

# ACCV 2016

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## PROGRAM GUIDE



## Message from the General Chairs

Welcome to the 13th Asian Conference on Computer Vision (ACCV 2016) held at the Taipei International Convention Center on 20-24 November 2016. This conference is supported by the Asian Federation of Computer Vision Societies (AFCV), Chinese Image Processing and Pattern Recognition (IPPR) Society, National Taiwan University and Academia Sinica. ACCV 2016 continues a proud tradition that began in 1993 with the first ACCV in Osaka, Japan, in which many scattered computer vision events and initiatives in the Asian region were first combined to form a major conference with the scope and quality comparable to ECCV in Europe and CVPR in the United States. It was followed by the highly successful ACCV 1995 in Singapore, ACCV 1998 in Hong Kong, ACCV 2000 in Taiwan, ACCV 2002 in Melbourne, ACCV 2004 in Jeju Island, ACCV 2006 in Hyderabad, ACCV 2007 in Tokyo, ACCV 2009 in Xian, ACCV 2010 in Queenstown, ACCV 2012 in Daejeon, and ACCV 2014 in Singapore. We offer an outstanding scientific program that was put together by the Program Chairs, and we are grateful for their excellent work. They assembled and guided an international group of 39 Area Chairs, comprising top experts in computer vision, to deliberate and reach decisions on paper acceptance. In addition to the main conference, we also have 18 workshops and 10 tutorials. We thank all the workshop and tutorial organizers and demo presenters for their proposals and efforts in enriching ACCV 2016. There are a number of people who have dedicated many hours (mostly in the evening and on weekends) to make ACCV 2016 happen. This event simply could not be possible without the time and effort from the Program Chairs, Workshop Chairs, Tutorial Chairs, Demo Chairs, Publication Chairs, Organizing Chairs (local arrangements), Area Chairs and Reviewers. There are also a number of administrative staff and an army of student volunteers who have worked quietly behind the scenes to ensure the conference runs smoothly. We are grateful for all their efforts. We would like to also thank all authors for contributing to ACCV with their high quality paper submissions. We are also honored to have three distinguished keynote speakers, Prof. Jitendra Malik (University of California at Berkeley, USA), Prof. Katsushi Ikeuchi (University of Tokyo, Japan and Microsoft Research Asia, China) and Prof. Marc Pollefeys (ETH, Switzerland), who have taken time to come to Taipei to address the ACCV 2016 audience. We truly appreciate their presence. We are pleased to receive the support from a record number of sponsors including Microsoft Research, Baidu Research, Qualcomm, Google, NEC, Viscovery, Mediatek, Nvidia, Sensetime, Yahoo, Pegatron, to name a few. Finally, we would like to thank all ACCV 2016 attendees for taking the time to come to Taipei and participate in ACCV 2016. In addition to attending the conference, we do encourage you to take time to experience the many tourist attractions and culinary offerings available here in Taipei and Taiwan.

*Yi-Ping Hung, Ming-Hsuan Yang, Hongbin Zha*  
General Chairs for ACCV 2016

## Message from the Program Chairs

Welcome to the 2016 edition of the Asian Conference on Computer Vision in Taipei. ACCV 2016 received a total number of 590 submissions, of which 479 papers went through the review process excluding papers rejected without review due to violation of the ACCV submission guidelines or withdrawn before review. The papers were submitted from diverse regions with 69% from Asia, 19% from Europe and 12% from North America.

The Program Chairs assembled a geographically diverse team of 39 Area Chairs who handled 9 to 15 papers each. Area Chairs were selected to provide a broad range of expertise, to balance junior and senior members, and to represent a variety of geographical locations. Area Chairs recommended reviewers for papers, and each paper received at least three reviews from the 631 reviewers who participated in the process. Paper decisions were finalized at an Area Chair meeting held in Taipei on August 13rd and 14th, 2016. At this meeting, Area Chairs worked in triples to reach collective decisions about acceptance, and in panels of 9 or 12 ACs to decide on the oral/poster distinction. The total number of papers accepted was 143 (an overall acceptance rate of 24%). Of these, 33 were selected for oral presentations and 110 were selected for poster presentations. We wish to thank all members of the local arrangement team for helping us run the Area Chair meeting smoothly. We also wish to extend our immense gratitude to the Area Chairs and Reviewers for their generous participation in the process. The conference would not be possible without this huge voluntary investment of time and effort. We acknowledge particularly the contribution of 29 reviewers designated as "Outstanding Reviewers" who were nominated by Area Chairs and Program Chairs for having provided a large number of helpful, high quality reviews. Lastly but not the least, we would like to show our deepest gratitude to all of the emergency reviewers who kindly responded to our last-minute request and provided thorough reviews for papers with missing reviews.

Finally, we wish all the attendees a highly simulating, informative, and enjoyable conference.

*Shang-Hong Lai, Vincent Lepetit, Ko Nishino, Yoichi Sato*  
Program Chairs for ACCV 2016

## Location and Transportation

### Conference Venue

ACCV 2016 will be held in the Taipei International Convention Center (TICC) on November 20 – 24, 2016. Both the main conference and workshops will be held in TICC. TICC locates in the eastern Taipei's Hsin-Yi District, an area housing many landmark buildings, including Taipei 101, National Dr. Sun Yat-Sen Memorial Hall, the Taipei World Trade Center Complex, Taipei City Hall, Taipei City Council, and is well-connected to every tourist attraction in Taipei City. It is less than 2-minute walk from the Taipei 101/World Trade Center station of MRT's red line.

### Taipei International Convention Center

Address: 1 Hsin-Yi Road, Sec.5, Taipei 11049

Website: [http://www.ticc.com.tw/index\\_en.aspx?lang=en-us](http://www.ticc.com.tw/index_en.aspx?lang=en-us)



**ACCV'16 will be held on Taipei International Convention Center.**



**The picture of Taipei International Convention Center.**

### Taipei, Taiwan, ROC

Taipei, officially known as Taipei City, is the capital of Taiwan, ROC. Situated at the northern tip of Taiwan, ROC, Taipei is located on the Tamsui River; it is about 25 km (16 mi) southwest of Keelung, a port city on the Pacific Ocean. It lies in the Taipei Basin, an ancient lakebed bounded by the two relatively narrow valleys of the Keelung and Xindian rivers, which join to form the Tamsui River along the city's western border. The city proper is home to an estimated 2,618,772 people. Taipei, New Taipei, and Keelung together form the Taipei–Keelung metropolitan area with a population of 6,900,273. They are administered under three municipal governing bodies. "Taipei" sometimes refers to the whole metropolitan area, while "Taipei City" refers to the city proper. Taipei City proper is surrounded on all sides by New Taipei.

### Transportation

#### From Taiwan Taoyuan International Airport (TPE)

Located about 40 km west of Taipei, Taiwan Taoyuan International Airport (TPE) is the major international airport serving the capital city of Taipei, Taiwan, ROC. Three ground transportation options are available (i.e., taxi, HSR, or bus) for getting from the airport to downtown Taipei. Once arriving at the downtown of Taipei, you may take Taipei MRT Tamsui-Xinyi Line to Taipei 101/World Trade Center station, and take Exit No. 1 for the Taipei International Convention Center (TICC).

#### By Taxi to Taipei

There are taxi services available on the west side of the Terminal 1's and Terminal 2's Arrivals Lobby at the Taiwan Taoyuan International Airport, provided 24 hours a day, all year round. Only taxi's approved by the Aviation Police Bureau are permitted to operate in Taoyuan Airport to ensure the safety of passengers.

#### Fare standards

Taxi fare is based on the meter and the fare starts at NT\$70 for the first 1.25 km with an additional NT\$5 charge per 200 meters, highway tolls not included. Taxis will also transport passengers throughout all of Taiwan according to passenger need. A one-way taxi fare between the airport and Taipei is around NT\$1,200- NT\$1,500.

#### Service number

Terminal 1 Taxi service center: +886-3-3982832

Terminal 2 Taxi service center: +886-3-3983599

Complaints: +886-3-3834499

## Location and Transportation

### By HSR (Taiwan High-Speed Rail) to Taipei

#### First Step: Shuttle to HSR or taxi to HSR

##### (1) Shuttle to HSR

Although the HSR station is not located within walking distance of the Taoyuan International Airport, there are shuttles buses connecting the network. Tickets for the buses could be bought at UBUS service counters at Arrivals Lobby of Terminals 1 and 2 prior to each journey. Please find the shuttle information below:

Adult fare:	NT\$30 per trip
Child fares:	NT\$15 per trip
The Intervals:	5 – 10 minutes intervals during peak times
Trip length:	25 minutes

##### (2) Taxi to HSR

Taxi fare is based on the meter, the distance between Taoyuan International Airport and HSR is about 1.56 kilometers. A one-way taxi fare is around NT\$100-150 (based on distance travelled).

#### Second Step: HSR to Taipei

You can catch one of the HSR trains from Taoyuan station to Taipei (Taipei Main Station), where it is easy to take a taxi or MRT to your final destination. Please find the following information for the HSR

Adult fares:	NT\$160 per trip
Child fares:	NT\$80 per trip
Intervals:	Please check <a href="http://www5.thsrc.com.tw/en/">http://www5.thsrc.com.tw/en/</a>
Trip length:	20 minutes

#### Service number and business hours for HSR

Toll-free hotline: 0800-241560 (Business hours: 24HR)  
Terminal 1 counter: +886-3-3834779 (Business hours: 06:00 – 24:00)  
Terminal 2 counter: +886-3-3833552 (Business hours: 06:00 – 24:00)  
THSR Taoyuan Station: 0913085530 (Business hours: 07:00 – 23:45)



## Location and Transportation

### By Coach/Long-distance Buses to Taipei

#### To Taipei Main Station

##### 1819 Bus information

Ticket price:	Full fare NT\$125/ Half fare NT\$65
Intervals:	15-20 (minutes)
Business Hours:	Taiwan Taoyuan International Airport 00:00-23:45
Trip length:	55 minutes

#### To Taipei Downtown

##### 1960 East Bus information (CitiAir Bus)

Ticket price:	Full fare NT\$145/ Half fare NT\$70
Intervals:	20-30 (minutes)
Business Hours:	Taiwan Taoyuan International Airport 05:50-01:05 Taipei City Hall Bus Station 04:40-23:00
Trip length:	60 – 70 minutes

##### 1961 West Bus information (CitiAir Bus)

Ticket price:	Full fare NT\$90/ Half fare NT\$45
Intervals:	20-30 (minutes)
Business Hours:	Taiwan Taoyuan International Airport 05:50-01:00 Taipei West Bus Station 04:40-23:00
Trip length:	70 – 90 minutes

##### 5502 Bus information (Free Go Bus)

Ticket price:	Full fare NT\$140/ Half fare NT\$70
Intervals:	15-20 (minutes)
Business Hours:	Taiwan Taoyuan International Airport to Taipei City: 05:25-01:15 Taipei City to Taiwan Taoyuan International Airport: 04:00-23:00.
Trip length:	60 minutes

#### **Ticketing and service location information**

Ticketing: Tickets sold at bus counters.

Terminal 1 bus pickup point: Bus pickup zone at B1 Arrivals.

Terminal 2 bus pickup point: Bus pickup zone at the northeast arcade of the 1st floor Arrivals lobby.

#### **Service number of Tourist Service Center**

Terminal 1 Counter: +886 3-398-2194

Terminal 2 Counter: +886-3-398-3341

## Location and Transportation

### **From Taipei Songshan Airport (TSA)**

Taipei Songshan Airport (TSA) is a midsize international airport located in Taipei, Taiwan, ROC. It has scheduled flights serving domestically in Taiwan, and also to Mainland China, South Korea and Japan. Two ground transportation options are available (i.e., taxi and MRT) for getting from the airport to TICC.

#### **By Taxi**

There are taxi services available on the outside of the Arrival Lobby. Fares are charged according to distance travelled. Taxis can also be hailed on the road south of the gas station. Fares are charged according to distance travelled also.

#### **Fare standards**

A one-way taxi fare between the Songshan airport and Taipei City is around NT\$200-250 (based on distance travelled). It takes around 20 minutes to arrive the venue (TICC).

#### **Service number and business hours**

Service center: +886-8-7703430 (06:00-22:00)

TSA Airport operation time: 05:30~23:00

#### **By MRT**

MRT is available outside the Arrival Lobby at TSA. You may take Taipei MRT Wenzhu Line from Songshan Airport Station to Daan Station and transfer to the Tamsui-Xinyi Line at Taipei 101/World Trade Center station. Please walk towards Xin-Yi Road Sec. 5 to Taipei International Convention Center from exit no. 1.



## Location and Transportation

### Taipei City Transportation

The Mass Rapid Transit (MRT) system run by the city government provides the most convenient commuting service between downtown and the suburbs of Taipei.

From Taipei Main Station to Taipei International Convention Center (TICC):

Take Taipei MRT-Tamsui-Xinyi Line from Taipei Main Station to MRT Taipei 101/World Trade Center station. Please Walk towards Xin-Yi Road Sec.5 to Taipei International Convention Center from exit no. 1.



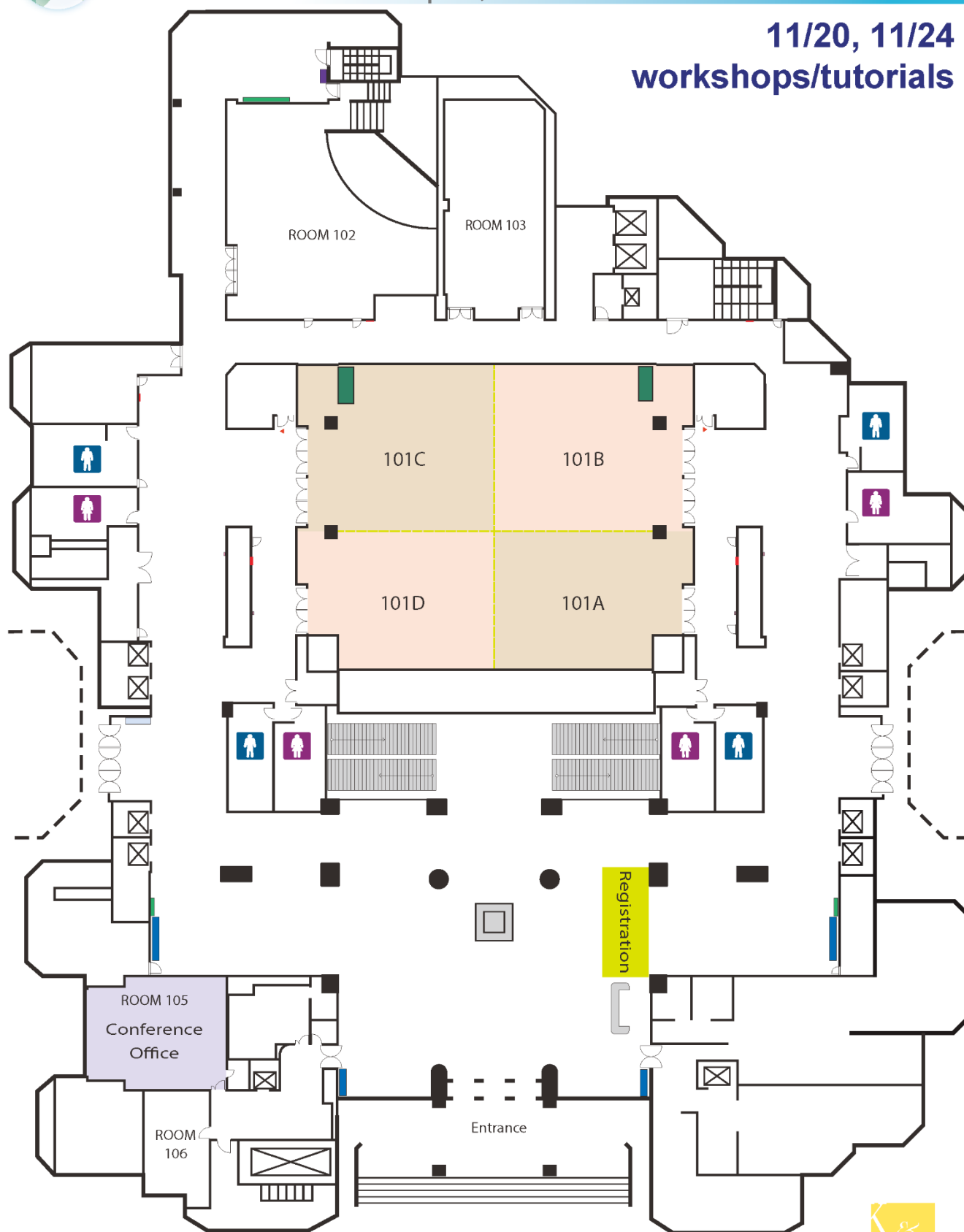


ACC'16 Taipei, Taiwan

(TICC)

1F

11/20, 11/24  
workshops/tutorials



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K&A INTERNATIONAL CO., LTD.

