerald Bay – Harvey’s)

1530–1600 Afternoon Break (Emerald Bay – Harvey’s)

Cross-Domain Biometric Recognition

Organizers: Shuowen (Sean) Hu
Nathaniel J. Short
Benjamin Riggan
Vishal Patel

Location: Emerald Bay A – Harvey’s

Schedule: Full Day

0830 Welcome & Introductions

0845 Cross-Domain Biometric Recognition Overview

0915 Keynote: Odin Program: Biometric Presentation Attack Detection, Chris Boehnen (Intelligence Advanced Research Projects Activity)

0945 Invited Talk: Deep Learning for Heterogenous Face Recognition, Nasser Nasrabadi (West Virginia Univ.)

1030 Morning Break (Emerald Bay – Harvey’s)

S1: Oral Session I – Cross-Domain Face Recognition (1100–1200)

1100 Facial Attributes Guided Deep Sketch-to-Photo Synthesis, Hadi Kazemi, Seyed Mehdi Iranmanesh, Ali Dabouei, Sobhan Soleymani, Nasser M. Nasrabadi

1120 ivisX: An Integrated Video Investigation Suite for Forensic Applications, Chengchao Qu, Jürgen Metzler, Eduardo Monari

1140 Evaluating a Convolutional Neural Network on Short-Wave Infra-Red Images, Michael Bihn, Manuel Günther, Daniel Lemmond, Terrance E. Boult

1200 Lunch (on your own)

1230 Invited Talk: Advances in Fingerprint Matching Technologies, Elham Tabassi (National Institute of Standards and Technology)

1415 Invited Talk: Multispectral Iris Recognition, George Quinn (National Institute of Standards and Technology)

1500 Afternoon Break (Emerald Bay – Harvey’s)

S2: Oral Session II – Cross-Domain Fingerprint and Iris Recognition (1515–1615)

1515 Automatic Access Control Based on Face and Hand Biometrics in a Non-Cooperative Context, Mohammad N. S. Jahromi, Morten Bojesen Bonderup, Maryam Asadi-Aghbolaghi, Egils Avots, Kamal Nasrollahi, Sergio Escalera, Shohreh Kasaei, Thomas B. Moeslund, Gholamreza Anbarjafari

1535 Enhancing Optical Cross-Sensor Fingerprint Matching Using Local Textural Features, Emanuela Marasco, Alexander Feldman, Keleigh Rachel Romine

1555 A Multi-Task Convolutional Neural Network for Joint Iris Detection and Presentation Attack Detection, Cunjian Chen, Arun Ross

1615 Best Paper Awards: Presented by Polaris Sensor Technologies, Inc.

• $350 – Best Paper
• $150 – Best Paper Runner-up

1625 Closing Remarks
Computer Vision for Active and Assisted Living

Organizers: Lili Tao  
Adeline Paiement

Location: Emerald Bay B – Harvey’s

Schedule: Half Day (Morning)

0850 Welcome & Opening Remarks

0900 Keynote Talk: Incorporating Domain Knowledge in the Design of Vision-based Assisted Living Systems, Henry Medeiros (Marquette Univ.)

0950 Paper Spotlights

1030 Morning Break & Poster Session

- Facial Expression Recognition Using a Large Out-of-Context Dataset, Elizabeth Tran, Michael B. Mayhew, Hyojoon Kim, Piyush Karande, Alan D. Kaplan
- Generic Object Discrimination for Mobile Assistive Robots Using Projective Light Diffusion, Panagiotis Papadakis, David Filliat
- Calorific Expenditure Estimation Using Deep Convolutional Network Features, Baodong Wang, Lili Tao, Tilo Burghardt, Majid Mirmehdi
- Group Affect Prediction Using Multimodal Distributions, Saqib Nizam Shamsi, Bhanu Pratap Singh, Manya Wadhwa
- Learning Visual Engagement for Trauma Recovery, Svati Dhamija, Terrance E. Boult
- Assessing Pain Levels From Videos Using Temporal Convolutional Networks, Xiang Xiang, Ye Tian, Gregory D. Hager, Trac D. Tran

1100 Invited Talk: TBA

1120 Panel Discussion

Notes: