Welcome to The 2020 IEEE/CVF Winter Conference on Computer Vision and Applications at Aspen, CO. WACV continues to be IEEE/CVF and PAMI-TCS’s premier meeting on applications of computer vision, for researchers in our community to present their exciting advances in computer vision, pattern recognition, machine learning, robotics, and artificial intelligence in practice. With invited keynotes talks, oral and poster presentations, tutorials, workshops, demo and exhibitions, and an amiable social setting, this is a week that everyone will enjoy, not to mention skiing and snowboarding that many attendees would love.

Following a similar accelerating multi-year trend, WACV2020 had a surge with a record number of 699 first round submissions and 397 second round submissions, which added to a total number of 1096 independent submissions. WACV has a unique 2 round review process, in which papers submitted in the first round have a chance to be revised and resubmitted for re-review. The program chairs were allowed to submit their papers to the conference. Reviews of their submissions are conducted offline by other program chairs, which avoided any potential conflict of interests.

After 4 months of diligent work from the 45 area chairs and 647 reviewers, 379 papers are accepted through the first and second round review process. 151 papers in the first round are revised and resubmitted for re-review in the second round, out of which 118 were accepted. Most of the papers received 3 full reviews. In the rare case a paper only received 2 reviews, an area chair (AC) would chime in to conduct an offline review, which is factored in the consolidation report. The final acceptance decisions were made with AC triplets, in consultation with the program chairs. Following the best practice of our community, the program chairs did not place any restrictions on acceptance. The final acceptance rate is 34.5%, which is trending lower compared with past WACV conferences.

Out of the 379 accepted papers, 11 papers are shortlisted as best paper candidates per recommendation from the AC triplets. The final 5 best papers and honorable mentions are selected from these 11 papers through our award committee, which is composed of 6 senior researchers in our community. Best papers are presented in a single track award session, with each allocated 10 minutes for presentation and 2 minutes for question and answering. All other papers are allocated 3 minutes for a short oral presentation followed by 1-hour poster presentation. To accommodate the growing number of papers and attendees, we run parallel oral and poster sessions. Also, to ensure the attendees have the opportunities to explore fun with the snow mountains, the main conference activities start in the early afternoon and last late in the evening.

We would like to thank everyone involved in making WACV2020 a success. This includes the organizing committee, the area chairs, the reviewers, authors, demo session participants, donors, exhibitors, and everyone else without whom this meeting would not be possible. We also thank Nicole Finn and C to C Events for their organization of the logistics of the conference. Last but not least, we thank all of you for attending WACV and making it one of the top venues for applications in computer vision research in the world. We hope that you also have some time to explore the gorgeous snow mountains and skiing resort in Aspen during the conference. Enjoy WACV 2020!

Gang Hua, Ming-Yu Liu, Vishal Patel, Walter Scheirer, and Ryan Farrell
Program Co-Chairs

Arun Ross, David Cox, and Scott McCloskey
General Co-Chairs
## WACV 2020 Organizing Committee

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<td>General Chairs</td>
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<td>Program Chairs</td>
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<td>Doctoral Consortium Chair</td>
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## WACV 2020 Area Chairs

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<td>Saket Anand</td>
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<td>Xiaodan Liang</td>
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<td>Oisin Mac Aodha</td>
<td>Ehsan Elhamifar</td>
<td>Feng Liu</td>
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<td>Angelica I. Aviles-Rivero</td>
<td>Orazio Gallo</td>
<td>Jiwen Lu</td>
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<td>Sarah Bargal</td>
<td>Chuang Gan</td>
<td>Le Lu</td>
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<td>Boqing Gong</td>
<td>Dimiccoli Mariella</td>
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Saturday, Feb 29

1800–2000  Registration (Conference Center Lobby)

Sunday, March 1

0730–1130  Registration (Conference Center Lobby)
1330–1700  Additional Registration

Demographic Variation in the Performance of Biometric Systems

Organizers: John Howard
             Mike King
             Yevgeniy Sirotin
             Arun Ross

Location: Castle Peak Aud.

Schedule: Full Day (0900 – 1700)

0900  Opening Remarks (Organizers)
0915  Paper: Analysis of Gender Inequality In Face Recognition Accuracy: Vítor Albiero (University of Notre Dame)
0940  Paper: Mitigating Algorithmic Bias: Evolving an Augmentation Policy that is Non-Biasing, Philip Smith (UNC Wilmington)
1005  Coffee Break
1035  Paper: Reducing Geographic Performance Differentials for Face Recognition: Martins Bruveris (Onfido)
1100  Keynote: Demographic Accuracy Differentials in Contemporary Face Recognition Algorithms: Patrick Grother (NIST)
1200  Lunch Break (on your own)
1300  Invited Talk: Imparting Demographic Privacy to Face Images: Arun Ross (Michigan State University)

1330  Invited Talk: Applying Fairness Models to Face Recognition Accuracy Rates: John Howard (Maryland Test Facility)
1400  Invited Talk: Reliability and Validity of Image-Based and Self-Reported Skin Phenotype Metrics: Yevgeniy Sirotin (Maryland Test Facility)
1430  Invited Talk: Measuring Demographic Variation in Humans and Face Recognition Algorithms Jacqueline Cavazos (UT Dallas)
1500  Coffee Break
1530  Keynote Talk: Modeling the Factors Affecting Variability in the Human Face: Mark Shriver (Penn State)
1630  Panel Discussion: Next Steps to Ensure Equitability in Biometric Systems Chaired by Michael King (FIT)
Deep Learning Methods and Applications for Animal Re-Identification

Organizers:  Sara Beery  
            Jason Parham  
            Stefan Schneider

Location:  Alpine Springs

Schedule:  Half Day (1300 – 1700)

1300  Introduction to Machine Learning / Deep Learning for Ecologists, Graham Taylor

1330  Similarity Comparison Networks for Animal Re-Identification, Stefan Schneider

1400  Animal Re-Identification from Camera Trap Images: Can We Deal with Low-Quality Data? Sara Beery

1430  Learning Landmark Guided Embeddings for Animal Re-Identification, Olga Moskvyak

1500  Coffee Break

1545  Siamese Network Based Pelage Pattern Matching for Ringed Seal Re-Identification, Ekaterina Nepovinnykh

1615  WildMe: The Future of Animal Re-ID Databases, Jason Parham

1645  Posters

- Re-Identification of Zebrafish using Metric Learning, Joakim Bruslund Haurum, Anastasija Karpova, Malte Pedersen, Stefan Hein Bengtson, Thomas B. Moeslund
- Learning Landmark Guided Embeddings for Animal Re-identification, Olga Moskvyak, Frederic Maire, Feras Dayoub, Mahsa Baktashmotlagh
- CAFM: A 3D Morphable Model for Animals, Yifan Sun, Noboru Murata
- "Siamese Network Based Pelage Pattern Matching for Ringed Seal Re-identification, "Ekaterina Nepovinnykh, Tuomas Eerola, Heikki Kalviainen
- Bumblebee Re-Identification Dataset, Frederic Tausch, Simon Stock, Julian Fricke, Olaf Klein
- Fusing Animal Biometrics with Autonomous Robotics: Drone-based Search and Individual ID of Friesian Cattle (Extended Abstract), William Andrew, Colin Greatwood, Tilo Burghardt
- Similarity Learning Networks for Animal Individual Re-Identification - Beyond the Capabilities of a Human Observer, Stefan Schneider, Graham W. Taylor, Stefan C. Kremer
- The Sloop System for Individual Animal Identification in a Deep Learning Context, Kshitij Bakliwal, Sai Ravela

1730  Travel and After Workshop Dinner

Neural Architecture Search for Computer Vision in the Wild

Organizers:  Mei Chen  
            Gaurav Mittal

Location:  Salon A

Schedule:  Full Day (0900 – 1700)

0915  Welcome and Opening Remarks: Guarav Mittal; Mei Chen (Microsoft)

0930  Neural Architecture Search: Has the revolution happened yet? Debadeepta Dey (Microsoft Research)

1020  Coffee break

1040  Neural Architecture Search in Large-Scale 3D Medical Image Analysis: Dong Yang (NVIDIA)

1130  Representational Dissimilarity Analysis as a Tool for Neural Network Model Search: Walter J. Scheirer (University of Notre Dame)

1220  Lunch

1335  Neural Architecture Search and Beyond: Barret Zoph (Google Brain)

1425  Memory-Efficient Models for Scene Text Recognition via Neural Architecture Search: SeulGI Hong (hutom); DongHyun Kim (NAVER Corp); Min-Kook Choi (hutom)

1445  Impact of ImageNet Model Selection on Domain Adaptation: Youshan Zhang; Brian Davison (Lehigh University)

1505  Coffee Break

1530  TBD

1620  Hardware-Aware Deep Neural Architecture Search: Péter Vajda (Facebook)

1710  Closing Remarks: Guarav Mittal; Mei Chen (Microsoft)
Monday, March 2

0830-1100  **Registration**  (Conference Center Lobby)
1300-1700  Additional Registration

0900-1200  **Tutorial: Local features: from SIFT to Differentiable**

**Organizers:** Vassileios Balntas
Dmytro Mishkin
Edgar Riba

**Location:** Salon A

**Website:** [https://local-features-tutorial.github.io/](https://local-features-tutorial.github.io/)

**Description:** Local feature matching is one of the cornerstones of “classical” computer vision. Despite the recent advances of deep learning, a crucial question still remains which is whether the learned local feature methods can outperform the classical methods. Initial results have shown that classical non-deep learning methods are still very competitive and can outperform recent deep learning methods. However, recent work has focused on training end-to-end differentiable systems for particular applications, with promising results.