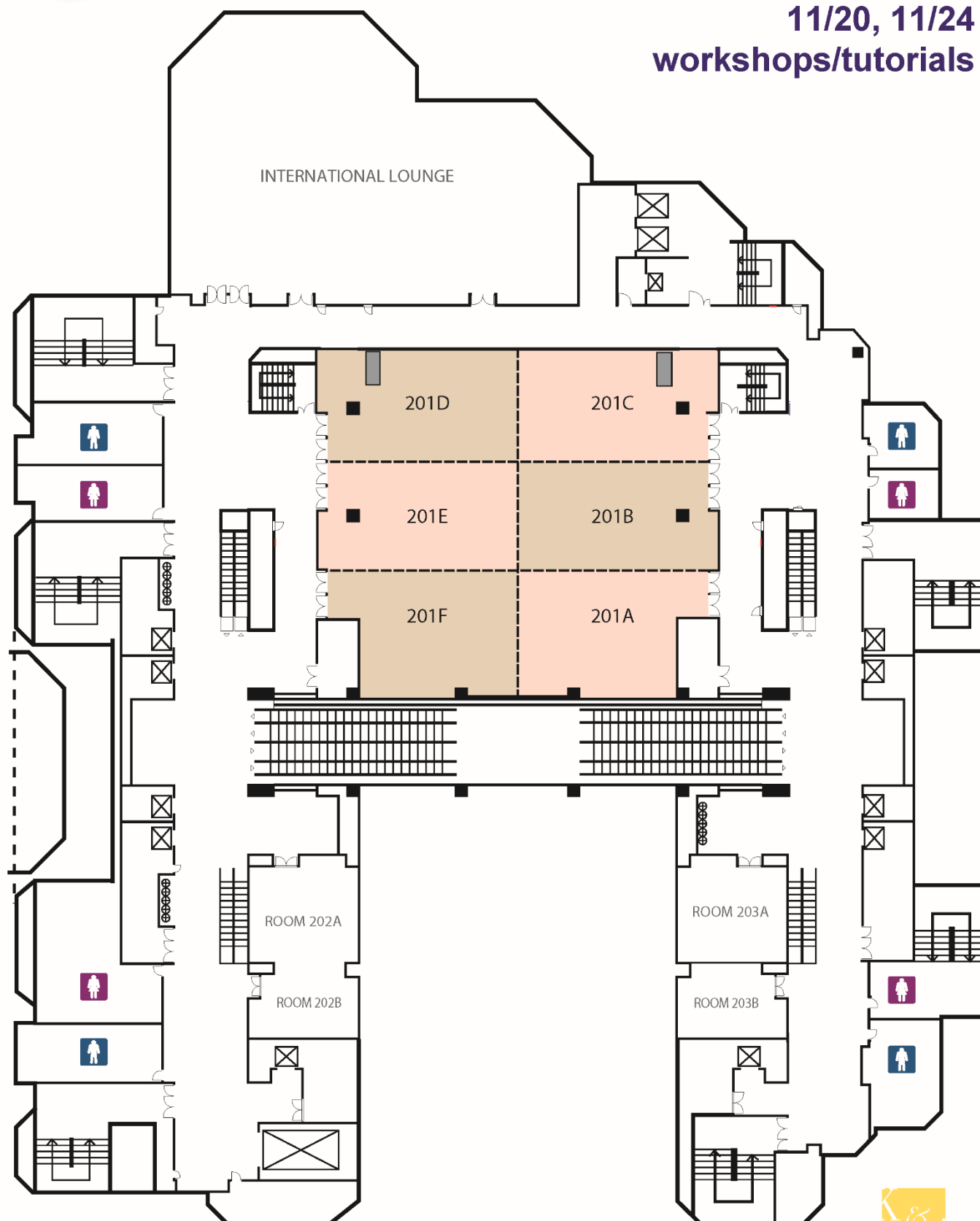


ACC'16 Taipei, Taiwan

(TICC)

2F

11/20, 11/24  
workshops/tutorials



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K&A INTERNATIONAL CO., LTD.

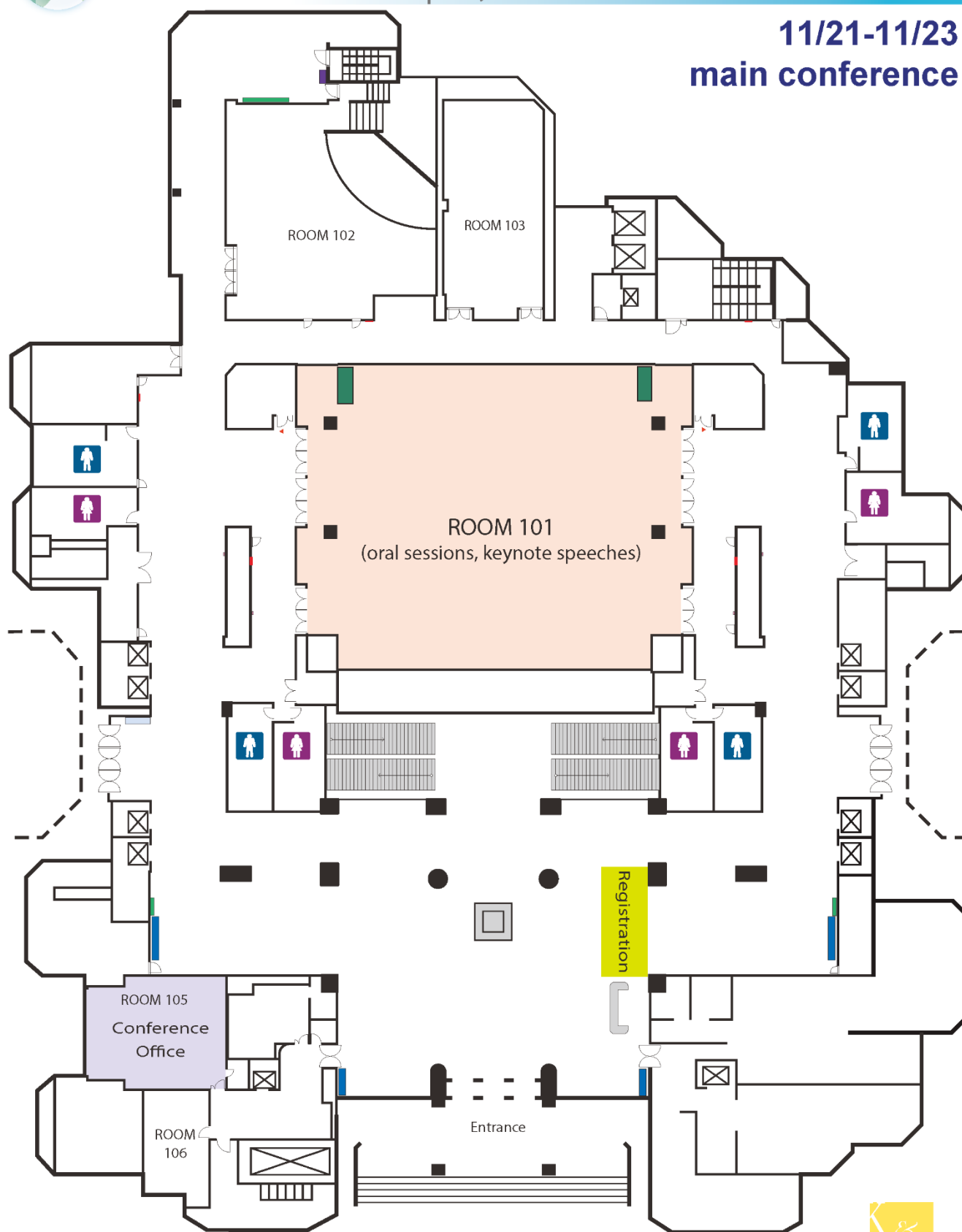


ACC'16 Taipei, Taiwan

(TICC)

1F

11/21-11/23  
main conference



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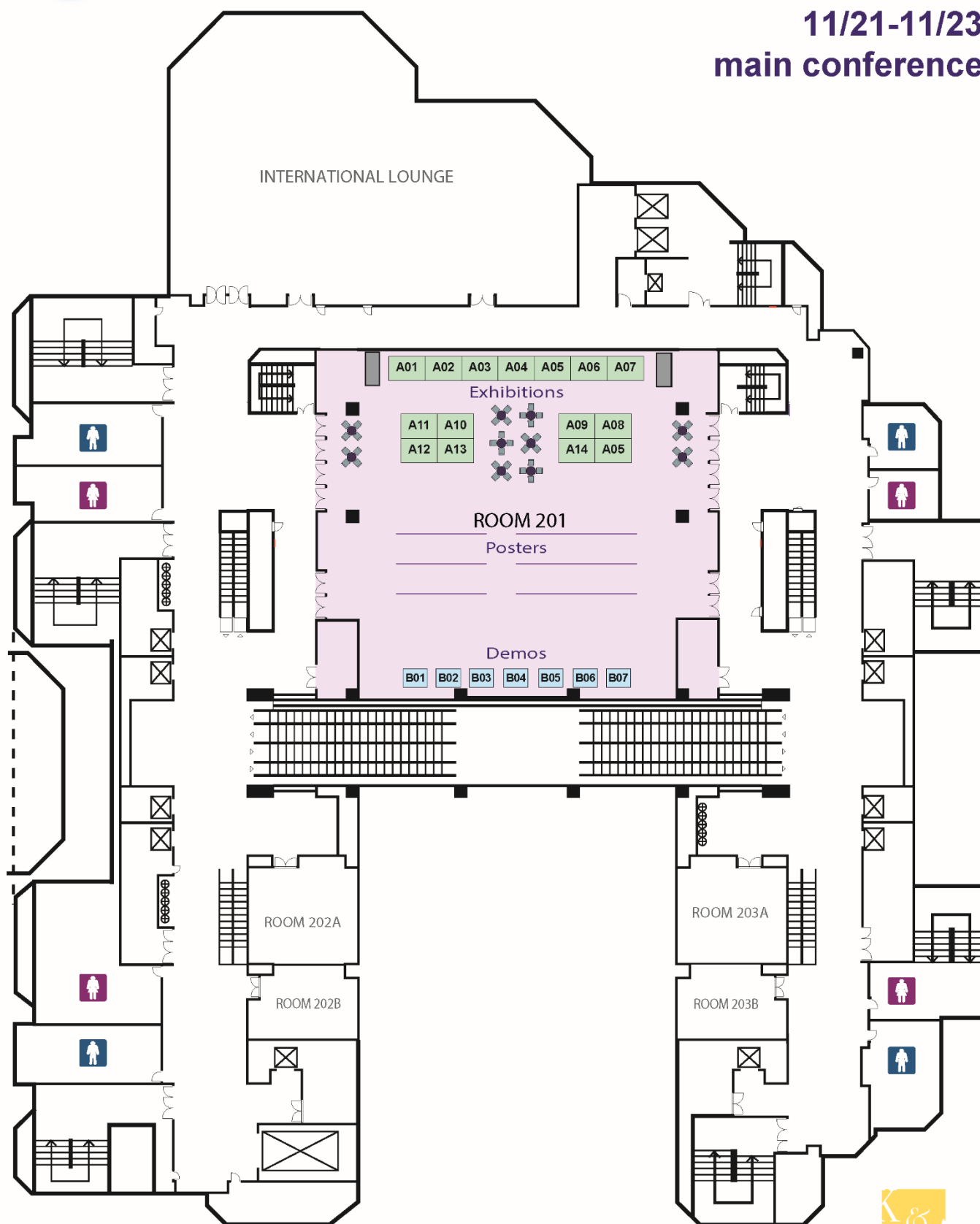


ACC'16 Taipei, Taiwan

(TICC)

2F

11/21-11/23  
main conference



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### Welcome Reception

**Location:** Courtyard by Marriott Taipei 台北六福萬怡酒店

No. 359, Sec. 7, Zhongxiao E. Rd. Nangang Dist., Taipei City 115, Taiwan

+886-2-21716565

**Date:** Sunday, November 20, 2016

**Time:** 6:00 PM – 9:00 PM

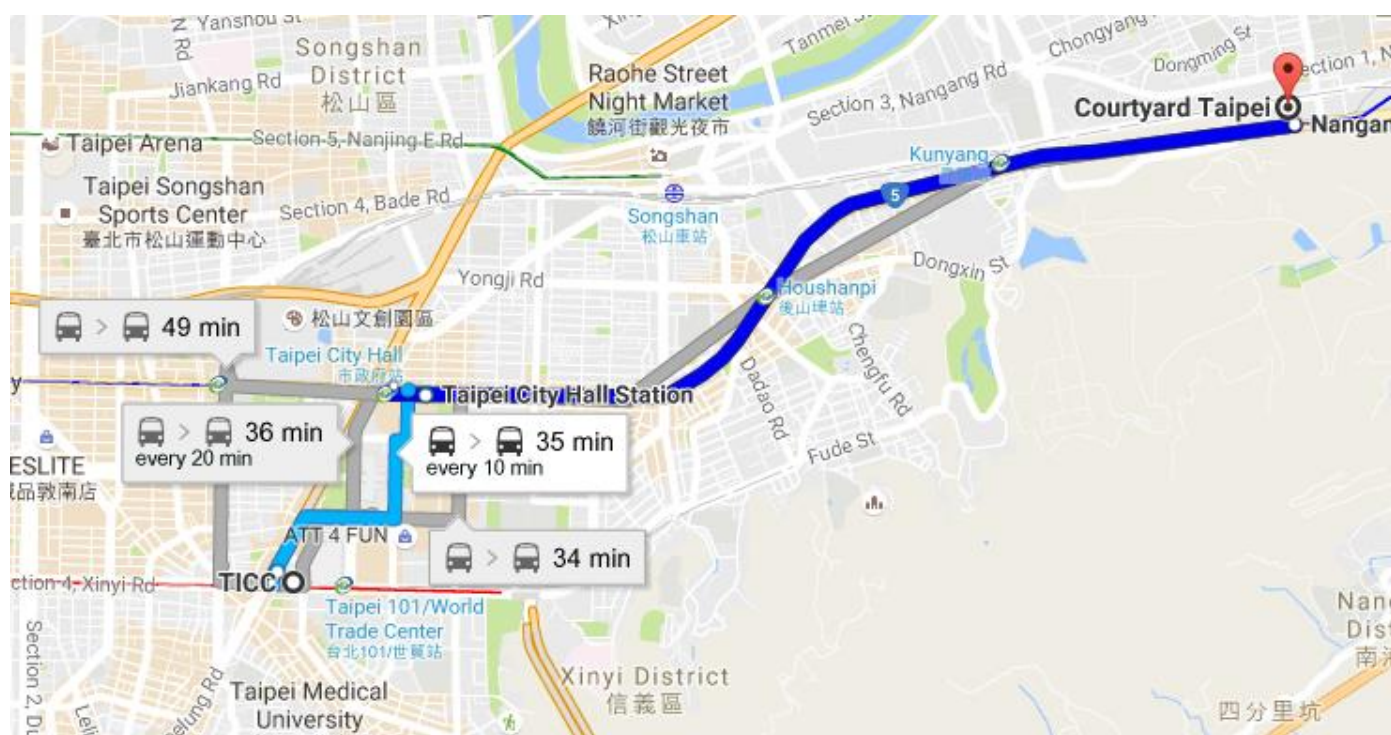
**Cost:** Included in all passes & registrations

**Direction:**

From Taipei International Convention Center (TICC) to Courtyard by Marriott Taipei:

1. Take a 15-min walk to MRT Taipei City Hall Station (see map).
2. Take MRT Bannan Line to Nangang Station (~8 min). The fare is NTD \$20 (\$16 with EasyCard/iPass).
3. Take Exit 2A to 1st floor, towards to Building B.
4. Take the elevators of Courtyard by Marriott Taipei to Level 7, and follow the signs for ACCV 2016 Welcome Reception.

**Map:**



### Conference Banquet

**Location:** Humble House Taipei 寒舍艾麗酒店

No. 18, Songgao Rd. Xinyi Dist., Taipei City 110, Taiwan

+886-2-6631800

**Date:** Tuesday, November 22, 2016

**Time:** 6:30 PM – 9:30 PM

**Cost:** Included in full/exhibition passes and full conference registration; additional banquet tickets available for purchase

**Direction:**

Take a 16-min walk from Taipei International Convention Center (TICC) to Humble House Taipei. See the following map.

**Map:**





### Day 1: Monday, November 21

**Speaker:** *Prof. Jitendra Malik (UC Berkeley)*

**Title:** Deep Visual Understanding from Deep Learning

**Abstract:**

Vision is the interplay of the processes of recognition, reconstruction and grouping. The availability of large annotated datasets of images and GPU computing have enabled artificial neural networks to become the machine learning technique of choice, leading to quite remarkable progress in the last few years. We now have a good capability to detect and localize objects and determine their 3d pose and layout in a scene. For people we can categorize them according to certain attributes or actions, and estimate their poses.

However we are still quite short of "visual understanding" which has many other aspects. For example, we should not just detect people, objects and actions but also link them together, by what we call "visual semantic role labeling", essentially identifying subject-verb-object relationships. We should be able to make predictions - what will happen next in a video stream? Vision helps guide manipulation and locomotion, and this requires building dynamic models of consequences of various actions. I will show several case studies of work along these lines, which holds the promise of developing learning procedures that are self-supervised and bypass the need for manual annotation.

**Bio:**

Jitendra Malik was born in Mathura, India in 1960. He received the B.Tech degree in Electrical Engineering from Indian Institute of Technology, Kanpur in 1980 and the PhD degree in Computer Science from Stanford University in 1985. In January 1986, he joined the university of California at Berkeley, where he is currently the Arthur J. Chick Professor in the Computer Science Division, Department of Electrical Engineering and Computer Sciences. He is also on the faculty of the department of Bioengineering, and the Cognitive Science and Vision Science groups. During 2002-2004 he served as the Chair of the Computer Science Division and during 2004-2006 as the Department Chair of EECS.

Prof. Malik's research group has worked on many different topics in computer vision, computational modeling of human vision, computer graphics and the analysis of biological images. Several well-known concepts and algorithms arose in this research, such as anisotropic diffusion, normalized cuts, high dynamic range imaging, and shape contexts. He has mentored more than 50 PhD students and postdoctoral fellows.

He received the gold medal for the best graduating student in Electrical Engineering from IIT Kanpur in 1980 and a Presidential Young Investigator Award in 1989. At UC Berkeley, he was selected for the Diane S. McEntyre Award for Excellence in Teaching in 2000, a Miller Research Professorship in 2001, and appointed to be the Arthur J. Chick Professor in 2002. He received the Distinguished Alumnus Award from IIT Kanpur in 2008. He was awarded the Longuet-Higgins Prize for a contribution that has stood the test of time twice, in 2007 and in 2008. He received the PAMI-TC Distinguished Researcher in Computer Vision Award in 2013, and in 2014 the K.S. Fu Prize from the International Association of Pattern Recognition. He is a fellow of the IEEE and the ACM. He is a member of the National Academy of Engineering, a fellow of the American Academy of Arts and Sciences and in 2015 was elected to the National Academy of Sciences.

### Day 2: Tuesday, November 22

**Speaker:** *Prof. Katsushi Ikeuchi (Microsoft Research)*

**Title:** e-Intangible Heritage

**Abstract:**

Tangible heritage, such as temples and statues, is disappearing day-by-day due to human and natural disaster. In-tangible heritage, such as folk dances, local songs, and dialects, has the same story due to lack of inheritors and mixing cultures. We have been developing methods to preserve such tangible and in-tangible heritage in the digital form. This project, which we refer to as e-Heritage, aims not only record heritage, but also analyze those recorded data for better understanding as well as display those data in new forms for promotion and education.

This talk mainly covers how to preserve in-tangible heritage, in particular, preservation of Japanese and Taiwanese folk dances. The first half of my talk covers how to display such a Japanese folk dance on a humanoid robot. Here, we follow the paradigm, learning-from-observation, in which a robot learns how to dance from observing human dance. Due to the physical difference between a human and a robot, the robot cannot mimic the entire human actions. Instead, the robot first extracts important actions of a dance, referred to key poses and then represents such key poses into symbolic representations. These symbolic representations are mapped to robot motions depending on the robot hardware. The second half of my talk covers our effort to apply similar technics to Taiwanese folk dances. We extract symbolic representations of folk dances, examine similarities among those folk dances, and compare the classification trees obtained from the representations with trees based on other aspects such as DNAs, languages and social institutions.

**Bio:**

Dr. Katsushi Ikeuchi is a Principal Researcher of Microsoft Research. He received a Ph.D. degree in Information Engineering from the University of Tokyo in 1978. After working at AI Lab of MIT as a pos-doc fellows for three years, Electrotechnical Lab, Japan as a researcher for five years, Robotics Institute of Carnegie Mellon University as a faculty member for ten years, the University of Tokyo as a faculty member for nineteen years, he joined Microsoft Research Asia in 2015. His research interest spans computer vision, robotics, and computer graphics. He has received several awards, including IEEE-PAMI Distinguished Researcher Award, the Okawa Prize from the Okawa foundation, and Shi-Ju-Ho-sho (the Medal of Honor with Purple ribbon) from the Emperor of Japan. He is a fellow of IEEE, IEICE, IPSJ, and RSJ. (<http://www.cvl.iis.u-tokyo.ac.jp/~ki>)

### Day 3: Wednesday, November 23

**Speaker:** *Prof. Marc Pollefeys (ETH Zurich)*

**Title:** Semantic 3D Reconstruction

**Abstract:**

While purely geometric models of the world can be sufficient for some applications, there are also many application that need additional semantic information. In this talk I will focus on 3D reconstruction approaches which combine geometric and appearance cues to obtain semantic 3D reconstructions. Specifically, the approaches I will discuss are formulated as multi-label volumetric segmentation, i.e. each voxel gets assigned a label corresponding to one of the semantic classes considered, including free-space. We propose a formulation representing raw geometric and appearance data as unary or high-order (pixel-ray) energy terms on voxels, with class-pair-specific learned anisotropic smoothness terms to regularize the results. We will see how by solving both reconstruction and segmentation/recognition jointly the quality of the results improves significantly and we can make progress towards 3D scene understanding.

**Bio:**

Marc Pollefeys is director of science at Microsoft HoloLens and a full professor of the Dept. of Computer Science at ETH Zurich. Previously he was on the faculty at the University of North Carolina at Chapel Hill. He obtained his MS and PhD degrees from the KU Leuven in Belgium. His main area of research is computer vision. Dr. Pollefeys has received several prizes for his research, including a Marr prize, an NSF CAREER award, a Packard Fellowship and a ERC Starting Grant. He is the author or co-author of more than 280 peer-reviewed papers. He will be general chair of ICCV 2019, was a general chair for ECCV 2014 in Zurich and one of the program chairs for the IEEE Conf. on Computer Vision and Pattern Recognition 2009. Prof. Pollefeys was on the Editorial Board of the IEEE Transactions on Pattern Analysis and Machine Intelligence, the International Journal of Computer Vision, Foundations and Trends in Computer Graphics and Computer Vision and several other journals. He is an IEEE Fellow.

Program At-a-Glance

0800	0830	0850	0900	0915	0930		1230	1330		1700	1730	1800	2100
Registration													
W10: New Trends in Image Restoration and Enhancement (NTIRE)													
W13: Workshop on Assistive Vision													
W3: ACCV 2016 Workshop on Hyperspectral Image and Signal Processing													
W5: Computer Vision Technologies for Smart Vehicle													
W11: Spontaneous Facial Behavior Analysis													
T9: Deep Learning in Computer Vision													
T2: Digital Geometry Processing: Extracting High Quality Geometric Features													
T7: Modern Local Image Descriptors: Hand-crafted VS. Learning-based Methods													
T1: Content-Adaptive Morphological Filters													
Reception													
Registration													
Opening													
0800	0830	0845	0850	0900	0915	0930	1030	1100	1200	1230	1330	1530	1600
Registration													
Oral Session 1													
Coffee Break													
Keynote: Prof. Jitendra Malik													
Lunch Break													
Poster & Demo Session 1													
Coffee Break													
Oral Session 2													
0830	0845	0900	1030	1100	1200	1330	1530	1600	1715	1730	1800	2100	
Registration													
Oral Session 3													
Coffee Break													
Keynote: Prof. Katsushi Ikeuchi													
Lunch Break													
Poster & Demo Session 2													
Coffee Break													
Oral Session 4													
0830	0900	1030	1100	1200	1330	1530	1600	1715	1730	1830	2130		
Registration													
Oral Session 5													
Coffee Break													
Keynote: Prof. Marc Pollefeys													
Lunch Break													
Poster & Demo Session 3													
Coffee Break													
Oral Session 6													
0830	0845	0850	0900	1030	1100	1200	1230	1330	1400	1530	1600	1700	1715
Registration													
W6: Discrete Geometry and Mathematical Morphology for Computer Vision													
W18: Workshop on Mathematical and Computational Methods in Biomedical Imaging and Image Analysis													
W7: International Workshop on Driver Drowsiness Detection from Video													
W15: Workshop on Meeting HCI with CV													
W16: Workshop on Human Identification for Surveillance (HIS): Methods & Applications													
T3: Fitting Ellipse and Computing Fundamental Matrix and Homography													
T5: Large-scale 3D Reconstruction from Images													
T6: Mathematics of Deep Learning													
0830	0845	0850	0900	1230	1330	1400	1530	1600	1700	1715	1730		
W4: Benchmark and Evaluation of Surveillance Task (BEST)													
W12: The Third Workshop on Computer Vision for Affective Computing (CV4AC)													
W17: Workshop on Interpretation and Visualization of Deep Neural Nets													
T4: Deep Learning for Vision-guided Language and Image Generation													
T8: Multi-view Geometry for Rolling Shutter Camera													
T10: Continuous User Authentication on Mobile Devices													
0830	0845	0850	0900	1230	1330	1400	1530	1600	1700	1715	1730		
ACCV 2016 At-a-Glance													

Sunday, November 20		
	Workshops	Tutorials
<b>08:00</b>	Registration Starts	Registration Starts
<b>08:30-17:30</b> <b>(whole day events)</b>	<b>W10:</b> New Trends in Image Restoration and Enhancement (NTIRE) <b>W13:</b> Workshop on Assistive Vision	<b>T09:</b> Deep Learning in Computer Vision
<b>08:30-12:30</b> <b>(morning events)</b>	<b>W03:</b> ACCV 2016 Workshop on Hyperspectral Image and Signal Processing <b>W05:</b> Computer Vision Technologies for Smart Vehicle <b>W11:</b> Spontaneous Facial Behavior Analysis	<b>T02:</b> Digital Geometry Processing: Extracting High Quality Geometric Features <b>T07:</b> Modern Local Image Descriptors: Hand-crafted VS. Learning-based Methods
<b>13:30-17:30</b> <b>(afternoon events)</b>	<b>W01:</b> 3D Modelling and Applications <b>W02:</b> 4th ACCV Workshop on e-Heritage <b>W08:</b> Large Scale 3D Human Activity Analysis Challenge in Depth Videos <b>W09:</b> Multi-view Lip-reading Challenges <b>W14:</b> Workshop on Facial Informatics (WFI)	<b>T01:</b> Content-Adaptive Morphological Filters
<b>18:00-21:00</b>	<b>Conference Reception (Courtyard by Marriott Taipei)</b>	

The venues for workshops and tutorials are at **ROOM 101** and **ROOM 201** of Taipei International Convention Center. Please refer to the following schedule for details.

	Day 1: Monday, November 21	Day 2: Tuesday, November 22	Day 3: Wednesday, November 23
<b>08:00</b>	Registration Starts	Registration Starts (08:30)	Registration Starts (08:30)
<b>08:45-09:00</b>	Opening Session		
<b>09:00-10:30</b>	Oral Session 1	Oral Session 3	Oral Session 5
<b>10:30-11:00</b>	Coffee Break	Coffee Break	Coffee Break
<b>11:00-12:00</b>	Keynote: <i>Prof. Jitendra Malik</i>	Keynote: <i>Prof. Katsushi Ikeuchi</i>	Keynote: <i>Prof. Marc Pollefeys</i>
<b>12:00-13:30</b>	Lunch Break	Lunch Break	Lunch Break
<b>13:30-15:30</b>	Poster Session 1 Demo and Exhibition	Poster Session 2 Demo and Exhibition	Poster Session 3 Demo and Exhibition
<b>15:30-16:00</b>	Coffee Break	Coffee Break	Coffee Break
<b>16:00-17:15</b>	Oral Session 2	Oral Session 4	Oral Session 6
<b>18:30-21:30</b>		<b>Banquet (Humble House)</b>	

The venues for keynotes and oral sessions are at **ROOM 101**, and poster sessions/demos and exhibitions are at **ROOM 201** of Taipei International Convention Center. Please refer the following schedule for details.

Thursday, November 24		
	Workshops	Tutorials
<b>08:30</b>	Registration Starts	Registration Starts
<b>08:30-17:30</b> <b>(whole day events)</b>	<b>W06:</b> Discrete Geometry and Mathematical Morphology for Computer Vision <b>W18:</b> Workshop on Mathematical and Computational Methods in Biomedical Imaging and Image Analysis	
<b>08:30-12:30</b> <b>(morning events)</b>	<b>W07:</b> International Workshop on Driver Drowsiness Detection from Video <b>W15:</b> Workshop on Meeting HCI with CV <b>W16:</b> Workshop on Human Identification for Surveillance (HIS): Methods & Applications	<b>T03:</b> Fitting Ellipse and Computing Fundamental Matrix and Homography <b>T05:</b> Large-scale 3D Reconstruction from Images <b>T06:</b> Mathematics of Deep Learning
<b>13:30-17:30</b> <b>(afternoon events)</b>	<b>W04:</b> Benchmark and Evaluation of Surveillance Task (BEST) <b>W12:</b> The Third Workshop on Computer Vision for Affective Computing (CV4AC) <b>W17:</b> Workshop on Interpretation and Visualization of Deep Neural Nets	<b>T04:</b> Deep Learning for Vision-guided Language and Image Generation <b>T08:</b> Multi-view Geometry for Rolling Shutter Camera <b>T10:</b> Continuous User Authentication on Mobile Devices

The venues for workshops and tutorials are at **ROOM 101** and **ROOM 201** of Taipei International Convention Center. Please refer to the following schedule for details.



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Lei Zhang*

## W10: New Trends in Image Restoration and Enhancement (NTIRE)

**Organizers:** Radu Timofte  
Luc Van Gool  
Ming-Hsuan Yang

**Location:** 201A & 201B

### Schedule:

08:30 **Poster Setup**

08:50 **Opening**

09:00 **Invited Talk:** Image restoration: From sparse prior, low-rank prior to deep priors, Lei Zhang (Hong Kong Polytechnic Univ.)