This tutorial will aim to

1. present a historic overview of the classical methods
2. present an overview of how deep learning changed the classical methods
3. focus on modern end-to-end (e2e) methods that are trained in a fully differentiable manner
4. present several practical examples of end-to-end differentiable local features, using the recently introduced kornia library, that was created by 2 of the tutorial’s organisers
5. present recommendations for practical use of local features and how they interact with other parts of image matching pipeline: image preprocessing, matching, RANSAC, etc.

1345-1500  **Oral 1A: 3D Vision and Computational Photography** (Salon A)

**Papers in this session are also in Poster Session 1.**

**Chair:** Abby Stylianou

**Format** (3 min. short presentation)

1. Inferring Super-Resolution Depth from a Moving Light-Source Enhanced RGB-D Sensor: A Variational Approach,  
   *Lu Sang, Bjoern Haefner, Daniel Cremers*

2. Unsupervised Learning of Camera Pose with Compositional Re-estimation,  
   *Seyed shahabeddin Nabavi, Mehrdad Hosseinzadeh, Ramin Fahimi, Yang Wang*

3. Blended Convolution and Synthesis for Efficient Discrimination of 3D Shapes,  
   *Sameera Ramasinghe, Salman Khan, Nick Barnes, Stephen Gould*

4. A Multi-Scale Guided Cascade Hourglass Network for Depth Completion,  
   *Ang Li, Zejian Yuan, Yonggen Ling, Wanchao Chi, shenghao zhang, Chong Zhang*

5. Silhouette Guided Point Cloud Reconstruction beyond Occlusion,  
   *Chuhang Zou, Derek Hoiem*

6. Non-Rigid Structure from Motion: Prior-Free Factorization Method Revisited,  
   *Suryansh Kumar*

7. PointGrow: Autoregressively Learned Point Cloud Generation with Self-Attention,  
   *Yongbin Sun, Yue Wang, Ziwei Liu, Joshua Siegel, Sanjay Sarma*

8. Depth Completion via Deep Basis Fitting,  
   *Chao Qu, Ty Nguyen, Camillo Taylor*

9. High Accuracy Face Geometry Capture using a Smartphone Video,  
   *Shubham Agrawal, Anuj Pahuja, Simon Lucey*

10. FlowNet3D++: Geometric Losses For Deep Scene Flow Estimation,  
    *Zirui Wang, Shuda Li, Henry Howard-Jenkins, Victor Prisacaru, Min Chen*

11. Style Transfer for Light Field Photography,  
    *David Hart, Bryan Morse, Jessica Greenland*

12. Fourier Based Pre-Processing For Seeing Through Water,  
    *Jerin Geo James, Ajit Rajwade*

13. DeOccNet: Learning to See Through Foreground Occlusions in Light Fields,  
    *Yingqian Wang, Tianhao Wu, Jungang Yang, Longguang Wang, Wei An, Yulan Guo*

14. Appearance and Shape from Water Reflection,  
    *Ryo Kawahara, Meng-Yu Kuo, Shohei Nobuhara, Ko Nishino*
An Extended Exposure Fusion and its Application to Single Image Contrast Enhancement, Charles Hessel, Jean-Michel Morel

Online Lens Motion Smoothing for Video Autofocus, Abdullah Abuolaim, Michael Brown

Fast Image Reconstruction with an Event Camera, Cedric Scheerlinck, Henri Rebecq, Daniel Gehrig, Nick Barnes, Robert Mahony, Davide Scaramuzza

Self-Guided Novel View Synthesis via Elastic Displacement Network, Yicun Liu, Jiawei Zhang, Ye Ma, Jimmy Ren

On Scene Flow Computation of Gas Structures with Optical Gas Imaging Cameras, Johannes Rangel, Robert Schmoll, Andreas Kroll

Fast Deep Stereo with 2D Convolutional Processing of Cost Signatures, Kyle Yee, Ayan Chakrabarti

Triple-SGM: Stereo Processing using Semi-Global Matching with Cost Fusion, Jan Kallwies, Torsten Engler, Bianca Forkel, Hans-Joachim Wuensche

Optimizing Through Learned Errors for Accurate Sports Field Registration, Wei Jiang, Juan Camilo Gamboa Higuera, Baptiste Angles, Weiwei Sun, Mehrsan Javan, Kwang Moo Yi

Reference Grid-assisted Network for 3D Point Signature Learning from Point Clouds, Jing Zhu, Yi Fang

Stable Intrinsic Auto-Calibration from Fundamental Matrices of Devices with Uncorrelated Camera Parameters, Torben Fetzer, Gerd Reis, Didier Stricker

Deep Image Blending, Lingzhi Zhang, Tarmily Wen, Jianbo Shi

360 Panorama Synthesis from a Sparse Set of Images with Unknown Field of View, Julius Surya Sumantri, In Kyu Park

1345-1500 Oral 1B: Biometrics (Cathedral Peak)
Papers in this session are also in Poster Session 1.

Paper # represents poster board #.
Chair: Nate Blanchard
Format (3 min. short presentation)

Cross-Domain Face Synthesis using a Controllable GAN, Fania Mokhayeri, Kaveh Kamali, Eric Granger

Does Face Recognition Accuracy Get Better With Age? Deep Face Matchers Say No, Vitor Albiero, Kevin Bowyer, Kushal Vangara, Michael King

Offset Calibration for Appearance-Based Gaze Estimation via Gaze Decomposition, Zhaokang Chen, Bertram Shi

Detecting Morphed Face Attacks Using Residual Noise from Deep Multi-Scale Context Aggregation Network, Sushma Venkatesh, Raghavendra Ramachandra, Kiran Raja, Luuk Spreeuwers, Raymond Veldhuis, Christoph Busch

Gaze Estimation for Assisted Living Environments, Philippe Ambrozio Dias, Damiano Malafonti, Henry Medeiros, Francesca Odone

On Hallucinating Context and Background Pixels from a Face Mask using Multi-scale GANs, Sandipan Banerjee, Walter Scheirer, Kevin Bowyer, Patrick Flynn

EyeGAN: Gaze–Preserving, Mask–Mediated Eye Image Synthesis, Harsimran Kaur, Roberto Manduchi

Boosting Deep Face Recognition via Disentangling Appearance and Geometry, Ali Dabouei, Fariborz Taherkhani, Sobhan Soleymani, Jeremy Dawson, Nasser Nasrabadi

Robust Facial Landmark Detection via Aggregation on Geometrically Manipulated Faces, Seyed mehdi Iranmanesh, Ali Dabouei, Sobhan Soleymani, Hadi Kazemi, Nasser Nasrabadi

End to End Lip Synchronization with a Temporal AutoEncoder, Yoav Shalev, Lior Wolf

Can a CNN Automatically Learn the Significance of Minutiae Points for Fingerprint Matching?, Anurag Chowdhury, Simon Kirchgasser, Andreas Uhl, Arun Ross

AutoToon: Automatic Geometric Warping for Face Cartoon Generation, Julia Gong, Yannick Hold-Geoffroy, Jingwan Lu

Component Attention Guided Face Super-Resolution Network: CAGFace, Ratheesh Kalarot, Tao Li, Fatih Porikli
1630-1715  Awards Session (Salon A)
Papers in this session are also in Poster Session 2.
Paper # represents poster board #.
Chair: Gang Hua
Format (10 min. short presentation followed by 2m Q&A)
2. Best Paper Award, Applications: Hand-Priming in Object Localization for Assistive Egocentric Vision, Kyungjun Lee (University of Maryland, College Park)*; Abhinav Shrivastava (University of Maryland); Hernisa Kacorri (University of Maryland, College Park)
4. Best Paper Honorable Mention: Word-level Deep Sign Language Recognition from Video: A New Large-scale Dataset and Methods Comparison, Dongxu Li (The Australian National University)*; Cristian Rodriguez (Australian National University); Xin Yu (Australian National University); Hongdong Li (Australian National University, Australia)
5. Best Student Paper Award: See the Sound, Hear the Pixels, Janani Ramaswamy (Indian Institute of Technology, Madras)*; Sukhendu Das (Indian Institute of Technology, Madras)

1715-1830  Keynote Session (Salon A)
Chair: Ryan Farrell
Keynote Talk:
Emotional AI, Faces, Deep Fakes and other topics
Maja Pantic Professor of Affective and Behavioral Computing and leader of the i-BUG group in Imperial College London, and the Research Director of the Samsung AI Centre in Cambridge (SAIC).

1830–2000  Dinner (Salon B-E, additional seating in Alpine Springs)
2000-2100 **Oral 2A: Action Recognition** (Salon A)

Papers in this session are also in Poster Session 2.

Paper # represents poster board #.

**Chair:** Terry Boult

Format (3 min. short presentation)

1. Detecting the Starting Frame of Actions in Video, Iljung Kwak, Jian-Zhong Guo, Adam Hantman, David Kriegman, Kristin Branson

2. Looking deeper into Time for Activities of Daily Living Recognition, Srijan Das, Monique Thonnat, Francois Bremond

3. Weakly-Supervised Multi-Person Action Recognition in 360° Videos, Junnan Li, Jianquan Liu, Wong Yongkang, Shoji Nishimura, Mohan Kankanhalli

4. Learning Multimodal Representations for Unseen Activities, AJ Piergiovanni, Michael Ryoo

5. Actor Conditioned Attention Maps for Video Action Detection, Oytun Ulutan, Swati Rallapalli, Mudhakar Srinivas, Carlos Torres, B. S. Manjunath

6. Weakly Supervised Gaussian Networks for Action Detection, Basura Fernando, Cheston Tan, Hakan Bilen


8. Dynamic Motion Representation for Human Action Recognition, Sadjad Asghari-Esfeden, Mario Sznaier, Octavia Camps

9. Image to Video Domain Adaptation Using Web Supervision, Andrew Kae, Yale Song

10. Stacked Spatio-Temporal Graph Convolutional Networks for Action Segmentation, Pallabi Ghosh, Yi Yao, Larry Davis, Ajay Divakaran

11. Global Co-occurrence Feature Learning and Active Coordinate System Conversion for Skeleton-based Action Recognition, Sheng Li, Tingting Jiang, Tiejun Huang, Yonghong Tian

12. Few-Shot Learning of Video Action Recognition Only Based on Video Contents, Yang Bo, Yangdi Lu, Wenbo He

13. Action Segmentation with Mixed Temporal Domain Adaptation, Min-Hung Chen, Baopu Li, Yingze Bao, Ghassan AlRegib

14. Action Graphs: Weakly-supervised Action Localization with Graph Convolution Networks, Maheen Rashid, Hedvig Kjellström, Yong Jae Lee

15. D3D: Distilled 3D Networks for Video Action Recognition, Jonathan Stroud, David Ross, Chen Sun, Jia Deng, Rahul Sukthankar

16. Self-Attention Network for Skeleton-based Human Action Recognition, Sangwoo Cho, Muhammad Maqbool, Fei Liu, Hassan Foroosh

17. Long-Short Graph Memory Network for Skeleton-based Action Recognition, Junjin Huang, Zhenhuan Huang, Xiang Xiang, Xuan Gong, Bochang Zhang

18. Weakly Supervised Graph Convolutional Neural Network for Human Action Localization, Daisuke Miki, Shi Chen, Kazuyuki Demachi

19. Temporal Contrastive Pretraining for Video Action Recognition, Guillaume Lorre, Jaonary Rabarisoa, Astrid Orcesi, Samia Ainouz, Stéphane Canu

20. Fine-Grained Motion Representation For Template-Free Visual Tracking, Kai Shuang, Yuheng Huang, Yue Sun, Zhun Cai, Hao Guo

21. Adaptive Aggregation of Arbitrary Online Trackers with a Regret Bound, Heon Song, Daiki Suehiro, Seiichi Uchida

22. Multiple Object Forecasting: Predicting Future Object Locations in Diverse Environments, Oliver Styles, Victor Sanchez, Tanaya Guha

23. Inverse Rectification for Efficient Procam Pattern Correspondence, Yubo Qiu, Jonathon Malcolm, Sheikh Ziauddin, Michael Greenspan, Abhay Vatoo

24. Graph Networks for Multiple Object Tracking, Jiahe Li, Xu Gao, Tingting Jiang
2000-2100  **Oral 2B: Object Recognition 1**  
(Cathedral Peak)

_Papers in this session are also in Poster Session 2._

_Paper # represents poster board #._

**Chair:** Antitza Dantcheva  
_Format (3 min. short presentation)_


32. Active Adversarial Domain Adaptation, Jong-Chyi Su, Yi-Hsuan Tsai, Kihyuk Sohn, Buyu Liu, Subhransu Maji, Manmohan Chandraker

33. Progressive Domain Adaptation for Object Detection, Han-Kai Hsu, Chun-Han Yao, Yi-Hsuan Tsai, Wei-Chih Hung, Hung-Yu Tseng, Maneesh Singh, Ming-Hsuan Yang

34. Boosting Standard Classification Architectures Through a Ranking Regularizer, Ahmed Taha, Yi-Ting Chen, Teruhisa Misu, Abhinav Shrivastava, Larry Davis

35. Overlap Sampler for Region-Based Object Detection, Joya Chen, Bin Luo, Qi Wu, Jia Chen, Xuezheng Peng

36. A one-and-half stage pedestrian detector, Ujjwal Ujjwal, Aziz Dziri, Bertrand Leroy, Francois Bremond

37. Model-Agnostic Metric for Zero-Shot Learning, Jiayi Shen, Haochen Wang, Anran Zhang, Qiang Qiu, Xiantong Zhen, Xianbin Cao

38. Intelligent Image Collection: Building the Optimal Dataset, Matthew Gwilliam, Ryan Farrell

39. Internet of Things (IoT) Discovery Using Deep Neural Networks, Ephraim Lo, JoHannah Kohl

40. Propose-and-Attend Single Shot Detector, Ho-Deok Jang, Sanghyun Woo, Philipp Benz, Jinsun Park, In So Kweon

41. Local Binary Pattern Networks, Jeng-Hau Lin, Justin Lazarow, Andrew Yang, Dezhi Hong, Rajesh Gupta, Zhuowen Tu

42. Leveraging Filter Correlations for Deep Model Compression, Pravendra Singh, Vinay Kumar Verma, Piyush Rai, Vinay Namboodiri

43. 360-Indoor: Towards Learning Real-World Objects in 360° Indoor Equirectangular Images, Shih-Han Chou, Cheng Sun, Wen-Yen Chang, Wan-Ting Hsu, Min Sun, Jianlong Fu

44. Regularize, Expand and Compress: NonExpansive Continual Learning, Jie Zhang, Junting Zhang, Shalini Ghosh, Dawei Li, Jingwen Zhu, Heming Zhang, Yalin Wang

45. Synthetic Examples Improve Generalization for Rare Classes, Sara Beery, Yang Liu, Dan Morris, Jim Piavis, Ashish Kapoor, Neel Joshi, Markus Meister, Pietro Perona

46. CANZSL: Cycle-Consistent Adversarial Networks for Zero-Shot Learning from Natural Language, Zhi Chen, Jingjing Li, Yadun Luo, Zi Huang, Yang Yang

47. Accuracy Booster: Performance Boosting using Feature Map Re-calibration, Pravendra Singh, Pratik Mazumder, Vinay Namboodiri

48. Generating Positive Bounding Boxes for Balanced Training of Object Detectors, Kemal Oksuz, Baris Can Cam, Emre Akbas, Sinan Kalkan

49. Towards Learning Affine-Invariant Representations via Data-Efficient CNNs, Wenju Xu, Guanghui Wang, Alan Sullivan, Ziming Zhang

50. Is Pruning Compression?: Investigating Pruning Via Network Layer Similarity, Cody Blakeney, Yan Yan, Ziliang Zong

51. Transductive Zero-Shot Learning for 3D Point Cloud Classification, Ali Cheraghian, Shafin Rahman, Dylan Campbell, Lars Petersson

52. Wide Hidden Expansion Layer for Deep Convolutional Neural Networks, Min Wang, Baoyuan Liu, Hassan Foroosh

53. Learning from THEODORE: A Synthetic Omnidirectional Top-View Indoor Dataset for Deep Transfer Learning, Tobias Scheck, Roman Seidel, Gangolf Hirtz

54. TKD: Temporal Knowledge Distillation for Active Perception, Mohammad Farhadi Bajestani, Yezhou Yang

55. Shape Constrained Network for Eye Segmentation in the Wild, Bingnan Luo, Jie Shen, Shiyang Cheng, Yujiang Wang, Maja Pantic

2100-2200  **Poster Session 2** (Salon B-E)

Exhibitors in Salon C & D.
Tuesday, March 3

0830-1030  **Registration** (Conference Center Lobby)
1200-1700  Additional Registration

0900-1200  **Tutorial: Distributed Hyperparameter Optimization and Model Search with Examples using SHADHO**

*Description:* Computer vision as a field now relies on learning algorithms, particularly deep convolutional neural networks (CNNs), to solve problems like object classification, segmentation, style transfer, and super-resolution, to name a few. Selecting the correct algorithm, with the correct configurations, and training model to solve these problems is, however, difficult: to create the highest quality CNNs possible, one must first create an architecture, and then optimize the hyperparameters that control the learning process. The entire process of model selection is extremely time consuming because hyperparameters, and model performance in general, can only be evaluated experimentally by standard training and testing procedures. This tutorial will introduce distributed hyperparameter optimization (HPO) using the Scalable Hardware-Aware Distributed Hyperparameter Optimizer (SHADHO), an open source framework distributed model search that works with modern Python machine/deep learning code*. Through SHADHO, we will formulate the problem of HPO, demonstrate how to set up search spaces and distributed searches, and show off a variety of search algorithms available out of the box.

1200-1400  **Doctoral Consortium** (Salon B-E)

*Reserved - by invitation only*

- Abdullah Abuolaim (York University)
- Sadjad Asghari-Esfeden (Northeastern University)
- Mohammad Farhadi Bajestani (Arizona State University)
- Björn Barz (Friedrich Schiller University Jena)
- Elizabeth Bondi (Harvard University)
- Liangjian Chen (University of California, Irvine)
- David M Hart (Brigham Young University)
- Alex M Lamb (Universite de Montreal)
- Wenchi Ma (University of Kansas)
- Behnoosh Parsa (University of Washington)
- Badri Patro (IIT Kanpur)
- Maheen Rashid (University of California, Davis)
- Amelie Royer (IST Austria)
- Omry Sendik (Tel Aviv University)
- Zengming Shen (University of Illinois at Urbana Champaign)
- Ahmed A Taha (University of Maryland)
- Patricia Vitoria (Universitat Pompeu Fabra)
- Hong Xuan (George Washington University)
- Junting Zhang (University of Southern California)
- Jing Zhu (New York University)
1300-1415  Oral 3A: Applications 1 (Salon A)
Papers in this session are also in Poster Session 3.