09:50 Blind Image Deblurring Using Elastic-Net Based Rank Prior, Hongyan Wang, Jinshan Pan, Zhixun Su, Songxin Liang

10:10 Single Image Dehazing Using Fixed Points and Nearest-Neighbor Regularization, Zhang Shengdong, Jian Yao

10:30 **Coffee Break**

10:50 **Invited Talk:** Single-Image Super-Resolution using Very Deep Convolutional Networks, Kyoung Mu Lee (Seoul National University)

11:40 Robust Noisy Image Super-Resolution using L1-norm Regularization and Non-local Constraint, Bo Yue, Shuang Wang, Xuefeng Liang, Licheng Jiao

12:00 **Lunch Break**

13:30 **Invited Talk:** Efficient robust estimation for 3D shape recovery, Yasuyuki Matsushita (Osaka University)

14:10 **Invited Talk:** Low-level Vision and Curse of the In-Camera Image Processing Pipeline, Michael S. Brown (York University)

14:50 CNN-GRNN for image sharpness assessment, Shaode Yu, Fan Jiang, Leida Li, Yaoqin Xie

15:10 **Coffee Break**

## 15:30 Poster Session

1. Model and Dictionary guided Face Inpainting in the Wild, Reuben A. Farrugia, Christine Guillemot
2. Patch Group based Bayesian Learning for Blind Image Denoising, Jun Xu, Dongwei Ren, Lei Zhang, David Zhang
3. Low-Rank Tensor Recovery and Alignment Based on lp Minimization, Kaifei Zhang, Di Wang, Xiaoqin Zhang, Nannan Gu, Hongxing Jiang, Xiuzi Ye
4. Deblurring Low-Resolution Images, Jinshan Pan, Zhe Hu, Zhixun Su, Ming-Hsuan Yang
5. Visual Smoke Detection, Abhishek Kumar Tripathi, Shanti Swarup
6. Local Feature-based Photo Album Compression by Eliminating Redundancy of Human Partition, Chia-Hsin Chan, Bo-Hsyuan Chen, Wen-Jiin Tsai
7. Generic 3D Convolutional Fusion for Image Restoration, Jiqing Wu, Radu Timofte, Luc Van Gool
8. Video Super Resolution Using non-Local Means with Adaptive Decaying Factor and Searching Window, Yawei Li, Xiaofeng Li, Cui Yao, Zhizhong Fu, Xiuxia Yin
9. Single Image Super-Resolution Reconstruction based on Edge-Preserving with External and Internal Gradient Prior Knowledge, Ruxin Wang, Congying Han, Mingqiang Li, Tiande Guo
10. A Dual Adaptive Regularization Method to Remove Mixed Gaussian-Poisson Noise, Ziling Wu, Hongxia Gao, Ge Ma, and Yanying Wan

17:10 **Closing**

## W13: Workshop on Assistive Vision

**Organizers:** *Chetan Arora*

*Vineeth N. Balasubmanian*

*C.V. Jawahar*

*Vinay P. Namboodiri*

*Ramanathan Subramanian*

**Location:** 201C

**Schedule:**

09:30 **Opening**

09:40 **Invited Talk:** Computer Vision @ Facebook, *Manohar Paluri (Facebook)*

10:30 **Coffee Break**

11:00 A Study of Combining Re-coloring and Adding Patterns to Images for Dichromats, *Wei-Ta Chu, and Tsung-Han Yang.*

11:20 Calorie Counter: RGB-Depth Visual Estimation of Energy Expenditure at Home, *Lili Tao, Tilo Burghardt, Majid Mirmehdi, Dima Damen, Ashley Cooper, Sion Hannuna, Massimo Camplani, Adeline Paiement, and Ian Craddock.*

11:40 Invited paper from the main conference: 'Part'ly First Among Equals: Semantic Part-Based Benchmarking for State-of-the-Art Object Recognition Systems, *RaviKiran Sarvadevhatla*

12:00 Invited paper from the main conference: Saliency Detection via Diversity-Induced Multi-view Matrix Decomposition, *Xiaoli Sun*

12:20 **Lunch Break**

13:50 **Invited Talk:** First-Person Vision, *Kris Kitani (CMU)*

14:40 Emotion understanding using multimodal information based on autobiographical memories for Alzheimer's patients, *Juan Fernandez Montenegro, Athanasios Gkelias, and Vasileios Argyriou.*

15:00 **Coffee Break**

15:30 Video Captioning via Sentence Augmentation and Spatio-Temporal Attention, *Tseng-Hung Chen, Kuo-Hao Zeng, Wan-Ting Hsu, and Min Sun.*

15:50 Bottom-up fixation prediction using unsupervised hierarchical models, *Hamed R.-Tavakoli, and Jorma Laaksonen.*

16:10 Face Detection and Object Recognition for a Retinal Prosthesis, *Derek Rollend, Paul Rosendall, Seth Billings, Philippe Burlina, Kapil Katyal, and Kevin Wolfe.*

16:30 **Invited Talk:** Anticipating Accidents in Dashcam Videos, *Min Sun (NTHU)*

16:50 **Panel Discussion**

17:30 **Closing**

### W03: Hyperspectral Image and Signal Processing

**Organizers:** *Keng-Hao Liu*  
*Wei-Min Liu*

**Location:** 201F

**Schedule:**

09:15 **Opening**

09:20 Spectral Dichromatic Parameter Recovery from Two Views via Total Variation Hyperpriors, *Filippo Bergamasco, Andrea Torsello, Antonio Robles-Kelly*

09:40 A Combinatorial Approach for Hyperspectral Image Segmentation, *José Antonio Valero Medina, Pablo Andrés Arbeláez Escalante, Iván Alberto Lizarazo Salcedo*

10:00 Hyperspectral Image Classification via a Joint Weighted K-Nearest Neighbor Approach, *Chunjuan Bo, Dong Wang, Huchuan Lu*

10:30 **Coffee Break**

11:00 **Invited Talk:** Real Time Hyperspectral Image Processing, *Chein-I Chang (Dalian Maritime University, Dalian, China, and Univ. of Maryland Baltimore County, USA)*

11:20 Perceptual Color Classification Based on Lightning Environment with Hyperspectral data, *Yuko Ozasa, Kenji Iwata, Naoko Enami, Yutaka Satou*

11:40 Joint Multiview Fused ELM Learning with Propagation Filter for Hyperspectral Image Classification, *Yu Shen, Liang Xiao, Mohsen Molaei*

12:00 Unsupervised Band Selection Based on Group-Based Sparse Representation, *Hung-Chang Chien, Chih-Hung Lai, Keng-Hao Liu*

12:20 **Closing**

### W05: Computer Vision Technologies for Smart Vehicle

**Organizers:** *Li-Chen Fu*  
*Pei-Yung Hsiao*  
*Shih-Shinh Huang*

**Location:** 101C

**Schedule:**

08:50 **Opening**

09:00 **Invited Talk:** Challenges of Computer Vision for Automotive Applications, *Dr. Cheng-Foo Chen (HAITEC)*

09:30 Cost-based Feature Transfer for Vehicle Occupant Classification, *Toby Perrett, Majid Mirmehdi*

09:50 The World is Changing: Finding Changes on the Street, *Kuan-Ting Chen, Fu-En Wang, Juan-Ting Lin, Fu-Hsiang Chan, and Min Sun*

10:10 Pedestrian and Vehicle Detection and Tracking with Object-Driven Vanishing Line Estimation, *Yi-Ming Chan, Li-Chen Fu, Pei-Yung Hsiao, Shin-Shinh Huang*

10:30 **Coffee Break**

11:00 Recognition of Texting-While-Walking by Joint Features based on Arm and Head Poses, *Fumito Shinmura, Yasutomo Kawanishi, Daisuke Deguchi, Ichiro Ide, Hiroshi Murase, Hironobu Fujiyoshi*

11:20 Motion Robust Remote-PPG for Driver's Health State Monitoring, *Bing-Fei Wu, Yun-Wei Chu, Po-Wei Huang, Meng-Liang Chung, Tzu-Min Lin*

11:40 Instance-level Segmentation of Vehicles by Deep Contours, *Jan van den Brand, Matthias Ochs and Rudolf Mester*

12:00 STFCN: Spatio-Temporal Fully Convolutional Neural Network for Semantic Segmentation of Street Scenes, *Mohsen Fayyaz, Mohammad Hajizadeh Saar, Mohammad Sabokrou, Mahmood Fathy, Fay Huang, and Reinhard Klette*

12:20 **Closing**

## W11: Spontaneous Facial Behavior Analysis

**Organizers:** *Xiaopeng Hong*  
*Guoying Zhao*  
*Stefanos Zafeiriou*  
*Matti Pietikäinen*  
*Maja Pantic*

**Location:** 101D

### Schedule:

#### 08:35 Opening

08:40 LBP-TOP: a Tensor Unfolding Revisit,  
*Xiaopeng Hong, Yingyue Xu, Guoying Zhao*

09:00 **Invited Talk:** Spontaneous Facial Behavior Analysis in 3D Spatial-Temporal Domain, *Prof. Lijun Yin (State University of New York Binghamton, USA)*

09:50 3D Convolutional Neural Networks for Facial Expression Classification, *Wenyun Sun, Haitao Zhao, Zhong Jin*

10:10 Suppression of Alpha Oscillation during Micro-Expression Recognition, *Ming Zhang, Yu-Hsin Chen, Xiaolan Fu*

#### 10:30 Coffee Break

11:00 Distinguishing Posed and Spontaneous Smiles by Facial Dynamics, *Bappaditya Mandal, David Lee, Nizar Ouarti*

11:20 Affective Gait Recognition and Baseline Evaluation from Real World Samples, *Vili Kellokumpu, Makus Särkiniemi, Guoying Zhao*

#### 11:40 Poster Session

1. Weighted Non-locally Self-similarity Sparse Representation for Face Deblurring, *Lei Tian, Chunxiao Fan, Yue Ming, Xiaopeng Hong*
2. Fiducial points detection of a face using RBF-SVM and Adaboost Classification, *Shreyank Gowda*
3. Real-time head pose estimation on mobile devices, *Zhengxin Cheng, Fangyu Bai*

#### 12:00 Closing

**W01: 3D Modelling and Applications**

**Organizers:** Chia-Yen Chen  
 Min-Chun Hu  
 Li-Wei Kang  
 Chih-Yang Lin  
 Tang-Kai Yin  
 Guo-Shiang Lin  
 Chia-Hung Yeh

**Location:** 101C

**Schedule:**

13:30 **Opening**

**Oral Session (I)**

13:40 DNA-SLAM: Dense Noise Aware SLAM for ToF RGB-D Cameras, *Oliver Wasenmüller, Mohammad Dawud Ansari, and Didier Stricker*

14:00 3D Shape Retrieval via Irrelevance Filtering and Similarity Ranking (IF/SR), *Xiaqing Pan, Yueru Chen, and C.-C. Jay Kuo*

14:20 3D Shape Reconstruction in Traffic Scenarios Using Monocular Camera and Lidar, *Qing Rao, Lars Krueger, and Klaus Dietmayer*

14:40 A 3D Recognition System with Local-Global Collaboration, *Kai Sheng Cheng, Huei Yung Lin, and Tran Van Luan*

15:00 **Coffee Break**

**Poster Session**

15:30~16:30

1. Comparison of Kinect v1 and v2 Depth Images in Terms of Accuracy and Precision, *Oliver Wasenmüller and Didier Stricker*
2. 3D Line Segment Reconstruction in Structured Scenes via Coplanar Line Segment Clustering, *Kai Li, Jian Yao, Li Li, and Yahui Liu*
3. Bio-inspired architecture for deriving 3D models from video sequences, *Julius Schöning and Gunther Heidemann*

4. DSLIC: A Superpixel Based Segmentation Algorithm for Depth Image, *Ali Suryaperdana Agoes, Zhencheng Hu, and Nobutomo Matsunaga*
5. Monocular Depth Estimation of Outdoor Scenes Using RGB-D Datasets, *Tianteng Bi, Yue Liu, Dongdong Weng, and Yongtian Wang*
6. Reconstruction of 3D Models Consisting of Line Segments, *Naoto Ienaga and Hideo Saito*
7. 3D Estimation of Extensible Surfaces Through a Local Monocular Reconstruction Technique, *S. Jafar Hosseini and Helder Araujo*
8. Disparity Estimation by Simultaneous Edge Drawing, *Dexmont Pena and Alistair Sutherland*
9. Image-based Camera Localization for Large and Outdoor Environments, *Chin-Hung Teng, Yu-Liang Chen, and Xuejie Zhang*
10. An Efficient Meta-Algorithm for Triangulation, *Qianggong Zhang and Tat-Jun Chin*

**Oral Session (II)**

16:40 Synchronization Error Compensation of Multi-view RGB-D 3D Modeling System, *Ju-Hwan Lee, Eung-Su Kim, and Soon-Yong Park*

17:00 Can Vehicle Become A New Pattern for Roadside Camera Calibration? *Yuan Zheng and Wenyong Zhao*

17:20 **Closing**



## W02: 4th ACCV Workshop on e-Heritage (Electronic Cultural Heritage)

**Organizers:** *Katsushi Ikeuchi*  
*El Mustapha Mouaddib*  
*Takeshi Masuda*  
*Takeshi Oishi*

**Location:** 201E

### Schedule:

13:30 **Opening**

13:35 **Invited Talk:** e-Cathedral: On the digital archiving of the largest medieval Gothic church of France, *Guillaume Caron*

14:20 Digital Longmen Project: A Free Walking VR System with Image-based Restoration, *Zeyu Wang, Xiaohan Jin, Dian Shao, Renju Li, Hongbin Zha, and Katsushi Ikeuchi*

14:45 Fast General Norm Approximation via Iteratively Reweighted Least Squares, *Masaki Samejima, Yasuyuki Matsushita*

15:10 **Coffee Break**

15:30 Radiometry propagation to large 3D point clouds from sparsely sampled ground truth, *Thomas Höll, Axel Pinz*

15:55 A 3D Reconstruction Method with Color Reproduction from Multi-Band and Multi-View Images, *Shuya Ito, Koichi Ito, Takafumi Aoki, Masaru Tsuchida*

16:20 Discussion on e-Heritage, *Takeshi Oishi, El-Mustapha Mouddib, Takeshi Masuda, Katsushi Ikeuchi*

16:50 **Closing**

## W08: Large Scale 3D Human Activity Analysis Challenge in Depth Videos

**Organizers:** *Gang Wang*  
*Amir Shahroudy*  
*Jun Liu*

**Location:** 101A

### Schedule:

13:30 **Opening and Overview**

13:40 **Invited Talk:** *Prof. Ming-Hsuan Yang (UC Merced)*

14:10 **Invited Talk:** High Order Statistics Guided Recurrent Neural Network for Action Recognition, *Mr. Yanghao Li, Prof. Jiaying Liu (PKU)*

14:30 **Invited Talk:** *Dr. Wanli Ouyang (CUHK)*

15:00 **Break**

15:30 **Invited Talk:** Action recognition using LSTM Networks with Spatial and Temporal Attention, *Dr. Cuiling Lan, Dr. Wenjun Zeng (MSRA)*

15:50 **Invited Talk:** On Nonlinear Activation in Convolutional Neural Networks, *Prof. C.-C. Jay Kuo (USC)*

16:20 **Closing**



## W09: Multi-view Lip-reading/Audio-Visual Challenges

**Organizers:** *Ziheng Zhou*  
*Zhao Guoying*  
*Takeshi Saitoh*  
*Richard Bowden*

**Location:** 201F

### Schedule:

13:30 **Opening Presentation**

14:00 **Invited Talk:** Audio and visual modality combination in speech processing applications, *Prof. Gerasimos Potamianos (University of Thessaly, Greece)*

14:30 Out of time: automated lip sync in the wild, *Joon Son Chung, Andrew Zisserman*

14:50 Visual Speech Recognition Using PCA Networks and LSTMs in a Tandem GMM-HMM System, *Marina Zimmermann, Mostafa Mehdipour Ghazi, Hazim Kemal Ekenel, Jean-Philippe Thiran*

15:10 **Coffee Break**

15:30 Concatenated Frame Image based CNN for Visual Speech Recognition, *Takeshi Saitoh, Ziheng Zhou, Guoying Zhao and Matti Pietikainen*

15:50 Multi-View Automatic Lip-Reading using Neural Network, *Daehyun Lee, Jongmin Lee and Kee-Eung Kim*

16:10 Lip Reading from Multi View Facial Images Using 3D-AAM, *Takuya Watanabe, Kouichi Katsurada and Yasushi Kanazawa*