Paper # represents poster board #.

Chair: Emily Hand
Format (3 min. short presentation)

1. SketchTransfer: A New Dataset for Exploring Detail-Invariance and the Abstractions Learned by Deep Networks, Alex Lamb, Sherjil Ozair, Vikas Verma, David Ha
2. SVIRO: Synthetic Vehicle Interior Rear Seat Occupancy Dataset and Benchmark, Steve Dias Da Cruz, Oliver Wasenmüller, Hans-Peter Beise, Thomas Stifter, Didier Stricker
3. Supervised and Unsupervised Learning of Parameterized Color Enhancement, Yoav Chai, Raja Giryes, Lior Wolf
4. ADNet: Adaptively Dense Convolutional Neural Networks, Mingjie Wang, Hao Cai, Xin Huang, Minglun Gong
6. The Overlooked Elephant of Object Detection: Open Set, Akshay Dhamija, Manuel Günther, Jonathan Ventura, Terrance Boult
10. Evaluation of Image Inpainting for Classification and Retrieval, Samuel Black, Somayeh Keshavarz, Richard Souvenir
11. Adversarial Examples for Edge Detection: They Exist, and they Transfer, Christian Cosgrove, Alan Yuille
13. Towards Good Practice for CNN-Based Monocular Depth Estimation, Zhicheng Fang, Xiaoran Chen, Yuhua Chen, Luc Van Gool
17. Class-incremental Learning via Deep Model Consolidation, Junting Zhang, Jie Zhang, Shalini Ghosh, Dawei Li, Serafettin Tasci, Larry Heck, Heming Zhang, C.-C. Jay Kuo
18. Cooperative Initialization based Deep Neural Network Training, Pravendra Singh, Munender Varshney, Vinay Namboodiri
19. Self-Growing Spatial Graph Networks for Pedestrian Trajectory Prediction, Sirin Haddad, Siew-Kei Lam
20. ImaGINator: Conditional Spatio-Temporal GAN for Video Generation, Yaohui WANG, Piotr Bilinski, Francois Bremond, Antitza Dantcheva
21. One-to-one Mapping for Unpaired Image-to-image Translation, Zeming Shen, S. Kevin Zhou, Yifan Chen, Bogdan Georgescu, Xuqi Liu, Thomas Huang
22. ViP: Virtual Pooling for Accelerating CNN-based Image Classification and Object Detection, Zhuo Chen, Jiyuan Zhang, Ruizhou Ding, Diana Marculescu
24. ReStGAN: A step towards visually guided shopper experience via text-to-image synthesis, Shiv Surya, Amrith Setlur, Arijit Biswas, Sumit Negi
1300-1415  **Oral 3B: Object Recognition 2**  
(Cathedral Peak)

**Papers in this session are also in Poster Session 3.**

Paper # represents poster board #.

**Chair:** Jimei Yang  
**Format (3 min. short presentation)**

25. A Multi-Space Approach to Zero-Shot Object Detection,  
*Dikshant Gupta, Aditya Anantharaman, Nehal Mamgain, Sowmya Kamath S, Vineeth N Balasubramanian, C.V. Jawahar*

26. L*ReLU: Piece-wise Linear Activation Functions for Deep Fine-grained Visual Categorization,  
*Mina Basirat, Peter Roth*

27. An Adversarial Domain Adaptation Network for Cross-Domain Fine-Grained Recognition,  
*Yimu Wang, Renjie Song, Xiu-Shen Wei, Lijun Zhang*

28. Generative Model with Semantic Embedding and Integrated Classifier for Generalized Zero-Shot Learning,  
*Ayyappa Pambala, Titir Dutta, Soma Biswas*

29. ELoPE: Fine-Grained Visual Classification with Efficient Localization, Pooling and Embedding,  
*Harald Hanselmann, Hermann Ney*

30. Scale Match for Tiny Person Detection,  
*Xuehui Yu, Yuqi Gong, Nan Jiang, Qixiang Ye, Zhenjun Han*

31. Scall: Classifier Weights Scaling for Class Incremental Learning,  
*Eden Belouadah, Adrian Popescu*

32. Extracting identifying contours for African elephants and humpback whales using a learned appearance model,  
*Hendrik Weideman, Chuck Stewart, Jason Parham, Jason Holmberg, Kiirsten Flynn, John Calambokidis, D. Barry Paul, Anka Bedetti, Michelle Henley, Frank Pope, Jerenimo Lepirei*

33. Anchor Box Optimization for Object Detection,  
*Yuanyi Zhong, Jianfeng Wang, Jian Peng, Lei Zhang*

34. GAR: Graph Assisted Reasoning for Object Detection,  
*Zheng Li, Xiaocong Du, Yu Cao*

35. Improving Object Detection with Inverted Attention,  
*Zeyi Huang, Wei Ke, Dong Huang*

36. Instance Segmentation of Benthic Scale Worms at a Hydrothermal Site,  
*Bhuvan Malladihalli Shashidhara, Mitchell Scott, Aaron Marburg*

37. Multi-Scale Adversarial Cross-Domain Detection with Robust Discriminative Learning,  
*YoungSun Pan, Andy J Ma, Yuan Gao, Jinpeng Wang, YiQi Lin*

38. Combining Compositional Models and Deep Networks For Robust Object Classification under Occlusion,  
*Adam Kortylewski, Qing Liu, Huiyu Wang, Zhishuai Zhang, Alan Yuille*

39. Robust estimation of local affine maps and its applications to image matching,  
*Mariano RODRIGUEZ, Gabriele Facciolo, Rafael Grompone von Gioi, Pablo Musé, Julie Delon*

40. Multi-way Encoding for Robustness,  
*Donghyun Kim, Sarah Bargal, Jianming Zhang, Stan Sclaroff*

41. Robust Face Detection via Learning Small Faces on Hard Images,  
*Zhishuai Zhang, Wei Shen, Siyuan Qiao, Yan Wang, Bo Wang, Alan Yuille*

42. Deep Learning on Small Datasets without Pre-Training using Cosine Loss,  
*Björn Barz, Joachim Denzler*

43. A Novel Self-Supervised Re-labeling Approach for Training with Noisy Labels,  
*Devraj Mandal, Shrisha Bharadwaj, Soma Biswas*

44. Crowded Human Detection via an Anchor-pair Network,  
*Jinguo Zhu, Zejian Yuan, Chong Zhang, Wanchao Chi, Yonggen Ling, shenghao zhang*

45. Multi-class Novelty Detection Using Mix-up Technique,  
*Supritam Bhattacharjee, Devraj Mandal, Soma Biswas*

46. Analysis and a Solution of Momentarily Missed Detection for Anchor-based Object Detectors,  
*Yusuke Hosoya, Masanori Sugaruma, Takayuki Okatani*

47. DATNet: Dense Auxiliary Tasks for Object Detection,  
*Alex Levinshtein, Alborz Rezazadeh Sereshkeh, Konstantinos Derpanis*

48. Active Learning for Imbalanced Datasets,  
*Umang Aggarwal, Adrian Popescu, Céline Hudelot*

49. Animal Detection in Man-made Environments,  
*Abhineet Singh, Marcin Pietrasik, Gabriell Natha, Nehla Ghouaiel, Ken Brizel, Nilanjan Ray*

**1415-1515  Coffee and Poster Session 3** (Salon B-E)  
Posters for Oral Sessions 3A and 3B.

Exhibitors in Salon C & D.
Tuesday, March 3

1515-1630   Oral 4A: Vision and Language  
(Salon A)

Papers in this session are also in Poster Session 4.

Paper # represents poster board #.