16:30 **Closing**

## W14: Workshop on Facial Informatics (WFI)

**Organizers:** *Gee-Sern (Jison) Hsu*

*Moi Hoon Yap*

*Xiaogang Wang*

*Su-Jing Wang*

*John See*

**Location:** 101D

**Schedule:**

13:30 **Opening**

13:40 **Invited Talk:** Human Age Estimation and Cross-Age Face Recognition, *Chu-Song Chen (Academia Sinica, Taiwan)*

14:00 **Invited Talk:** Deep Learning in Face Analysis, *Chen-Change Loy (Chinese University of Hong Kong)*

14:20 **Invited Talk:** Filter Bank Representation and Face Recognition, *Andrew Teoh Beng Jin (Yonsei University, Korea)*

14:40 **Invited Talk:** A Brief Introduction to the Spontaneous Micro-Expression Databases, *Wen-Jing Yan (Wenzhou University, China)*

15:00 **Coffee Break**

**Oral Session**

15:20 Face Detection by Aggregating Visible Components, *Jiali Duan, Shengcai Liao, Xiaoyuan Guo, Stan Z. Li*

15:36 Deep Architectures for Face Attributes, *Tobias Baumgartner, Jack Culpepper*

15:52 Automatic Micro-expression Recognition from Long Video using a Single Spotted Apex, *Sze-Teng Liong, John See, KokSheik Wong, Raphael Chung-Wei Phan*

16:08 Failure Detection for Facial Landmark Detectors, *Andreas Steger, Radu Timofte*

16:24 Fitting a 3D Morphable Model to Edges: A Comparison between Hard and Soft Correspondences, *Anil Bas, William A.P. Smith, Timo Bolkart, Stefanie Wuhrer*

16:40 **Break**

17:00 **Poster Session & Interactions** (starts 13:30)

17:25 **Closing**

## Poster Session (13:30-17:25)

1. Multiple Facial Attributes Estimation based on Weighted Heterogenous Learning, *H. Fukui, T. Yamashita, Y. Kato, R. Matsui, T. Ogata, Y. Yamauchi, H. Fujiyoshi*
2. Reliable Age Estimation based on Apt Gabor Features Selection and SVM, *ArulMurugan Ambikapathi, Yi-Tseng Cheng, Gee-Sern (Jison) Hsu, Cheng-Hua Hsieh*
3. VFSC: A Very Fast Sparse Clustering to Cluster Faces from Videos, *Dinh-Luan Nguyen, Minh-Triet Tran*
4. Deep or Shallow Facial Descriptors? A Case for Facial Attribute Classification and Face Retrieval, *Rasoul Banaeeyan, Mohd Haris Lye, Mohammad Faizal Ahmad Fauzi, Hezerul Abdul Karim, John See*
5. A Main Directional Maximal Difference Analysis for Spotting Micro-expressions, *Su-Jing Wang, Shuhang Wu, Xiaolan Fu*
6. Aesthetic Evaluation of Facial Portraits Using Compositional Augmentation for Deep CNNs, *Magzhan Kairanbay, John See, Lai-Kuan Wong*

**T09: Deep Learning in Computer Vision**

**Organizers:** *Wanli Ouyang*  
*Hongsheng Li*  
*Xiaogang Wang*

**Time:** 09:30 - 17:00

**Location:** 101B

**Description:** Deep learning has become a major breakthrough in artificial intelligence and achieved amazing success on solving grand challenges in many fields including computer vision, speech recognition, and natural language processing. Its success benefits from big training data and super parallel computational power emerging in recent years, as well as advanced model design and training strategies. The most important breakthrough of deep learning in computer vision happened in 2012. Hinton's group won the ImageNet object recognition challenge with the deep convolutional neural network and beat conventional computer vision technologies with a large margin.

In this tutorial, we will introduce deep learning and its applications in computer vision. It starts with a historical overview of deep learning and introduction on several classical deep models. Through concrete examples on image classification, face recognition, object detection, human pose estimation, object tracking and video understanding, we will explain why deep learning works in computer vision and how design effective deep models and learning strategies. We will introduce structured deep learning developed in recent years and explain semantic meanings of the learned neural responses. Some open questions related to deep learning will also be discussed in the end.

**T02: Digital Geometry Processing:  
Extracting High Quality  
Geometric Features**

**Organizer:** *Bertrand Kerautret*

**Time:** 09:00 - 12:20

**Location:** 201D

**Description:** Extracting high-quality and robust geometric information plays an important role in many computer vision applications. For instance, the noise, scale or curvature estimations can influence the resulting quality of shape recognition, matching or indexation. In this context, the aim of this tutorial is to present the new robust geometric estimators (like normals, tangents, curvature and local noise estimators), recently proposed in the digital geometry community, starting from their theoretical description up to their concrete implementation in the emerging DGtal Library framework, and to show some of their applications. Such tutorial will benefit to the audience by showing them how to create image analysis tools using these features and how to integrate them in another framework like OpenCV. Also, the audience will exploit the described advanced estimators and discover progressively the DGtal Library through several concrete tutorial applications, starting from simple topology based contour extraction to unsupervised noise detection techniques. The last part of this tutorial will focus on how to build online demonstration tools. This is especially important in image filtering and analysis, in order to make unbiased and reproducible research. This tutorial will present the new automated demonstration framework of the IPOL journal (Image Processing On-Line).

### T07: Modern Local Image Descriptors: Hand-crafted VS. Learning-based Methods

**Organizers:** *Bin Fan*  
*Jiwen Lu*  
*Pascal Fua*

**Time:** 09:00 - 12:10

**Location:** 101A

**Description:** Local image descriptors have been developed over two decades. Representative methods such as SIFT, SURF, and LBP, have been widely used in various computer vision applications. Although popularity, these methods are either not suitable or less robust in many new applications, which emerges the development of modern local image descriptors. In this half-day tutorial, we will give an extensive introduction of the latest advances on this topic. Particularly, after a brief introduction of local descriptors and review of the classical methods, we will introduce modern approaches for local image description. We divide them into two categories: those were proposed for high matching performance, and those for high efficiency. For each category, we will introduce both hand-crafted and learning-based methods, as well as discuss their advantages and disadvantages. Moreover, we will give an introduction of benchmarks and software for performance evaluation and some typical applications.

### T01: Content-Adaptive Morphological Filters

**Organizers:** *Hugues Talbot*  
*Michael H.F. Wilkinson*

**Time:** 13:30 – 17:30

**Location:** 201D

**Description:** Mathematical morphology filters using basic structuring elements (erosions, dilations etc) are classics. Most textbooks covering morphological filtering restrict their exposition to these basic filters. This is unfortunate, since very significant advances have been made since the development of these filters, in particular by making the filters adaptive to the image content. This has lead to a whole new range of image processing and analysis tools, ranging from shape preserving image denoising techniques, to object recognition methods. In this tutorial we will discuss the theory behind recently developed advanced morphological filters, including adaptive structural filters, viscous filters, morphological PDEs, path openings, amoeba filters, and connected, semi-connected and hyperconnected filters. Numerous applications will be used to demonstrate the usefulness of these filters. This tutorial is the second in a series, the first having been presented at ICPR 2014 in Stockholm. The present proposal is updated with new results and applications that have recently appeared.

**Location: 101 (Oral) & 201 (Poster)**08:00 **Registration Starts**08:45-09:00 **Opening Session**09:00-10:30 **Oral Session 1****Segmentation and Classification**

**Chairs:** *Kyoung Mu Lee (Seoul National U.) and Yasuyuki Matsushita (Osaka U.)*

01-01 Realtime Hierarchical Clustering based on Boundary and Surface Statistics, *Dominik Alexander Klein, Fraunhofer FKIE; Dirk Schulz, Fraunhofer FKIE; Armin Cremers, Bonn-Aachen International Center for Information Technology*

01-02 Weakly-supervised Video Scene Co-parsing, *Guangyu Zhong, Dalian University of Technology; Yi-Hsuan Tsai, UC Merced; Ming-Hsuan Yang, UC Merced*

01-03 Supervoxel-based Segmentation of 3D Volumetric Images, *Chengliang Yang, University of Florida; Manu Sethi, University of Florida; Anand Rangarajan, University of Florida; Sanjay Ranka, University of Florida*

01-04 Message Passing on the Two-Layer Network for Geometric Model Fitting, *Xing Wang, Xiamen University; Guobao Xiao, Xiamen University; Yan Yan, Xiamen University; Hanzi Wang, Xiamen University*

01-05 Deep Supervised Hashing with Triplet Labels, *Xiaofang Wang, Carnegie Mellon University; Yi Shi, Carnegie Mellon University; Kris Kitani, Carnegie Mellon University*

01-06 Boosting Zero-Shot Image Classification via Pairwise Relationship Learning, *Hanhui Li, Sun Yat-sen University; Hefeng Wu, Guangdong University of Foreign*

*Studies / Sun Yat-sen University; Shujin Lin, Sun Yat-sen University; Liang Lin, Sun Yat-sen University; Xiaonan Luo, Sun Yat-sen University / Beijing University of Technology; Ebroul Izquierdo, Queen Mary University of London*

10:30-11:00 **Coffee Break**11:00-12:00 **Keynote Speech**

Deep Visual Understanding from Deep Learning

*Prof. Jitendra Malik (UC Berkeley)*

12:00-13:00 **Lunch Break**13:00-15:30 **Poster Session 1****Segmentation and Semantic Segmentation**

P1-01 Hierarchical Supervoxel Graph for Interactive Video Object Representation and Segmentation, *Xiang Fu, University of Southern California; Changhu Wang, Microsoft Research; C.-C. Jay Kuo, University of Southern California*

P1-02 Learning to Generate Object Segmentation Proposals with Multi-modal Cues, *Haoyang Zhang, The Australian National University / CSIRO; Xuming He, The Australian National University / CSIRO; Fatih Porikli, The Australian National University / CSIRO*

P1-03 Saliency Detection via Diversity-Induced Multi-view Matrix Decomposition, *Xiaoli Sun, Shenzhen University; Zhixiang He, Shenzhen University; Xiujun Zhang, Shenzhen Polytechnic; Wenbin Zou, Shenzhen University; George Baci, Hongkong Polytechnic University*

- P1-04 Parallel Accelerated Matting Method Based on Local Learning, *Xiaoqiang Li, Shanghai University; Qing Cui, Shanghai University*
- P1-05 Semi-Supervised Domain Adaptation for Weakly Labeled Semantic Video Object Segmentation, *Huiling Wang, Aalto University; Tapani Raiko, Aalto University; Lasse Lensu, Lappeenranta University of Technology; Tinghuai Wang, Nokia Technologies; Juha Karhunen, Aalto University*
- P1-06 Semantic Segmentation of Earth Observation Data Using Multimodal and Multi-Scale Deep Networks, *Nicolas Audebert, ONERA / IRISA; Bertrand Le Saux, ONERA; Sébastien Lefèvre, IRISA*
- P1-07 Object Boundary Guided Semantic Segmentation, *Qin Huang, University of Southern California; Chunyang Xia, University of Southern California; Wenchao Zheng, University of Southern California; Yuhang Song, University of Southern California; Hao Xu, University of Southern California; C.-C. Jay Kuo, University of Southern California*
- P1-08 FuseNet: Incorporating Depth into Semantic Segmentation via Fusion-based CNN Architecture, *Caner Hazırbaş, Technical University of Munich; Lingni Ma, Technical University of Munich; Csaba Domokos, Technical University of Munich; Daniel Cremers, Technical University of Munich*
- P1-09 Point-Cut: Interactive Image Segmentation using point Supervision, *Changjae Oh, Yonsei University; Bumsub Ham, Yonsei University; Kwanghoon Sohn, Yonsei University*
- P1-10 A Holistic Approach for Data-Driven Object Cutout, *Huayong Xu, Shandong University; Yangyan Li, Tel Aviv University; Wenzheng Chen, Shandong University; Dani Lischinski, Hebrew University of Jerusalem; Daniel Cohen-Or, Tel Aviv University; Baoquan Chen, Shandong University*
- P1-11 Interactive Segmentation from 1-Bit Feedback, *Ding-Jie Chen, National Tsing Hua University; Hwann-Tzong Chen, National Tsing Hua University; Long-Wen Chang, National Tsing Hua University*
- P1-12 Geodesic Distance Histogram Feature for Video Segmentation, *Hieu Le, Stony Brook University; Vu Nguyen, Stony Brook University; Chen-Ping Yu, Harvard University; Dimitris Samaras, Stony Brook University*
- P1-13 HF-FCN: Hierarchically Fused Fully Convolutional Network for Robust Building Extraction, *Tongchun Zuo, University of Science and Technology of China; Juntao Feng, University of Science and Technology of China; Xuejin Chen, University of Science and Technology of China*
- Dictionary Learning, Retrieval, and Clustering**
- P1-14 Dictionary Reduction: Automatic Compact Dictionary Learning for Classification, *Yang Song, University of Tennessee; Zhifei Zhang, University of Tennessee; Liu Liu, University of Tennessee; Alireza Rahimpour, University of Tennessee; Hairong Qi, University of Tennessee*



- P1-15 A Vote-and-Verify Strategy for Fast Spatial Verification in Image Retrieval, *Johannes L. Schönberger, ETH Zürich; True Price, UNC Chapel Hill; Torsten Sattler, ETH Zürich; Jan-Michael Frahm, UNC Chapel Hill; Marc Pollefeys, ETH Zürich / Microsoft*
- P1-16 SSP: Supervised Sparse Projections for Large-Scale Retrieval in High Dimensions, *Frederick Tung, University of British Columbia; James J. Little, University of British Columbia*
- P1-17 An online algorithm for efficient and temporally consistent subspace clustering, *Vasileios Zografos, Technical University Munich; Kai Krajsek, Forschungszentrum Jülich; Bjoern Menze, Technical University of Munich*
- P1-18 Sparse Gradient Pursuit for Robust Visual Analysis, *Jiangxin Dong, Dalian University of Technology; Risheng Liu, Dalian University of Technology; Kewei Tang, Liaoning Normal University; Yiyang Wang, Dalian University of Technology; Xindong Zhang, Dalian University of Technology; Zhixun Su, Dalian University of Technology*
- P1-19 F-SORT: An Alternative for Faster Geometric Verification, *Jacob Chan, Nanyang Technological University; Jimmy Addison Lee, A\*STAR; Qian Kemao, Nanyang Technological University*
- P1-20 Clustering Symmetric Positive Definite Matrices on the Riemannian Manifolds, *Ligang Zheng, Guangzhou University; Guoping Qiu, University of Nottingham; Jiwu Huang, Shenzhen University*
- P1-21 Subspace Learning Based Low-Rank Representation, *Kewei Tang, Liaoning Normal University; Xiaodong Liu, Dalian University of Technology; Zhixun Su, Dalian*

*University of Technology; Wei Jiang, Liaoning Normal University; Jiangxin Dong, Dalian University of Technology*

### Deep Learning

- P1-22 Analysis on the Dropout Effect in Convolutional Neural Networks, *Sungheon Park, Seoul National University; Nojun Kwak, Seoul National University*
- P1-23 Efficient Model Averaging for Deep Neural Networks, *Michael Opitz, Graz University of Technology; Horst Possegger, Graz University of Technology; Horst Bischof, Graz University of Technology*
- P1-24 Joint Training of Generic CNN-CRF Models with Stochastic Optimization, *A. Kirillov, Dresden University of Technology; D. Schlesinger, Dresden University of Technology; S. Zheng, University of Oxford; B. Savchynskyy, Dresden University of Technology; P.H.S. Torr, University of Oxford; C. Rother, Dresden University of Technology*
- P1-25 Object-Aware Dictionary Learning with Deep Features, *Yurui Xie, Australian National University / CSIRO/ University of Electronic Science and Technology of China; Fatih Porikli, Australian National University / CSIRO; Xuming He, Australian National University / CSIRO*



**People Tracking and Action Recognition**

P1-26 Gait Energy Response Function for Clothing-invariant Gait Recognition, *Xiang Li, Nanjing University of Science and Technology / Osaka University; Yasushi Makiyama, Osaka University; Chi Xu, Nanjing University of Science and / Osaka University Technology / Osaka University; Daigo Muramatsu, Osaka University; Yasushi Yagi, Osaka University; Mingwu Ren, Nanjing University of Science and Technology*