Chair: Karl Ricanek
Format (3 min. short presentation)

1. CookGAN: Meal Image Synthesis from Ingredients, Fangda Han, Ricardo Guerrero, Vladimir Pavlovic
2. Exploring Hate Speech Detection in Multimodal Publications, Raul Gomez, Jaume Gibert, Lluis Gomez, Dimosthenis Karatzas
4. Differentiable Scene Graphs, Moshiko Raboh, Roei Herzig, Jonathan Berant, Gal Chechik, Amir Globerson
5. Answering Questions about Data Visualizations using Efficient Bimodal Fusion, Kushal Kafle, Robik Shrestha, Scott Cohen, Brian Price, Christopher Kanan
6. Cross-modal Scene Graph Matching for Relationship-aware Image-Text Retrieval, Sijin Wang, Ruiping Wang, Ziwei Yao, Shiguang Shan, Xilin Chen
7. MHSAN: Multi-Head Self-Attention Network for Visual Semantic Embedding, Daeshik Kim, Geondo Park, Chihye Han, Wonjun Yoon
8. PlotQA: Reasoning over Scientific Plots, Nitesh Methani, Pritha Ganguly, Mitesh M. Khapra, Pratyush Kumar
9. Figure Captioning with Relation Maps for Reasoning, Charles Chen, Ruiyi Zhang, Eunyee Koh, Sungchul Kim, Scott Cohen, Ryan Rossi
10. Rotation-invariant Mixed Graphical Model Network for 2D Hand Pose Estimation, Deying Kong, Haoyu Ma, Yifei Chen, Xiaohui Xie
11. BERT representations for Video Question Answering, Zekun Yang, Noa Garcia, Chenhui Chu, Mayu Otani, Yuta Nakashima, Haruo Takemura
13. Robust Explanations for Visual Question Answering, Badri Patro, Shivansh Patel, Vinay Namboodiri
14. Domain-Specific Semantics Guided Approach to Video Captioning, Hemalatha M, C Chandra Shekhar
15. Adapting Style and Content for Attended Text Sequence Recognition, Steven Schwarcz, Alexander Gorban, Xavier Gibert, Dar-Shyang Lee
16. Visual Question Answering on 360° Images, Shih-Han Chou, Wei-Lun Chao, Wei-Sheng Lai, Min Sun, Ming-Hsuan Yang
17. Spatio-Temporal Ranked-Attention Networks for Video Captioning, Anoop Cherian, Jue Wang, Chiori Hori, Tim Marks
18. ULSAM: Ultra-Lightweight Subspace Attention Module for Compact Convolutional Neural Networks, Rajat Saini, Nandan Kumar Jha, Bedanta Das, Sparsh Mittal, C. Krishna Mohan
19. Watch to Listen Clearly: Visual Speech Enhancement Driven Multi-modality Speech Recognition, Bo Xu, Jacob Wang, Cheng Lu, Yandong Guo
Tuesday, March 3

1515-1630  **Oral 4B: Robotics** (Cathedral Peak)

**Papers in this session are also in Poster Session 4.**

Paper # represents poster board #.

**Chair:** Kimberly Wilber

Format (3 min. short presentation)

21. Video Object Segmentation-based Visual Servo Control and Object Depth Estimation on a Mobile Robot, *Brent Griffin, Victoria Florence, Jason Corso*

22. Robust Feature Tracking in DVS Event Stream using Bezier Mapping, *Hochang Seok, Jongwoo Lim*

23. SymGAN: Orientation Estimation without Annotation for Symmetric Objects, *Phil Ammirato, Jonathan Tremblay, Ming-Yu Liu, Alexander Berg, Dieter Fox*

24. QUICKSAL: A small and sparse visual saliency model for efficient inference in resource constrained hardware, *Vignesh Ramanathan, Pritesh Dwivedi, Bharath Katabathuni, Anirban Chakraborty, Chetan Singh Thakur*


26. Frustum VoxNet for 3D object detection from RGB-D or Depth images, *Xiaoke Shen, Ioannis Stamos*

27. Cross-View Contextual Relation Transferred Network for Unsupervised Vehicle Tracking in Drone Videos, *Wenfeng Song, Shuai Li, Tao Chang, Aimin Hao, Qinping Zhao, Hong Qin*

28. Unsupervised and Semi-Supervised Domain Adaptation for Action Recognition from Drones, *Jinwoo Choi, Gaurav Sharma, Manmohan Chandraker, Jia-Bin Huang*

29. Localizing Grouped Instances for Efficient Detection in Low-Resource Scenarios, *Amelie Royer, Christoph Lampert*

30. Reconstructing Road Network Graphs from both Aerial Lidar and Images, *Biswas Parajuli, Ahana Roy Choudhury, Piyush Kumar*


32. Dual-Mode Training with Style Control and Quality Enhancement for Road Image Domain Adaptation, *Moritz Venator, Fengyi Shen, Selcuk Aklanoglu, Erich Bruns, Klaus Diepold, Andreas Maier*

33. Periphery-Fovea Multi-Resolution Driving Model Guided by Human Attention, *Ye Xia, Jinkyu Kim, John Canny, Karl Zipser, Teresa Canas-Bajo, David Whitney*


35. City-Scale Road Extraction from Satellite Imagery v2: Road Speeds and Travel Times, *Adam Van Etten*

36. Cloud Removal from Satellite Images using Spatiotemporal Generator Networks, *Vishnu Sarukkai, Anirudh Jain, Burak UzKent, Stefano Ermon*

37. Single Satellite Optical Imagery Dehazing using SAR Image Prior Based on conditional Generative Adversarial Networks, *Binghui Huang, Li Zhi, Chao Yang, Fuchun Sun, Yixu Song*

38. The Synthinel-1 dataset: a collection of high resolution synthetic overhead imagery for building segmentation, *Fanjie Kong, Bohao Huang, Kyle Bradbury, Jordan Malof*

39. Efficient Object Detection in Large Images Using Deep Reinforcement Learning, *Burak UzKent, Christopher Yeh, Stefano Ermon*


1630-1730  **Coffee and Poster Session 4** (Salon B-E)

Posters for Oral Sessions 4A and 4B.

1730-1830  **Keynote Session** (Salon A)

**Chair:** Vishal Patel

- **Keynote Talk** Computer Vision for Surgery: Assessment, Augmentation, and Automation, *Gregory Hager (Johns Hopkins University)*
**Tuesday, March 3**

1830–2000  **Dinner** (Salon B-E, additional seating in Alpine Springs)

2000–2100  **Oral 5A: Segmentation** (Salon A)

**Papers in this session are also in Poster Session 5.**

**Chair:** Michael Jones

**Format** (3 min. short presentation)

1. It's All About The Scale - Efficient Text Detection Using Adaptive Scaling, Elad Richardson, Yaniv Azar, Or Avioz, Niv Geron, Tomer Ronen, Zach Avraham, Stav Shapiro

2. Casting Geometric Constraints in Semantic Segmentation as Semi-Supervised Learning, Sinisa Stekovic, Friedrich Fraundorfer, Vincent Lepetit

3. MLSL: Multi-Level Self-Supervised Learning for Domain Adaptation with Spatially Independent and Semantically Consistent Labeling, Javed Iqbal, Mohsen Ali

4. FuseSeg: LiDAR Point Cloud Segmentation Fusing Multi-Modal Data, Georg Krispel, Michael Opitz, Georg Waltner, Horst Possegger, Horst Bischof

5. EpO-Net: Exploiting Geometric Constraints on Dense Trajectories for Motion Saliency, Ijaz Akhter, Mohsen Ali, Muhammad Faisal, Richard Hartley


7. DIPNet: Dynamic Identity Propagation Network for Video Object Segmentation, Ping Hu, Jun Liu, Gang Wang, Vitaly Ablavsky, Kate Saenko, Stan Sclaroff

8. Representing Objects in Video as Space-Time Volumes by Combining Top-Down and Bottom-Up Processes, Filip Ilic, Axel Pinz

9. Dense Extreme Inception Network: Towards a Robust CNN Model for Edge Detection, Xavier Soria Poma, Edgar Riba, Angel Sappa

10. Can I teach a robot to replicate a line art, Raghav B.V., Subham Kumar, Vinay Namboodiri

11. Multiview Co-segmentation for Wide Baseline Images using Cross-view Supervision, Yuan Yao, Hyun Soo Park

12. ROSS: Robust Learning of One-shot 3D Shape Segmentation, Shuaihang Yuan, Yi Fang


14. Template-Based Automatic Search of Compact Semantic Segmentation Architectures, Vladimir Nekrasov, Chunhua Shen, Ian Reid

15. Simultaneous Detection and Removal of Dynamic Objects in Multi-view Images, Gagan Kanojia, Shanmuganathan Raman


17. Leveraging Pretrained Image Classifiers for Language-Based Segmentation, David Golub, Roberto Martín-Martín, Ahmed El-Kishky, Silvio Savarese

18. Quadtree Generating Networks: Efficient Hierarchical Scene Parsing with Sparse Convolutions, Kashyap Chitta, Jose M. Alvarez, Martial Hebert


20. Multi-Level Representation Learning for Deep Subspace Clustering, Mohsen Kheirandishfard, Fariba Zohrizadeh, Farhad Kamangar


22. RPM-Net: Robust Pixel-Level Matching Networks for Self-Supervised Video Object Segmentation, Youngeun Kim, Seokeon Choi, Hunkyel Lee, Taekyung Kim, Changick Kim


24. Multi-Modal Association based Grouping for Form Structure Extraction, Milan Aggarwal, Mausoom Sarkar, Hiresh Gupta, Balaji Krishnamurthy
2000-2100  Oral 5B: Applications 2
(Cathedral Peak)

Papers in this session are also in Poster Session 5.

Paper # represents poster board #.