P1-27 Action Recognition Based on Optimal Joint Selection and Discriminative Depth Descriptor, *Haomiao Ni, Chinese Academy of Sciences; Hong Liu, Chinese Academy of Sciences; Xiangdong Wang, Chinese Academy of Sciences; Yueliang Qian, Chinese Academy of Sciences*

P1-28 Model-Free Multiple Object Tracking with Shared Proposals, *Gao Zhu, Australian National University; Fatih Porikli, Australian National University; Hongdong Li, Australian National University*

P1-29 Learning to integrate Occlusion-specific Detectors for Heavily Occluded Pedestrian Detection, *Chunluan Zhou, Nanyang Technological University; Junsong Yuan, Nanyang Technological University*

P1-30 Deep Second-order Siamese Network for Pedestrian Re-identification, *Xuesong Deng, Chinese Academy of Sciences / CAS; Bingpeng Ma, Chinese Academy of Sciences / CAS; Hong Chang, Chinese Academy of Sciences; Shiguang Shan, Chinese Academy of Sciences; Xilin Chen, Chinese Academy of Sciences*

P1-31 Cost-sensitive Two-stage Depression Prediction using Dynamic Visual Clues, *Xingchen Ma, Beihang University; Di Huang,*

*Beihang University; Yunhong Wang, Beihang University; Yiding Wang, North China University of Technology*

P1-32 Human Interaction Recognition by Mining Discriminative Patches on Key Frames, *Dingyi Shan, University of Chinese Academy of Sciences / CAS; Laiyun Qing, University of Chinese Academy of Sciences / CAS; Jun Miao, Chinese Academy of Sciences*

P1-33 Stacked Overcomplete Independent Component Analysis for Action Recognition, *Zhikang Liu, University of Science and Technology of China; Ye Tian, Stanford University; Zilei Wang, University of Science and Technology of China*

P1-34 Searching Action Proposals via Spatial Actionness Estimation and Temporal Path Inference and Tracking, *Nannan Li, Peking University; Dan Xu, University of Trento; Zhenqiang Ying, Peking University; Zhihao Li, Peking University; Ge Li, Peking University*

P1-35 Markov Chain Monte Carlo Cascade for Camera Network Calibration based on Unconstrained Pedestrian Tracklets, *Louis Lettry, ETH Zurich; Ralf Dragon, ETH Zurich; Luc Van Gool, ETH Zurich / KU Leuven*

P1-36 Scale-Adaptive Deconvolutional Regression Network for Pedestrian Detection, *Yousong Zhu, Institute of Automation / Chinese Academy of Sciences; Jinqiao Wang, Institute of Automation / Chinese Academy of Sciences; Chaoyang Zhao, Institute of Automation / Chinese Academy of Sciences; Haiyun Guo, Institute of Automation / Chinese Academy of Sciences; Hanqing Lu, Chinese Academy of Sciences*

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15:30-16:00 **Coffee Break**

16:00-17:15 **Oral Session 2**

**People and Actions**

**Chairs:** *Imari Sato (NII) and Min Sun (NTHU)*

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02-01 Sparse Code Filtering for Action Pattern Mining, *Wei Wang, University of Trento; Yan Yan, University of Trento; Liqiang Nie, National University of Singapore; Luming Zhang, Advanced Digital Sciences Center; Stefan Winkler, Hefei University of Technology; Nicu Sebe, University of Trento*

02-02 Learning Action Concept Trees and Semantic Alignment Networks from Image-Description Data, *Jiyang Gao, University of Southern California; Ram Nevatia, University of Southern California*

02-03 Pedestrian Color Naming via Convolutional Neural Network, *Zhiyi Cheng, The Chinese University of Hong Kong; Xiaoxiao Li, The Chinese University of Hong Kong; Chen Change Loy, The Chinese University of Hong Kong*

02-04 Speed Invariance vs. Stability: Cross-Speed Gait Recognition Using Single-Support Gait Energy Image, *Chi Xu, Nanjing University of Science & Technology / Osaka University ; Yasushi Makihara, Osaka University; Xiang Li, Nanjing University of Science & Technology / Osaka University; Yasushi Yagi, Osaka University; Jianfeng Lu, Nanjing University of Science & Technology*

02-05 Parametric Image Segmentation of Humans with Structural Shape Priors, *Alin-Ionut Popa, Institute of Mathematics of the Romanian Academy; Cristian Sminchisescu, Lund University / Institute of Mathematics of the Romanian Academy*

**Location: 101 (Oral) & 201 (Poster)**

08:00 **Registration Starts**

09:00-10:30 **Oral Session 3**

**Faces**

**Chairs:** *Michael Brown (National U. Singapore)*  
and *Lei Zhang (Hong Kong Poly U.)*

03-01 Lip Reading in the Wild, *Joon Son Chung, University of Oxford; Andrew Zisserman, University of Oxford*

03-02 Recurrent Convolutional Face Alignment, *Wei Wang, University of Trento; Sergey Tulyakov, University of Trento; Nicu Sebe, University of Trento*

03-03 Continuous Supervised Descent Method for Facial Landmark Localisation, *Marc Oliu, University of Barcelona; Ciprian Corneanu, University of Barcelona; L'aszl'o A. Jeni, Carnegie Mellon University; Jeffrey F. Cohn, Carnegie Mellon University / University of Pittsburgh; Takeo Kanade, Carnegie Mellon University; Sergio Escalera, University of Barcelona*

03-04 Modeling Stylized Character Expressions via Deep Learning, *Deepali Aneja, University of Washington; Alex Colburn, Zillow Group; Gary Faigin, Gage Academy of Art; Linda Shapiro, University of Washington; Barbara Mones, University of Washington*

03-05 Variational Gaussian Process Auto-Encoder for Ordinal Prediction of Facial Action Units, *Stefanos Eleftheriadis, Imperial College London; Ognjen Rudovic, Imperial College London; Marc Deisenroth, Imperial College London; Maja Pantic, Imperial College London / University of Twente*

03-06 Multi-instance Dynamic Ordinal Random Fields for Weakly-supervised Pain Intensity Estimation, *Adrià Ruiz, Universitat Pompeu Fabra; Ognjen Rudovic, Imperial College London; Xavier Binefa, Universitat Pompeu Fabra; Maja Pantic, Imperial College London / University of Twente*

10:30-11:00 **Coffee Break**

11:00-12:00 **Keynote Speech**

e-Intangible Heritage

*Prof. Katsushi Ikeuchi (Microsoft Research)*

12:00-13:30 **Lunch Break**

13:30:15:30 **Poster Session 2**

**Computational Photography**

P2-01 Layered Scene Reconstruction from Multiple Light Field Camera Views, *Ole Johannsen, University of Konstanz; Antonin Sulc, University of Konstanz; Nico Marniok, University of Konstanz; Bastian Goldluecke, University of Konstanz*

P2-02 A Dataset and Evaluation Methodology for Depth Estimation on 4D Light Fields, *Katrin Honauer, Heidelberg University; Ole Johannsen, University of Konstanz; Daniel Kondermann, Heidelberg University; Bastian Goldluecke, University of Konstanz*

P2-03 Radial Lens Distortion Correction Using Convolutional Neural Networks Trained with Synthesized Images, *Jiangpeng Rong, Peking University; Shiyao Huang, Peking University; Zeyu Shang, Peking University; Xianghua Ying, Peking University*

- P2-04 Ultrasound Speckle Reduction via  $L_0$  Minimization, *Lei Zhu, The Chinese University of Hong Kong; Weiming Wang, Shenzhen Institute of Advanced Integration Technology; Xiaomeng Li, The Chinese University of Hong Kong; Qiong Wang, Shenzhen Institute of Advanced Integration Technology; Jing Qin, The Hong Kong Polytechnic University; Kin-Hong Wong, The Chinese University of Hong Kong; Pheng-Ann Heng, The Chinese University of Hong Kong / Shenzhen Institute of Advanced Integration Technology*
- P2-05 A Variational Model for Intrinsic Light Field Decomposition, *Anna Alperovich, University of Konstanz; Bastian Goldluecke, University of Konstanz*
- P2-06 Dense Depth-map Estimation and Geometry Inference from Light Fields via Global Optimization, *Lipeng Si, Northwestern Polytechnical University; Qing Wang, Northwestern Polytechnical University*
- P2-07 Direct and Global Component Separation from a Single Image Using Basis Representation, *Art Subpa-asa, Tokyo Institute of Technology; Ying Fu, University of Tokyo; Yinqiang Zheng, National Institute of Informatics; Toshiyuki Amano, Wakayama University; Imari Sato, National Institute of Informatics / National Institute of Informatics*
- P2-08 Ultra-Shallow DoF imaging using faced Paraboloidal Mirrors, *Ryoichiro Nishi, Nara Institute of Science and Technology; Takahito Aoto, Nara Institute of Science and Technology; Norihiko Kawai, Nara Institute of Science and Technology; Tomokazu Sato, Nara Institute of Science and Technology; Yasuhiro Mukaigawa, Nara Institute of Science and Technology; Naokazu Yokoya, Nara Institute of Science and Technology*
- P2-09 ConvNet-based Depth Estimation, Reflection Separation and Deblurring of Plenoptic Images, *Paramanand Chandramouli, University of Bern; Mehdi Noroozi, University of Bern; Paolo Favaro, University of Bern*
- P2-10 Learning a Mixture of Deep Networks for Single Image Super-Resolution, *Ding Liu, University of Illinois at Urbana-Champaign; Zhaowen Wang, Adobe Research; Nasser Nasrabadi, West Virginia University; Thomas Huang, University of Illinois at Urbana-Champaign*
- P2-11 A Fast Blind Spatially-varying Motion Deblurring Algorithm with Camera Poses Estimation, *Yuquan Xu, Toyota Technological Institute; Seiichi Mita, Toyota Technological Institute; Silong Peng, Chinese Academy of Sciences*
- P2-12 Removing Shadows from Images of Documents, *Steve Bako, University of California; Soheil Darabi, Adobe Research Seattle; Jue Wang, Adobe Research Seattle; Eli Shechtman, Adobe Research Seattle; Kalyan Sunkavalli, Adobe Research Seattle; Pradeep Sen, University of California*
- P2-13 Video Enhancement via Super-resolution using Deep Quality Transfer Network, *Pai-Heng Hsiao, Umbo CV; Ping-Lin Chang, Umbo CV*

**Face and Gestures**

P2-14 Age Estimation Based on A Single Network with Soft Softmax of Aging Modeling, *ZiChang Tan, Chinese Academy of Sciences; Shuai Zhou, Chinese Academy of Science / Macau University of Science and Technology; Jun Wan, Chinese Academy of Sciences; Zhen Lei, Chinese Academy of Sciences; Stan Li, Chinese Academy of Sciences*

P2-15 Illumination-Recovered Pose Normalization for Unconstrained Face Recognition, *Zhongjun Wu, Beijing University of Posts and Telecommunications; Weihong Deng, Beijing University of Posts and Telecommunications*

P2-16 Local Fractional Order Derivative Vector Quantization Pattern for Face Recognition, *Jing Li, Huazhong University of Science and Technology; Nong Sang, Huazhong University of Science and Technology; Changxin Gao, Huazhong University of Science and Technology*

P2-17 Learning Facial Point Response for Alignment by Purely Convolutional Network, *Zhenqi Xu, Beijing University of Posts and Telecommunications; Weihong Deng, Beijing University of Posts and Telecommunications*

P2-18 Random Forest with Suppressed Leaves for Hough Voting, *Hui Liang, Nanyang Technological University; Junhui HOU, Nanyang Technological University; Junsong Yuan, Nanyang Technological University; Daniel Thalmann, Nanyang Technological University*

P2-19 Sign-Correlation Partition based on Global Supervised Descent Method for Face

Alignment, *Yongqiang Zhang, Harbin Institute of Technology; Shuang Liu, Bournemouth University; XiaoSong Yang, Bournemouth University; Daming Shi, Middlesex University; JianJun Zhang, Bournemouth University*

P2-20 Deep Video Code for Efficient Face Video Retrieval, *Shishi Qiao, Chinese Academy of Sciences; Ruiping Wang, Institute of Computing Technology, Chinese Academy of Sciences / Cooperative Medianet Innovation Center; Shiguang Shan, Chinese Academy of Sciences / Cooperative Medianet Innovation Center; Xilin Chen, Chinese Academy of Sciences / Cooperative Medianet Innovation Center*

P2-21 From face images and attributes to attributes, *Robert Torfason, ETH Zurich; Eirikur Agustsson, ETH Zurich; Rasmus Rothe, ETH Zurich; Radu Timofte, ETH Zurich*

P2-22 Learning with Ambiguous Label Distribution for Apparent Age Estimation, *Ke Chen, Tampere University of Technology; Joni-Kristian Kamarainen, Tampere University of Technology*

P2-23 Prototype Discriminative Learning for Face Image Set Classification, *Wen Wang, Chinese Academy of Sciences; Ruiping Wang, Chinese Academy of Sciences / Cooperative Medianet Innovation Center; Shiguang Shan, Chinese Academy of Sciences / Cooperative Medianet Innovation Center; Xilin Chen, Chinese Academy of Sciences / Cooperative Medianet Innovation Center*



- P2-24 Collaborative Learning Network for Face Attribute Prediction, *Shiyao Wang, Tsinghua University; Zhidong Deng, Tsinghua University; Zhenyang Wang, Tsinghua University*
- P2-25 Facial Expression-Aware Face Frontalization, *Yiming Wang, University of Portsmouth; Hui Yu, University of Portsmouth; Junyu Dong, Ocean University of China; Brett Stevens, University of Portsmouth; Honghai Liu, University of Portsmouth*
- P2-26 Eigen-Aging Reference Coding for Cross-Age Face Verification and Retrieval, *Kaihua Tang, Waseda University / Shanghai Jiao Tong University; Sei-ichiro Kamata, Waseda University; Xiaonan Hou, Shanghai Jiao Tong University; Shouhong Ding, Shanghai Jiao Tong University; Lizhuang Ma, Shanghai Jiao Tong University*
- P2-27 Consistent Sparse Representation for video-based face recognition, *Xiuping Liu, Dalian University of Technology; Aihong Shen, Dalian University of Technology; Jie Zhang, Liaoning Normal University; Junjie Cao, Dalian University of Technology / Nanchang Hangkong University; Yanfang Zhou, Dalian University of Technology*
- P2-28 Unconstrained Gaze Estimation Using Random Forest Regression Voting, *Amine Kacete, Institute of Research and Technology B-com; Renaud Séguier, Institute of Research and Technology B-com; Michel Collobert, Institute of Research and Technology B-com; Jérôme Royan, Institute of Research and Technology B-com*
- P2-29 A Novel Time Series Kernel for Sequences Generated by LTI Systems, *Liliana Lo Presti,*

*University of Palermo; Marco La Cascia, University of Palermo*

- P2-30 Hand Pose Regression via a Classification-guided Approach, *Hongwei Yang, University of Science and Technology of China; Juyong Zhang, University of Science and Technology of China*
- P2-31 Who's that Actor? Automatic Labelling of Actors in TV series starting from IMDB Images, *Rahaf Aljundi, KU Leuven; Punarjay Chakravarty, KU Leuven; Tinne Tuytelaars, KU Leuven*

### Image Alignment

- P2-32 Adaptive Direct RGB-D Registration and Mapping for Large Motions, *Renato Martins, Inria/Mines Paristech; Eduardo Fernandez-Moral, Inria; Patrick Rives, INRIA*
- P2-33 Deep Discrete Flow, *Fatma Guney, MPI for Intelligent Systems; Andreas Geiger, MPI for Intelligent Systems / ETH Zurich*
- P2-34 Dense Motion Estimation for Smoke, *Da Chen, University of Bath; Wenbin Li, University College London; Peter Hall, University of Bath*
- P2-35 Data Association based Multi-Target Tracking Using a Joint Formulation, *Jun Xiang, Huazhong University of Science and Technology / University for Nationalities; Jian Hou, University for Nationalities; Chang Gao, Huazhong University of Science and Technology; Nong Sang, Huazhong University of Science*
- P2-36 Combining Texture and Shape Cues for Object Recognition With Minimal Supervision, *Xingchao Peng, Boston University*