Chair: Michael King
Format (3 min. short presentation)

25. Multiparty Visual Co-Occurrences for Estimating Personality Traits in Group Meetings, Lingyu Zhang, Indrani Bhattacharya, Mallory Morgan, Michael Foley, Christoph Riedl, Brooke Welles, Richard Radke

26. Uncertainty-aware Short-term Motion Prediction of Traffic Actors for Autonomous Driving, Nemanja Djuric, Vladan Radosavljevic, Henggang Cui, Thi Nguyen, Fang-Chieh Chou, Tsung-Han Lin, Nitin Singh, Jeff Schneider

27. Image identification of Protea species with attributes and subgenus scaling, Peter Thompson, Willie Brink

28. Reverse Variational Autoencoder for Visual Attribute Manipulation and Anomaly Detection, Gauerhof Lydia, Nianlong Gu

29. QR-code Reconstruction from Event Data via Optimization in Code Subspace, Jun Nagata, Yusuke Sekikawa, Kosuke Hara, Teppai Suzuki, Yoshimitsu Aoki

30. Region Pooling with Adaptive Feature Fusion for End-to-End Person Recognition, Vijay Kumar, Anoop Namboodiri, C.V. Jawahar

31. Event-based Star Tracking via Multiresolution Progressive Hough Transforms, Samya Bagchi, Tat-Jun Chin

32. Toward Explainable Fashion Recommendation, Pongsate Tangseng, Takayuki Okatani

33. Self-Contained Stylization via Steganography for Reverse and Serial Style Transfer, Hung-Yu Chen, I-Sheng Fang, Chia-Ming Cheng, Wei-Chen Chiu

34. Adversarial Discriminative Attention for Robust Anomaly Detection, Daiki Kimura, Subhajit Chaudhury, Minoru Narita, Asim Munawar, Ryuki Tachibana


36. A Flexible Selection Scheme for Minimum-Effort Transfer Learning, Amelie Royer, Christoph Lampert

37. Multi-Label Visual Feature Learning with Attentional Aggregation, Ziqiao Guan, Kevin Yager, Dantong Yu, Hong Qin

38. Instance Segmentation for the Quantification of Microplastic Fiber Images, Viktor Wegmeyr, Aytunc Sahin, Björn Saemundsson, Joachim Buhmann


41. Erasing Scene Text with Weak Supervision, Jan Zdenek, Hideki Nakayama

42. Scalable Detection of Offensive and Non-compliant Content / Logo in Product Images, Shreyansh Gandhi, Samrat Kokkula, Abon Chaudhuri, Alessandro Magnani, Theban Stanley, Behzad Ahmadi, Venkatesh Kandaswamy, Omer Ovenc, Shie Mannor

43. Very Power Efficient Neural Time-of-Flight, Yan Chen, Jimmy Ren, Xuanye Cheng, Keyuan Qian, Luyang Wang, Jinwei Gu

44. Semantic Consistency and Identity Mapping Multi-Component Generative Adversarial Network for Person Re-Identification, Amena Khatun, Simon Denman, Sridha Sridharan, Clinton Fookes

45. Structured Compression of Deep Neural Networks with Debiased Elastic Group LASSO, Oyebade Oyedotun, Djamila Aouada, Bjorn Ottersten

46. Plug-and-Play Rescaling Based Crowd Counting in Static Images, Usman Sajid, Guanghui Wang

47. Looking Ahead: Anticipating Pedestrians Crossing with Future Frames Prediction, Mohamed Chaabane, Ameni Trabelsi, Nathaniel Blanchard, Ross Beveridge

48. Post-Mortem Iris Recognition Resistant to Biological Eye Decay Processes, Mateusz Trokielewicz, Adam Czajka, Piotr Maciejewicz

49. Fungi Recognition: A Practical Use Case, Milan Sulc, Lukas Picek, Jiri Matas, Thomas Jeppesen, Jacob Heilmann-Clausen

2100-2200  Poster Session 5 (Salon B-E)

Posters for Oral Sessions 5A and 5B.

Exhibitors in Salon C & D.
0830-1030  Registration (Conference Center Lobby)
1200-1700  Additional Registration

1300-1415  Oral 6A: Image and Video Processing and Retrieval (Salon A)
Papers in this session are also in Poster Session 6.
Paper # represents poster board #.

Chair: Yijun Li
Format (3 min. short presentation)
2. A GAN-based Tunable Image Compression System, Lirong Wu, Kejie Huang, Haibin Shen
5. DCIL: Deep Contextual Internal Learning for Image Restoration and Image Retargeting, Indra Deep Mastan, Shanmuganathan Raman
6. DAVID: Dual-Attentional Video Deblurring, Junru Wu, Xiang Yu, Ding Liu, Manmohan Chandraker, Zhangyang Wang
7. From Image to Video Face Inpainting: Spatial-Temporal Nested GAN (STN-GAN) for Usability Recovery, Yifan Wu, Vivek Singh, Ankur Kapoor
8. Variational Image Deraining, Yingjun Du, Jun Xu, Qiang Qiu, Xiantong Zhen, Lei Zhang
9. End-To-End Trainable Video Super-Resolution Based on a New Mechanism for Implicit Motion Estimation and Compensation, Xiaohong Liu, Lingshi Kong, Yang Zhou, Jiying Zhao, Jun Chen
10. Identifying Recurring Patterns with Deep Neural Networks for Natural Image Denoising, Zhihao Xia, Ayan Chakrabarti
12. ChromaGAN: Adversarial Picture Colorization with Semantic Class Distribution, Patricia Vitoria, Lara Raad, Coloma Ballester
13. Image denoising via K-SVD with primal-dual active set algorithm, Quan Xiao, Canhong Wen, Zirui Yan
15. Improved Embeddings with Easy Positive Triplet Mining, Hong Xuan, Abby Stylianou, Robert Pless
16. Learning Discriminative and Generalizable Representations by Spatial-Channel Partition for Person Re-Identification, Hao Chen, Benoit Lagadec, Francois Bremond
18. Spatial-Content Image Search in Complex Scenes, Jin Ma, Shanmin Pang, Bo Yang, Jihua Zhu, Yaochen Li
20. Geometric Image Correspondence Verification by Dense Pixel Matching, Zakaria Laskar, Iaroslav Melekhov, Hamed Rezazadegan Tavakoli, Juha Ylioinas, Juho Kannala
21. Image Hashing via Linear Discriminant Learning, Weixiang Hong, Yu-Ting Chang, Haifang Qin, Wei-Chih Hung, Yi-Hsuan Tsai, Ming-Hsuan Yang
23. 2-MAP: Aligned Visualizations for Comparison of High-Dimensional Point Sets, Xiaotong Liu, Zeyu Zhang, Hong Xuan, Roxana Leontie, Abby Stylianou, Robert Pless
24. Color Composition Similarity and Its Application in Fine-grained Similarity, Mai Lan Ha, Vlad Hosu, Volker Blanz
1300-1415  Oral 6B: Security, Surveillance, and Motion (Cathedral Peak)

Papers in this session are also in Poster Session 6.

Paper # represents poster board #.
Chair: Mateusz Trokielewicz
Format (3 min. short presentation)

26. Street Scene: A new dataset and evaluation protocol for video anomaly detection, Bharathkumar Ramachandra, Michael Jones
27. Estimate 3D Camera Pose from 2D Pedestrian Trajectories, Yan Xu, Vivek Roy, Kris Kitani
28. Detecting Face2Face Facial Reenactment in Videos, Prabhat Kumar, Mayank Vatsa, Richa Singh
29. Learning a distance function with a Siamese network to localize anomalies in videos, Michael Jones, Bharathkumar Ramachandra, Ranga Vatsavai
30. Temporal Similarity Analysis of Remote Photoplethysmography for Fast 3D Mask Face Presentation Attack Detection, Siqi Liu, Xiangyuan Lan, PongChi Yuen
31. Text-based Person Search via Attribute-aided Matching, Surbhi Aggarwal, Venkatesh Babu RADHAKRISHNAN, Anirban Chakraborty
32. Multi-timescale Trajectory Prediction for Abnormal Human Activity Detection, Royston Rodrigues, Neha Bhargava, Rajbabu Velmurugan, Subhasis Chaudhuri
33. Relativistic Discriminator: A One-Class Classifier for Generalized Iris Presentation Attack Detection, Shivangi Yadav, Cunjian Chen, Arun Ross
34. Unsupervised Domain Adaptation in Person re-ID via k-Reciprocal Clustering and Large-Scale Heterogeneous Environment Synthesis, Devinder Kumar, Parthipan Siva, Paul Marchwica, Alexander Wong
35. Video Person Re-Identification using Learned Clip Similarity Aggregation, Neeraj Matiyali, Gaurav Sharma
37. Pose Guided Gated Fusion for Person Re-identification, Amran Bhuiyan, Yang Liu, Parthipan Siva, Mehrsan Javan, Ismail Ben Ayed, Eric Granger
38. EDGE20: A Cross Spectral Evaluation Dataset for Multiple Surveillance Problems, Ha Le, Christos Smailis, Lei Shi, Ioannis Kakadiaris
41. Stochastic Dynamics for Video Infilling, Qiangeng Xu, Hanwang Zhang, Weiuye Wang, Peter Belhumeur, Ulrich Neumann
42. Cross-Conditioned Recurrent Networks for Long-Term Synthesis of Inter-Person Human Motion Interactions, Jogendra Nath Kundu, Himanshu Buckchash, Priyanka Mandikal, Rahul M V, Anirudh Jamkhandi, Venkatesh Babu Radhakrishnan
43. MotionRec: A Unified Deep Framework for Moving Object Recognition, Murari Mandal, Lav Kush Kumar, Mahipal Singh Saran, Santosh Kumar vipparthi
44. TwoStreamVAN: Improving Motion Modeling in Video Generation, Ximeng Sun, Huijuan Xu, Kate Saenko
45. NRMVS: Non-Rigid Multi-view Stereo, Matthias Innmann, Kihwan Kim, Jinwei Gu, Matthias Niessner, Charles Loop, Marc Stamminger, Jan Kautz
46. Fusing Semantics and Motion State Detection for Robust Visual SLAM, Gaurav Singh, Meiqing Wu, Siew-Kei Lam
47. BSUV-Net: A Fully-Convolutional Neural Network for Background Subtraction of Unseen Videos, Ozan Tezcan, Prakash Ishwar, Janusz Konrad
48. Disentangling Human Dynamics for Pedestrian Locomotion Forecasting with Noisy Supervision, Karttikeya Mangalam, Ehsan Adeli, Kuan-Hui Lee, Adrien Gaidon, Juan Carlos Niebles
49. Adapting Grad-CAM for Embedding Networks, Lei Chen, Jianhui Chen, Hossein Hajimiradaghi, Greg Mori
1415-1515  Coffee and Poster Session 6 (Salon B-E)
Posters for Oral Sessions 6A and 6B.
Exhibitors in Salon C & D.

1515-1630  Oral 7A: Scene Understanding
(Salon A)

Papers in this session are also in Poster Session 7.

Paper # represents poster board #.
Chair: Xavier Gibert Serra
Format (3 min. short presentation)

2. PonitPoseNet: Point Pose Network for Robust 6D Object Pose Estimation, Wei Chen, Jinming Duan, Hector Basevi, Hyung Jin Chang, Ales Leonardis
3. Predicting the Physical Dynamics of Unseen 3D Objects, Davis Rempe, Srinath Sridhar, He Wang, Leonidas Guibas
8. Plugin Networks for Inference under Partial Evidence, Michal Koperski, Tomasz Konopczynski, Rafał Nowak, Piotr Semberecki, Tomasz Trzciński
9. Classifying All Interacting Pairs in a Single Shot, Sanaa Chafik, Astrid Orcesi, Romaric Audigier, Bertrand Luvison
10. A Little Fog for a Large Turn, Harshitha Machiraju, Vineeth N Balasubramanian
11. Smart Hypothesis Generation for Efficient and Robust Room Layout Estimation, Martin Hirzer, Vincent Lepeitit, Peter Roth
12. Graph Neural Networks for Image Understanding Based on Multiple Cues: Group Emotion Recognition and Event Recognition as Use Cases, Xin Guo, Luisa Polanía, Bin Zhu, Charles Boncelet, Kenneth Barner
14. Combinational Class Activation Maps for Weakly Supervised Object Localization, Seunghan Yang, Yoonhyung Kim, Youngeun Kim, Changick Kim
16. Iterative and Adaptive Sampling with Spatial Attention for Black-Box Model Explanations, Bhavan Vasu, Chengjiang Long
17. Focusing Visual Relation Detection on Relevant Relations with Prior Potentials, François Plesse, Alexandru Ginsca, Bertrand Delezoide, Françoise Preteux
18. Domain Bridge for Unpaired Image-to-Image Translation and Unsupervised Domain Adaptation, Fabio Pizzati, Raoul de Charette, Michela Zaccaria, Pietro Cerri
1515-1630  **Oral 7B: Statistical Methods and Learning** (Cathedral Peak)

**Papers in this session are also in Poster Session 7.**

*Paper # represents poster board #.*

**Chair:** Yezhou Yang  
**Format:** (3 min. short presentation)

20. GradMix: Multi-source Transfer across Domains and Tasks, Junnan Li, Ziwei Xu, Wong Yongkang, Qi Zhao, Mohan Kankanhalli


23. Partially Zero-shot Domain Adaptation from Incomplete Target Data with Missing Classes, Masato Ishii, Takashi Takenouchi, Masashi Sugiyama

24. microbatchGAN: Stimulating Diversity with Multi-Adversarial Discrimination, Gonçalo Mordido, Haojin Yang, Christoph Meinel

25. Adversarial Sampling for Active Learning, Christoph Mayer, Radu Timofte

26. Resisting Large Data Variations via Introspective Transformation Network, Yunhan Zhao, Ye Tian, Charless Fowlkes, Wei Shen, Alan Yuille

27. Uncertainty in Model-Agnostic Meta-Learning using Variational Inference, Cuong Nguyen, Thanh-Toan Do, Gustavo Carneiro


32. Filter Distillation for Network Compression, Xavier Suau Cuadros, Luca Zappella, Nicholas Apostoloff

33. Improving Style Transfer with Calibrated Metrics, Mao-Chuang Yeh, Shuai Tang, Anand Bhattad, Chuanghai Zou, David Forsyth

34. Learning from Noisy Labels via Discrepant Collaborative Training, Yan Han, Soumava Roy, Lars Petersson, Mehrtash Harandi

35. Class-Discriminative Feature Embedding For Meta-Learning based Few-Shot Classification, Alireza Rahimpour, Hairong Qi

36. Adaptive Neural Connections for Sparsity Learning, Alex Gain, Prakhar Kaushik, Hava Siegelmann

37. FX-GAN: Self-Supervised GAN Learning via Feature Exchange, Rui Huang, Wenju Xu, Teng-Yok Lee, Anoop Cherian, Ye Wang, Tim Marks

38. Synthesizing human-like sketches from natural images using a conditional convolutional decoder, Moritz Kampelmühler, Axel Pinz

1630-1730  **Coffee and Poster Session 7** (Salon B-E)

Posters for Oral Sessions 7A and 7B.

Exhibitors in Salon C & D.

1730-1830  **Keynote Session** (Salon B-E)  
**Chair:** Ming-Yu Liu

**Keynote Talk**  Amazon Go: a peek under the hood by Gerard Medioni, Vice President & Distinguished Scientist at Amazon and Professor Emeritus of Computer Science USC

1830–2000  **Dinner** (Salon B-E,  
Additional seating in Alpine Springs)
2000-2100 Oral 8A: Multimedia (Salon A)

Papers in this session are also in Poster Session 8.

Paper # represents poster board #.

Chair: Adam Czajka
Format (3 min. short presentation)

1. Best Frame Selection in a Short Video, Jian Ren, Xiaohui Shen, Zhe Lin, Radomir Mech
2. Fast Video Multi-Style Transfer, Wei Gao, Yijun Li, Yihang Yin, Ming-Hsuan Yang
3. Toward Interactive Self-Annotation For Video Object Bounding Box: Recurrent Self-Learning And Hierarchical Annotation Based Framework, Trung-Nghia Le, Akihiro Sugimoto, Shintaro Ono, Hiroshi Kawasaki
6. s-SBIR: Style Augmented Sketch based Image Retrieval, Titir Dutta, Soma Biswas
8. Animating Face using Disentangled Audio Representations, Gaurav Mittal, Baoyuan Wang
10. AlignNet: A Unifying Approach to Audio-Visual Alignment, Jianren Wang, Zhaoyuan Fang, Hang Zhao
11. Eye Contact Correction using Deep Neural Networks, Furkan Isikdogan, Timo Gerasimow, Gilad Michael
12. Attention Flow: End-to-End Joint Attention Estimation, Ömer Sümer, Peter Gerjets, Ulrich Trautwein, Enkelejda Kasneci
13. PSNet: A Style Transfer Network for Point Cloud Stylization on Geometry and Color, Xu Cao, Weimin Wang, Katashi Nagao, Ryosuke Nakamura
15. BRDF-Reconstruction in Photogrammetry Studio Setups, Matthias Innmann, Jochen Süßmuth, Marc Stamminger
16. Do As I Do: Transferring Human Motion and Appearance between Monocular Videos with Spatial and Temporal Constraints, Thiago Gomes, Renato Martins, João Ferreira, Erickson Nascimento
17. Temporal Aggregation with Clip-level Attention for Video-based Person Re-identification, Mengliu Li, Han Xu, Jinjun Wang, Wenpeng Li, Yongli Sun
18. ICface: Interpretable and Controllable Face Reenactment Using GANs, Soumya Tripathy, Juho Kannala, Esa Rahtu
20. Preference-Based Image Generation, Hadi Kazemi, Fariborz Taherkhani, Nasser Nasrabadi
22. Multimodal Image Outpainting With Regularized Normalized Diversification, Lingzhi Zhang, Jiancong Wang, Jianbo Shi
23. Learning to Detect Head Movement in Unconstrained Remote Gaze Estimation in the Wild, Zhecan Wang, Jian Zhao, Cheng Lu, Fan Yang, Han Huang, lianji li, Yandong Guo
2000-2100  Oral 8B: Applications 3
(Cathedral Peak)

Papers in this session are also in Poster Session 8.

Paper # represents poster board #.