P2-37 Video temporal alignment for object viewpoint, *Anestis Papazoglou, University of Edinburgh; Luca Del Pero, University of Edinburgh; Vittorio Ferrari, University of Edinburgh*

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15:30-16:00 **Coffee Break**

16:00-17:15 **Oral Session 4**

### **Computational Photography and Image Processing**

**Chairs:** *Hongdong Li (Australian National U.) and Akihiro Sugimoto (NII)*

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04-01 Blind Image Quality Assessment Based on Natural Redundancy Statistics, *Jia Yan, Wuhan University; Weixia Zhang, Wuhan University; Tianpeng Feng, Wuhan University*

04-02 Sparse Coding on Cascaded Residuals, *Tong Zhang, The Australian National University; Fatih Porikli, Australian National University / CSIRO*

04-03 End-To-End Learning for Image Burst Deblurring, *Patrick Wieschollek, Max Planck Institute for Intelligent Systems / University of Tuebingen; Bernhard Schölkopf, Max Planck Institute for Intelligent Systems; Hendrik P.A. Lensch, University of Tuebingen; Michael Hirsch, Max Planck Institute for Intelligent Systems*

04-04 Spectral Reflectance Recovery with Interreflection Using a Hyperspectral Image, *Hiroki Okawa, Tokyo Institute of Technology; Yinqiang Zheng, National Institute of Informatics; Antony Lam, Saitama University; Imari Sato, Tokyo Institute of Technology / National Institute of Informatics*

04-05 Learning Contextual Dependencies for Optical Flow with Recurrent Neural Networks, *Minlong Lu, Zhejiang University / Simon Fraser University; Zhiwei Deng, Simon Fraser University; Ze-Nian Li, Simon Fraser University*

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18:30-21:30 **Banquet at Humble House**



**Location: 101 (Oral) & 201 (Poster)**08:00 **Registration Starts**09:00-10:30 **Oral Session 5****Language and Video****Chairs:** *Chiou-Ting Hsu (NTHU) and Yu-Chiang Wang (Academia Sinica)*

05-01 Auto-Illustrating Poems and Songs with Style, *Katharina Schwarz, University of Tübingen; Tamara L. Berg, University of North Carolina; Hendrik P.A. Lensch, University of Tübingen*

05-02 Spatio-Temporal Attention Models for Grounded Video Captioning, *Elisabeta Marinoiu, Institute of Mathematics of the Romanian Academy; Mihai Zanfir, Institute of Mathematics of the Romanian Academy; Cristian Sminchisescu, Lund University/ Institute of Mathematics of the Romanian Academy*

05-03 Variational Convolutional Networks for Human-Centric Annotations, *Tsung-Wei Ke, Academia Sinica; Che-Wei Lin, Academia Sinica; Tyng-Luh Liu, Academia Sinica; Davi Geiger, New York University*

05-04 Anticipating Accidents in Dashcam Videos, *Fu-Hsiang Chan, National Tsing Hua University; Yu-Ting Chen, National Tsing Hua University; Yu Xiang, University of Washington; Min Sun, National Tsing Hua University*

05-05 Pano2Vid: Automatic cinematography for watching 360° Videos, *Yu-Chuan Su, The University of Texas at Austin; Dinesh Jayaraman, The University of Texas at Austin; Kristen Grauman, The University of Texas at Austin*

05-06 PicMarker: Data-Driven Image Categorization Based on Iterative Clustering, *Jiagao Hu, Nanjing University; Zhengxing Sun, Nanjing University; Bo Li, Nanjing University; Shuang Wang, Nanjing University*

10:30-11:00 **Coffee Break**11:00-12:00 **Keynote Speech**

Semantic 3D reconstruction

*Prof. Marc Pollefeys (ETH Zurich)*12:00-13:30 **Lunch Break**13:30-15:30 **Poster Session 3****3D Computer Vision**

P3-01 Recovering Pose and 3D Deformable Shape from Multi-Instance Image Ensembles, *Antonio Agudo, Institut de Robòtica i Informàtica Industrial; Francesc Moreno-Noguer, Institut de Robòtica i Informàtica Industrial*

P3-02 Robust Multi-Model Fitting using Density and Preference Analysis, *Lokender Tiwari, IIIT-Delhi; Saket Anand, IIIT-Delhi; Sushil Mittal, Scibler Corporation*

P3-03 Photometric Bundle Adjustment for Vision-Based SLAM, *Hatem Alismail, Carnegie Mellon University; Brett Browning, Carnegie Mellon University; Simon Lucey, Carnegie Mellon University*

- P3-04 Can Computer Vision Techniques be Applied to Automated Forensic Examinations? A Study on Sex Identification from Human Skulls Using Head CT Scans, *Olasimbo Ayodeji Arigbabu, University of Nottingham Malaysia Campus; Iman Yi Liao, University of Nottingham Malaysia Campus; Nurliza Abdullah, Hospital Kuala Lumpur; Mohamad Helmee Mohamad Noor, Hospital Kuala Lumpur*
- P3-05 Deep Depth Super-Resolution: Learning Depth Super-Resolution using Deep Convolutional Neural Network, *Xibin Song, Shandong University; Yuchao Dai, Australian National University; Xueying Qin, Shandong University*
- P3-06 3D Watertight mesh generation with uncertainties from ubiquitous data, *Laurent Caraffa, IGN Recherche; Mathieu Bredif, IGN Recherche; Bruno Vallet, IGN Recherche*
- P3-07 Color Correction for Image-Based Modeling in the Large, *Tianwei Shen, Hong Kong University of Science and Technology; Jinglu Wang, Hong Kong University of Science and Technology; Tian Fang, Hong Kong University of Science and Technology; Siyu Zhu, Hong Kong University of Science and Technology; Long Quan, Hong Kong University of Science and Technology*
- P3-08 Bringing 3D Models Together: Mining Video Liaisons in Crowdsourced Reconstructions, *Ke Wang, University of North Carolina; Enrique Dunn, Stevens Institute of Technology; Mikel Rodriguez, Mitre Corp.; Jan-Michael Frahm, University of North Carolina*
- P3-09 Planar Markerless Augmented Reality using Online Orientation Estimation, *Tatsuya Kobayashi, KDDI R&D Laboratories Inc.; Haruhisa Kato, KDDI R&D Laboratories Inc.; Masaru Sugano, KDDI R&D Laboratories Inc.*
- P3-10 Simultaneous independent image display technique on multiple 3D objects, *Takuto Hirukawa, Kagoshima University; Marco Visentini-Scarzanella, Kagoshima University; Hiroshi Kawasaki, Kagoshima University; Ryo Furukawa, Hiroshima City University; Shinsaku Hiura, Hiroshima City University*
- P3-11 ZigzagNet: Efficient Deep Learning for Real Object Recognition Based on 3D Models, *Yida Wang, Beijing University of Posts and Telecommunications; Can Cui, Beijing Jiaotong University; Xiuzhuang Zhou, Capital Normal University; Weihong Deng, Beijing University of Posts and Telecommunications*
- P3-12 Precise Measurement of Cargo Boxes for Gantry Robot Palletization in Large Scale Workspaces using Low-Cost RGB-D Sensors, *Yaadhav Raaj, TUM CREATE; Suraj Nair, TUM CREATE; Alois Knoll, Technische Universität München*
- P3-13 Visual place recognition using landmark distribution descriptors, *Pilailuck Panphattarasap, University of Bristol; Andrew Calway, University of Bristol*
- P3-14 Real Time Direct Visual Odometry for Flexible Multi-Camera Rigs, *Benjamin Resch, University of Tübingen; Jian Wei, University of Tübingen; Hendrik P.A. Lensch, University of Tübingen*

P3-15 Analysis and Practical Minimization of Registration Error in a Spherical Fish Tank Virtual Reality System, *Qian Zhou, University of British Columbia; Gregor Miller, University of British Columbia; Kai Wu, University of British Columbia; Ian Stavness, University of Saskatchewan; Sidney Fels, University of British Columbia*

P3-16 Enhancing Direct Camera Tracking with Dense Feature Descriptors, *Hatem Alismail, Carnegie Mellon University; Brett Browning, Carnegie Mellon University; Simon Lucey, Carnegie Mellon University*

### **Image Attributes, Language and Recognition**

P3-17 Learning to Describe E-Commerce Images from Noisy Online Data, *Takuya Yashima, Tohoku University; Naoaki Okazaki, Tohoku University; Kentaro Inui, Tohoku University; Kota Yamaguchi, Tohoku University; Takayuki Okatani, Tohoku University*

P3-18 phi-LSTM: A Phrase-based Hierarchical LSTM Model for Image Captioning, *Ying Hua Tan, University of Malaya; Chee Seng Chan, University of Malaya*

P3-19 Deep Relative Attributes, *Yaser Souri, Sobhe; Erfan Noury, Sharif University of Technology; Ehsan Adeli, University of North Carolina at Chapel Hill*

P3-20 Fast Fashion Guided Clothing Image Retrieval: Delving Deeper into What Feature Makes Fashion, *Yuhang He, Sun Yat-sen University; Long Chen, Sun Yat-sen University*

P3-21 Using Gaussian Processes to Improve Zero-Shot Learning with Relative Attributes, *Yeshe Dolma, Indian Institute of*

*Technology; Vinay P. Namboodiri, Indian Institute of Technology*

P3-22 MARVEL: A Large-Scale Image Dataset for Maritime Vessels, *Erhan Gundogdu, Aselsan Research Center; Berkan Solmaz, Aselsan Research Center; Veysel Yucesoy, Aselsan Research Center; Aykut Ko, Aselsan Research Center*

P3-23 'Part'ly first among equals: Semantic part-based benchmarking for state-of-the-Art object recognition systems, *Ravi Kiran Sarvadevabhatla, Indian Institute of Science; Shanthakumar Venkatraman, Indian Institute of Science; Venkatesh Babu R., Indian Institute of Technology - Hyderabad*

P3-24 End-to-end training of object class detectors for mean average precision, *Paul Henderson, University of Edinburgh; Vittorio Ferrari, University of Edinburgh*

P3-25 R-CNN for Small Object Detection, *Chenyi Chen, Princeton University; Ming-Yu Liu, Mitsubishi Electric Research Labs (MERL); Oncel Tuzel, Mitsubishi Electric Research Labs (MERL); Jianxiong Xiao, Princeton University*

P3-26 Image Set Classification via Template Triplets and Context-Aware Similarity Embedding, *Feng-Ju Chang, University of Southern California; Ram Nevatia, University of Southern California*

P3-27 Object-Centric Representation Learning from Unlabeled Videos, *Ruohan Gao, University of Texas at Austin; Dinesh Jayaraman, University of Texas at Austin; Kristen Grauman, University of Texas at Austin*

P3-28 Visual Concept Recognition and Localization via Iterative Introspection, *Amir Rosenfeld, Weizmann Institute of Science; Shimon Ullman, Weizmann Institute of Science*

P3-29 Aggregating Local Context for Accurate Scene Text Detection, *Dafang He, Penn State University; Xiao Yang, Penn State University; Wenyi Huang, Penn State University; Zihan Zhou, Penn State University; Daniel Kifer, Penn State University; C. Lee Giles, Penn State University*

P3-30 Bilinear Discriminant Analysis Hashing: A Supervised Hashing Approach for High-Dimensional Data, *Yanzhen Liu, Beihang University; Xiao Bai, Beihang University; Cheng Yan, Beihang University; Jun Zhou, Griffith University*

P3-31 Signature of Geometric Centroids for 3D Local Shape Description and Partial Shape Matching, *Keke Tang, University of Science and Technology of China; Peng Song, University of Science and Technology of China; Xiaoping Chen, University of Science and Technology of China*

### Video Understanding

P3-32 Unsupervised Crowd Counting, *Nada Ellassal, York University; James H. Elder, York University*

P3-33 Long-Term Activity Forecasting Using First-Person Vision, *Syed Zahir Bokhari, Carnegie Mellon University; Kris M. Kitani, Carnegie Mellon University*

P3-34 Video Summarization using Deep Semantic Features, *Mayu Otani, Nara Institute of Science and Technology; Yuta Nakashima, Nara Institute of Science and*

*Technology; Esa Rahtu, University of Oulu; Janne Heikkilä, University of Oulu; Naokazu Yokoya, Nara Institute of Science and Technology*

P3-35 Towards Segmenting Consumer Stereo Videos: Benchmark, Baselines and Ensembles, *Wei-Chen Chiu, Max Planck Institute for Informatics; Fabio Galasso, OSRAM Corporate Technology; Mario Fritz, Max Planck Institute for Informatics*

P3-36 No-Reference Video Shakiness Quality Assessment, *Zhaoxiong Cui, Peking University; Tingting Jiang, Peking University*

P3-37 Learning to Extract Motion from Videos in Convolutional Neural Networks, *Damien Teney, University of Adelaide; Martial Hebert, Carnegie Mellon University*

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15:30-16:00 **Coffee Break**

16:00-17:15 **Oral Session 6**

### 3D Vision

**Chairs:** *Yung-Yu Chuang (National Taiwan University) and Tyng-Luh Liu (Academia Sinica)*

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O6-01 Divide and Conquer: Efficient Density-Based Tracking of 3D Sensors in Manhattan Worlds, *Yi Zhou, The Australian National University / The Australian Centre for Robotic Vision; Laurent Kneip, Australian National University / The Australian Centre for Robotic Vision; Cristian Rodriguez, The Australian National University / Australian Centre for Robotic Vision; Hongdong Li, The Australian National University / Australian Centre for Robotic Vision*

- 06-02 Visual Saliency Detection for RGB-D Images with Generative Model, *Song-Tao Wang, Harbin University of Science & Technology and Beijing Academy of Science and Technology; Zhen Zhou, Harbin University of Science & Technology; Han-Bing Qu, Beijing Academy of Science and Technology; Bin Li, Beijing Academy of Science and Technology*
- 06-03 A Coarse-to-Fine Indoor Layout Estimation (CFILE) Method, *Yuzhuo Ren, University of Southern California; Shangwen Li, University of Southern California; Chen Chen, University of Southern California; C.-C. Jay Kuo, University of Southern California*
- 06-04 Unifying Algebraic Solvers for Scaled Euclidean Registration from Point, Line and Plane Constraints, *Folker Wientapper, Fraunhofer IGD; Arjan Kuijper, TU Darmstadt*
- 06-05 Generalized Fusion Moves for Continuous Label Optimization, *Christopher Zach, Toshiba Research Europe*

## Demo and Exhibition

**Location:** ROOM 201, TICC

**Time:** 13:30 – 15:30, November 21-23

- D1. Stereo Depth based Human Detection and Tracking for Queue Analysis, by *Csaba Beleznai (AIT Austrian Institute of Technology GmbH)*
- D2. Component-Based Distributed Framework for Coherent and Real-Time Video Dehazing, by *Meihua Wang, Jiaming Mai, Yun Liang (South China Agricultural University), Tom Z. J. Fu, Zhenjie Zhang (Advanced Digital Sciences Center) and Ruichu Cai (Guangdong University of Technology)*
- D3. Based on 3D Trajectory Projection Object Grouping and Classification for Video Synopsis, by *Jing-Ming Guo and Yu-Da Lin (National Taiwan University of Science and Technology)*
- D4. Recognition from Hand Cameras: A Revisit with Deep Learning, by *Cheng-Sheng Chan, Ting-An Chien, Tz-Ying Wu and Min Sun (National Tsing Hua University)*
- D5. Visual-Inertial Ego-Positioning for Flying Cameras, by *Meng-Hsun Chou, Hsin-Ruey Tsai, Qiao Liang, Tian-Yi Shen, Kuan-Wen Chen and Yi-Ping Hung (Nation Taiwan University)*
- D6. Deep Learning of Facial Attributes, by *Yan-Xiang Chen, Cheng-Hua Hsieh, Hung-Cheng Shie and Gee-Sern Jison Hsu (National Taiwan University of Science and Technology)*
- D7. LRP — A General Tool to Explain Predictions of Deep Neural Networks, by *Wojciech Samek and Alexander Binder (Fraunhofer Heinrich Hertz Institute)*