Chair: Richard Souvenir
Format (3 min. short presentation)

24. MoBiNet: A Mobile Binary Network for Image Classification, Hai Phan, Dang The Huynh, Yihui He, Marios Savvides, Zhiqiang Shen
25. Image Difficulty Curriculum for Generative Adversarial Networks (CuGAN), Petru Soviany, Claudiu Ardei, Radu Tudor Ionescu, Marius Leordeanu
27. CoachGAN, Mike Brodie
28. Towards Preserving the Ephemeral: Texture-Based Background Modelling for Capturing Back-of-the-Napkin Notes, Melissa Cote, Alexandra Branzan Albu
29. Unsupervised Writer Adaptation for Synthetic-to-Real Handwritten Word Recognition, Lei Kang, Marçal Rusiñol, Alicia Fornes, Pau Riba, Mauricio Villegas
30. LEAF-QA: Locate, Encode & Attend for Figure Question Answering, Ritwick Chaudhry, Sumit Shekhar, Utkarsh Gupta, Pranav Maneriker, Prann Banosal, Ajay Joshi
32. Main-Secondary Network for Defect Segmentation of Textured Surface Images, Yu Xie, Fangrui Zhu, Yanwei Fu
33. A Novel Inspection System For Variable Data Printing Using Deep Learning, Oren Haik, Oded Perry, Eli Chen, Peter Klammer
34. Print Defect Mapping with Semantic Segmentation, Augusto Valente, Cristina Wada, Deangela Neves, Deangeli Neves, Fábio Perez, Guilherme Megeto, Marcos Cascone, Otavio Gomes, Qian Lin
35. Low Cost, High Performance Automatic Motorcycle Helmet Violation Detection, Aphinya Chairat, Matthew Dailey, Somphop Limsoonthrakul, Mongkol Ekpanyapong, Dharma Raj KC
36. Composition-Aware Image Aesthetics Assessment, Dong Liu, Rohit Puri, Nagendra Kamath, Subhabrata Bhattacharya
37. Adversarial Defense based on Structure-to-Signal Autoencoders, Sebastian Palacio, Joachim Folz, Jörn Hees, Andreas Dengel
38. Calibrated Domain-Invariant Learning for Highly Generalizable Large Scale Re-Identification, Ye Yuan, Wuyang Chen, Tianlong Chen, Yang Yang, Zhou Ren, Zhangyang Wang, Gang Hua
39. Two-Grid Preconditioned Solver for Bundle Adjustment, Siddhant Katyal, Shrutimoy Das, Pawan Kumar
41. NeurReg: Neural Registration and Its Application to Image Segmentation, Wentao Zhu, Andriy Myronenko, Ziyue Xu, Wenqi Li, Holger Roth, Yufang Huang, Fausto Milletari, Daguang Xu
42. Enhanced generative adversarial network for 3D brain MRI super-resolution, Jiancong Wang, Yuhua Chen, Yifan Wu, Jianbo Shi, James Gee
43. HistoNet: Predicting size histograms of object instances, Kishan Sharma, Moritz Gold, Christian Zurbruegg, Laura Leal-Taixé, Jan Dirk Wegner
44. 3D semi-supervised learning with uncertainty-aware multiview co-training, Yingda Xia, Fengze Liu, Dong Yang, Jinheng Cai, Lequan Yu, Zhuotun Zhu, Daguang Xu, Alan Yuille, Holger Roth
45. IterNet: Retinal Image Segmentation Utilizing Structural Redundancy in Vessel Networks, Liangzhi Li, Manisha Verma, Yuta Nakashima, Hajime Nagahara, Ryo Kawasaki
46. Star-convex Polyhedra for 3D Object Detection and Segmentation in Microscopy, Martin Weigert, Uwe Schmidt, Robert Haase, Ko Sugawara, Gene Myers
47. Kornia: an Open Source Differentiable Computer Vision Library for PyTorch, Edgar Riba, Dmytro Mishkin, Daniel Ponsa, Ethan Rublee, Gary Bradski

2100-2200  Poster Session 8 (Salon B-E)

Posters for Oral Sessions 8A and 8B.
Exhibitors in Salon C & D.
Thursday, March 5

Deepfakes and Presentation Attacks in Biometrics

**Organizers:** Cunjian Chen
Adam Czajka
Naser Damer
Antitza Dantcheva
Hu Han
Kiran Raja
Raghavendra Ramachandra

**Location:** Alpine Springs
Posters will be in Salon B-E

**Schedule:** Half day (0900–1300)

- **0930 Opening remarks,** Kiran Raja / Adam Czajka
- **0940 Keynote:** Deepfakes and Detection Challenges, *Wael Abd-Almageed*, *USC Viterbi School of Engineering.*
- **0935 Coffee Break**
- **1100 IMD2020: A Large-Scale Annotated Dataset Tailored for Detecting Manipulated Images, Babak Mahdian*
- **1120 Disrupting Image-Translation-Based DeepFake Algorithms with Adversarial Attacks, Chin-Yuan Yeh, Shang-Lun Tsai, Hsi-Wen Chen, Sheng-De Wang**
- **1140 Syn2Real: Forgery Classification via Unsupervised Domain Adaptation, Akash Kumar, Arnav Bhavsar, Rajesh Verma**
- **1200 Lunch (On your own)**
- **1300 Invited talk:** A video is worth more than 1000 lies. 3D CNN approaches for detecting deepfakes, *Anitza Dantcheva, INRIA*
- **1200 Keynote:** Presentation Attacks and Master Prints, Arun Ross, MSU
- **1245 Closing remarks, Anitza Dantcheva, INRIA**

Vision Applications & Solutions to Biased or Scarce Data

**Organizers:** Kuan-Chuan Peng
Ziming Zhang

**Location:** Salon A

**Schedule:** Full day (0900–1700)

- **0910 Opening Remarks:** Ziming Zhang
- **0920 Keynote:** Vishal Patel
- **1000 Coffee Break**
- **1020 Keynote:** Boqing Gong
  *Rethinking Class-Balanced Methods for Long-Tailed Visual Recognition from A Domain Adaptation Perspective*
- **1100 Keynote:** Yang Wang
  *Scene-adaptive visual learning with limited data*
- **1140 Lunch Break**
- **1340 Keynote:** Walter J. Scheirer
  *Visual Psychophysics for Making Face Recognition Algorithms More Explainable*
- **1420 Keynote:** TBD
- **1500 Coffee break**
- **1520 Keynote:** TBD
- **1600 Closing Remarks:** Ziming Zhang
Human Activity Detection in multi-camera, Continuous, long-duration Video

Organizers: Jonathan Fiscus
Afzal Godil
Anthony Hoogs
Reuven Meth

Location: Cathedral Peak.
Posters will be in Salon B-E

Schedule: Full day (0900–1700)

0900 Welcome

0905 Invited Talk: FBI Uses of Video Analytics, Richard Vorder Bruegge (Federal Bureau of Investigation)

0945 Activity Detection in Untrimmed Videos Using Chunk-based Classifiers, Joshua Gleason; Steven Schwarcz; Rajeev Ranjan; Carlos Castillo; Jun-Cheng Chen; Rama Chellappa (University of Maryland)

1010 Context Sensitivity of Spatio-Temporal Activity Detection using Hierarchical Deep Neural Networks in Extended Videos, Felix Hertlein; David Münch; Michael Arens (Fraunhofer IOSB)

1035 Morning Break

ActEV Challenge Results & Best Performer Presentations

1055 ActEV SDL & TRECVID Challenge Results, Yooyoung Lee; Jonathan Fiscus; Afzal Godil; Andrew Delgado; Eliot Godard; Edmond J. Golden; Maxime Hubert; Lukas Diduch (NIST)

1120 Faster than Real-time Detection of Activities in Untrimmed Videos (SDL Leaderboard), Joshua Gleason; Carlos Castillo; Rama Chellappa (University of Maryland)

1145 Argus: Efficient Parallel Activity Detection System for Extended Video Analysis (TRECVID Leaderboard), Wenhe Liu; Xiaojun Chang; Guoliang Kang; Po-Yao Huang; lijun yu; Yijun Qian; Jing Wen; Alexander Hauptmann (Carnegie Mellon University, Monash University)

1210 Activity Detection/Recognition Session I

1210 Adaptive Feature Aggregation for Video Object Detection, Yijun Qian; Lijun Yu; Wenhe Liu; Guoliang Kang; Alexander Hauptmann (Carnegie Mellon University)

1235 Invited Talk: The IARPA DIVA Program, Jeff Alstott (IARPA)

1310 Lunch + Poster Setup

Activity Detection/Recognition Session II (1410-1515)

1410 Invited Talk: Two Decades of Action for Action Recognition and Detection: From Shallow to Deep Representations, Rama Chellappa (University of Maryland)

1450 Real-Time Activity Detection of Human Movement in Videos via Smartphone Based on Synthetic Training, Data Rico Thomanek; Tony Rolletschke; Benny Platte; Claudia Hösel; Christian Roschke; Robert Manthey; Manuel Heinzig; Richard Vogel; Frank Zimmer; Matthias Vodel; Maximilian Eibl; Marc Ritter (University of Applied Sciences Mittweida, TU Chemnitz)

1515 ActEV Challenges and Datasets Group Discussion

1530 Afternoon Break + Poster Session (15:30-16:45)

• Efficient Parallel Activities Detection System for Extended Video Analysis, Wenhe Liu; Guoliang Kang; Po-Yao Huang; lijun yu; Yijun Qian; Jing Wen; Alexander Hauptmann (Carnegie Mellon University)

• A Spatio-Temporal Activity Detection Framework, Mandis Beigi; Lisa Brown; Quanfu Fan; John Henning; Chung-Ching Lin; Yue Meng; Rameswar Panda; sharath pankanti; Honghui Shi; Rogerio Feris (IBM Research)

• Summary of 2019 Activity Detection in Extended Videos Prize Challenge, Yooyoung Lee; Jonathan Fiscus; Afzal Godil; Andrew Delgado; Edmond J. Golden III; Maxime Hubert; Lukas Diduch (NIST)

• Boosted Kernelized Correlation Filters for Event-based Face Detection, Bharath Ramesh (National University of Singapore); Hong Yang (NUS)

• Exploring Techniques to Improve Activity Recognition using Human Pose Skeletons, Bharath Raj Nagoor Kani; Anand Subramanian; Kashyap Ravichandran; N. Venkateswaran (SSN College of Engineering and SSNCE)