## W06: Discrete Geometry and Mathematical Morphology for Computer Vision

**Organizers:** *Jean Cousty*

*Yukiko Kenmochi*

*Akihiro Sugimoto*

**Location:** 201A

### Schedule:

08:40 **Opening**

08:45 **Invited Talk:** Digital Distance Functions:  
Recent Advances in Theory and  
Applications, *Robin Strand*

09:35 **Break**

09:40 Discrete Polynomial Curve Fitting  
Guaranteeing Inclusion-wise Maximality  
of Inlier Set, *Fumiki Sekiya and Akihiro  
Sugimoto*

10:05 A Discrete Approach for Decomposing  
Noisy Digital Contours into Arcs and  
Segment, *Phuc Ngo, Hayat Nasser, and  
Isabelle Debled-Rennesson*

10:30 **Coffee Break**

11:00 **Invited Talk:** Skeletonization and Its  
Application to Quantitative Morphometry,  
*Punam Sara*

11:50 **Lunch Break**

13:30 **Invited Talk:** Analysis of Complex  
Material Structure from 3D Images Using  
Discrete Morse Theory and Persistent  
Homology, *Adrian Sheppard*

14:20 **Coffee Break**

14:25 Mathematical Morphology on Irregularly  
Sampled Signals, *Teo Asplund, Cris L.  
Luengo Hendriks, Matthew J. Thurley and  
Robin Strand*

14:50 Adaptive Moving Shadows Detection  
Using Local Neighboring Information,  
*Bingshu Wang, Yule Yuan, Yong Zhao and  
Wenbin Zou*

15:15 **Closing**



## W18: Mathematical and Computational Methods in Biomedical Imaging and Image Analysis

**Organizers:** *Atsushi Imiya*

*Xiaoyi Jiang*

*Hidetaka Hontani*

**Location:** 201F

**Schedule:**

08:50 **Opening**

09:00 Cell lineage Tree Reconstruction from Time Series of 3D Images of Zebrafish Embryogenesis, *Robert Spir, Karol Mikula, Nadine Peyrieras*

09:20 Binary Pattern Dictionary Learning for Gene Expression Representation in Drosophila Imaginal Discs, *Jiri Borovec, Jan Kybic*

09:40 T-Test based Adaptive Random Walk Segmentation under Multiplicative Speckle Noise Model, *Ang Bian, Xiaoyi Jiang*

10:00 Langerhans Islet Volume Estimation from 3D Optical Projection Tomography, *Jan Svihlik, Jan Kybic, Jiri Dvorak, David Habart, Hanna Hlushak, Barbora Radochova*

10:20 Level Set Segmentation of Brain Matter using a Trans-Roto-Scale Invariant High Dimensional Feature, *Naveen Sai Madiraju, Amarjot Singh, Sn Omkar*

10:40 **Coffee Break**

11:00 Discriminative Subtree Selection for NBI Endoscopic Image Labeling, *Tsubasa Hirakawa, Toru Tamaki, Takio Kurita, Bisser Raytchev, Kazufumi Kaneda, Chaohui Wang, Laurent Najman, Tetsushi Koide, Shigeto Yoshida, Hiroshi Mieno, Shinji Tanaka*

11:20 Modelling Respiration Induced Torso Deformation using a Mesh Fitting Algorithm, *Haobo Yu, Harvey Ho, Adam Bartlett, Peter Hunter*

11:40 **Lunch Break**

13:40 Segmentation of Trabecular Bone for In Vivo CT Imaging Using a Novel Approach of Computing Spatial Variation in Bone and Marrow Intensities, *Cheng Chen, Dakai Jin, Xiaoliu Zhang, Steven Levy, Punam Saha*

14:00 Approximation of N-Way Principal Component Analysis for Organ Data, *Hayato Itoh, Atsushi Imiya, Tomoya Saka*

14:20 Bayesian Saliency Model for Focal Liver Lesion Enhancement and Detection, *Xian-Hua Han, Jian Wang, Yuu Konno, Yen-Wei Chen*

14:40 A Novel Iterative Method for Airway Tree Segmentation from CT Imaging using Multiscale Leakage Detection, *Syed Ahmed Nadeem, Dakai Jin, Eric A. Hoffman, Punam K. Saha*

15:00 **Coffee Break**

15:30 Rapid Analytic Optimization of Quadratic ICP Algorithms, *Leonid German, Jens R. Ziehn, Bodo Rosenhahn*

15:50 Segmentation of Partially Overlapping Convex Objects using Branch and Bound Algorithm, *Sahar Zafari, Tuomas Eerola, Jouni Sampo, Heikki Kälviäinen, Heikki Haario*

16:10 Classification of Lung Nodule Malignancy Risk on Computed Tomography Images using Convolutional Neural Network: A Comparison between 2D and 3D Strategies, *Xingjian Yan, Jianing Pang, Hang Qi, Yixin Zhu, Chunxue Bai, Xin Geng, Mina Liu, Demetri Terzopoulos, Xiaowei Ding*

16:30 A Hybrid Convolutional Neural Network for Plankton Classification, *Jialun Dai, Zhibin Yu, Haiyong Zheng, Bing Zheng, Nan Wang*

16:50 **Award Ceremony and Closing**

## W07: International Workshop on Driver Drowsiness Detection from Video

**Organizers:** *Chen-Kuo Chiang*  
*Shang-Hong Lai*  
*Michel Sarkis*

**Location:** 201C

### Schedule:

#### 09:00 Opening & Ceremony of Challenge Session

09:10 **Invited Talk:** Deep Monitoring Facial and head Movements for Drowsy Detection, *Chang D. Yoo (KAIST)*

10:10 Driver Drowsiness Detection via a Hierarchical Temporal Deep Belief Network, *Jennifer Wung, Ying-Hsiu Lai, Shang-Hong Lai*

#### 10:30 Coffee Break

11:00 Detection of Driver Drowsiness Using 3D Deep Neural Network and Semi-supervised Gradient Boosting Machine, *Xuan-Phung Huynh, Sang-Min Park, Yong-Guk Kim*

11:15 MSTN: Multistage Spatial-Temporal Network for Driver Drowsiness Detection, *Tun-Huai Shih, Chiou-Ting Hsu*

11:30 Driver Drowsiness Detection System Based on Feature Representation Learning Using Various Deep Networks, *Sanghyuk Park, Fei Pan, Sunghun Kang, Chang D. Yoo*

11:45 Representation Learning, Scene Understanding and Feature Fusion for Drowsiness Detection, *Jongmin Yu, Sangwoo Park, Sangwook Lee, Moongu Jeon*

12:00 Joint Shape and Local Appearance Features for Real-Time Driver Drowsiness Detection, *Jie Lyu, Hui Zhang, Zejian Yuan*

#### 12:15 Closing

## W15: Meeting HCI with CV

**Organizers:** *Liwei Chan*  
*Yi-Ping Hung*

**Location:** 101C

### Schedule:

#### 09:00 Opening

09:10 **Invited Talk:** Using Vision Sensors for Innovative HCI, *Hideki Koike (Tokyo Institute of Technology)*

#### 10:00 Coffee Break

10:10 3D Pose Estimation of a Front-pointing Hand using a Random Regression Forest, *Dai Fujita and Takashi Komuro*

10:25 A Fingertips Tracking Algorithm for Guitarist based on Temporal Grouping and Pattern Analysis, *Zhao Wang and Jun Ohya*

#### 10:40 Break and Demo

11:20 Intuitive Pointing Position Estimation for Large Scale Display Interaction in Top-view Depth Images, *Hyemi Kim, Daehwan Kim, Yongsun Kim and Ki-Hong Kim*

11:35 Investigate Size Personalization for More Accurate Eye Tracking Glasses, *Yi-Yu Hsieh, Chia-Chen Liu, Wei-Lin Wang and Jen-Hui Chuang*

11:50 HeadPager: Page Turning with Computer Vision based Head Interaction, *Zhenyu Tang, Chenyu Yan, Sijie Ren and Huagen Wan*

12:05 Exploring Manipulation Behavior on Video See-Through Head-Mounted Display with View Interpolation, *Chun-Jui Lai, Ping-Hsuan Han, Han-Lei Wang and Yi-Ping Hung*

#### 12:20 Closing

## W16: Human Identification for Surveillance (HIS): Methods & Applications

**Organizers:** *Wei-Shi Zheng*  
*Ruiping Wang*  
*Weihong Deng,*  
*Shenghua Gao*

**Location:** 101D

### Schedule:

#### 08:35 Opening

08:40 **Invited Talk:** *Wen-Huang Cheng*  
*(Academia Sinica, Taiwan), Chen-Change*  
*Loy (Chinese University of Hong Kong)*

09:10 Multi-cue Information Fusion for Two-layer Activity Recognition, *Yanli Ji, Jiaming Li, Hong Cheng, Xing Xu, Jingkuan Song*

09:25 Piecewise Video Condensation for Complex Scenes, *Yingying Chen, La Zhang, jinqiao Wang, Hanqing Lu*

09:40 Unsupervised Person Re-identification via Graph-Structured Image Matching, *Bolei Xu, Guoping Qiu*

10:00 **Invited Talk:** *Chen-Change Loy (Chinese University of Hong Kong)*

#### 10:30 Coffee Break

10:45 Saliency-Based Person Re-Identification by Probability Histogram, *Zhang Zongyan, Cairong Zhao*

11:00 Gait Gate: An Online Walk-through Multimodal Biometric Verification System using a Single RGB-D Sensor, *Mohamed Hasan, Yasushi Makiyara, Daigo Muramatsu, Yasushi Yagi*

11:15 3D Object Recognition with Enhanced Grassmann Discriminant Analysis, *Lincon Souza, Kazuhiro Fukui, Hideitsu Hino*

11:30 An Extended Sparse Classification Framework for Domain Adaptation in Video Surveillance, *Farshad Nourbakhsh, Eric granger, Giorgio Fumera*

11:45 BCP-BCS: Best-Fit Cascaded Matching Paradigm with Cohort Selection using Bezier Curve for Individual Recognition, *Jogendra Garain, Adarsh Shah, Ravi Kumar, Dakshina Kisku, Goutam Sanyal*

#### 12:00 Closing

## W04: Benchmark and Evaluation of Surveillance Task (BEST)

**Organizers:** Xiaokang Yang  
Chong-Yang Zhang  
Bingbing Ni  
Lin Mei

**Location:** 101D

### Schedule:

13:35 **Opening**

13:40 BEST: Benchmark and Evaluation of Surveillance Task, Chongyang Zhang, Bingbing Ni, Li Song, Guangtao Zhai, Xiaokang Yang, Wenjun Zhang

14:00 Multiple-shot Person Re-identification via Riemannian Discriminative Learning, Yuheng Lu, Ruiping Wang, Shiguang Shan, Xilin Chen

14:20 Visually Similar K-poselets Based Human Pose Recognition, Shoucheng Ni, Weiwei Liu, Hao Cheng, Chongyang Zhang

14:40 Public Security Video and Image Analysis Challenge: A Retrospective, Gengjian Xue, Wenfei Wang, Jie Shao, Chen Liang, Jinjing Wu, Hui Yang, Xiaoteng Zhang, Lin Mei, Chuanping Hu

15:00 **Coffee Break**

15:30 Multiple-Branched Faster RCNN for Human Parts Detection and Pose Estimation, Kaiqiang Wei, Xu Zhao

15:50 SPID: Surveillance Pedestrian Image Dataset and Performance Evaluation for Pedestrian Detection, Dan Wang, Chongyang Zhang, Hao Cheng, Yanfeng Shang, Lin Mei

16:10 Actions Recognition in Crowd Based on Coarse-to-Fine Multi-Object Tracking, Sixue Gong, Hu Han, Shiguang Shan, Xilin Chen

16:30 Multi-view Multi-exposure Image Fusion Based on Random Walks model, Xiao Xue, Yue Zhou

16:50 Attributes and Action Recognition Based on Convolutional Neural Networks and Spatial Pyramid VLAD Encoding, Shiyang Yan, Jeremy S. Smith, Bailing Zhang

17:10 **Closing**

## W12: The Third Workshop on Computer Vision for Affective Computing (CV4AC)

**Organizers:** *Abhinav Dhall*  
*Roland Goecke*  
*O.V. Ramana Murthy*  
*Jesse Hoey*  
*Nicu Sebe*

**Location:** 201C

### Schedule:

#### 13:30 Opening

13:40 **Keynote Talk:** From Facial Expression Recognition to Interpersonal Relation Prediction, *Prof. Chen Change Loy, Chinese University of Hong Kong*

14:40 **Invited Talk:** Modeling Stylized Character Expressions via Deep Learning, *Deepali Aneja, Alex Colburn, Gary Faigin, Linda Shapiro and Barbara Mones*

#### 15:00 Coffee Break

15:30 Expression Recognition with Ri-HOG Cascade, *Jinhui Chen, Zhaojie Luo, Tetsuya Takiguchi, and Yasuo Arik*

15:50 The LFW-gender Dataset, *Ahsan Jalal and Usman Tariq*

16:10 **Invited Talk:** Cost-sensitive Two-stage Depression Prediction using Dynamic Visual Clues, *Xingchen Ma, Di Huang, Yunhong Wang and Yiding Wang*

16:30 Thermal Imaging Based Elderly Fall Detection, *Somasundaram Vadivelu, Sudakshin Ganesan, O.V. Ramana Murthy and Abhinav Dhall*

16:50 **Invited Talk:** Facial Expression-Aware Face Frontalization, *Yiming Wang, Hui Yu, Junyu Dong and Honghai Liu*

#### 17:10 Closing

## W17: Workshop on Interpretation and Visualization of Deep Neural Nets

**Organizers:** *Alexander Binder*  
*Wojciech Samek*

**Location:** 101C

### Schedule:

#### 13:30 Opening + Introductory Talk

Interpretation and Visualization of Deep Neural Nets, *Alexander Binder*

13:50 Multi-Scale Hierarchy Deep Feature Aggregation for Compact Image Representations, *Zhenbing Zhao, Guozhi Xu, Yincheng Qi*

14:10 Glance and Glimpse Network: a Stochastic Attention Model Driven by Class Saliency, *Mingming Li, Shuzhi Sam Ge, Tong Heng Lee*

14:30 **Invited Talk:** Towards Better Analysis of Deep Convolutional Neural Networks, *Shixia Liu (Tsinghua University)*

#### 15:00 Coffee Break

15:30 Fine-tuning Deep Neural Networks in Continuous Learning Scenarios, *Christoph Käding, Erik Rodner, Alexander Freytag, Joachim Denzler*

15:50 Dense Residual Pyramid Networks for Salient Object Detection, *Ziqin Wang, Peilin Jiang, Fei Wang*

16:10 Quantitative Analysis of a Bioplausible Model of Misperception of Slope in the Café Wall Illusion, *Nasim Nematzadeh, David M. W. Powers, Trent Lewis*

16:30 Image Patch Matching Using Convolutional Descriptors with Euclidean Distance, *Iaroslav Melekhov, Juho Kannala, Esa Rahtu*

#### 16:50 Closing

### T03: Fitting Ellipse and Computing Fundamental Matrix and Homography

**Organizer:** Kenichi Kanatani

**Time:** 09:00 - 12:20

**Location:** 201D

**Description:** Computational techniques for ellipse fitting, fundamental matrix computation, and homography computation have extensively been studied since the 1980s, but significant progress was made only in the 2010s. This lecture introduces the latest state of the art. The talk is based on two recent books of the lecturer:

[1] K. Kanatani, Y. Sugaya, and Y. Kanazawa, *Ellipse Fitting for Computer Vision: Implementation and Applications*, Morgan & Claypool, 2016.

[2] K. Kanatani, Y. Sugaya, and Y. Kanazawa, *Guide to 3D Vision Computation: Geometric Analysis and Implementation*, Springer, to appear.

### T05: Large-scale 3D Reconstruction from Images

**Organizers:** Long Quan

Tian Fang

Tianwei Shen

**Time:** 09:00 - 12:30

**Location:** 101A

**Description:** Modeling the world from 2D images has long been a hot topic in computer vision research over the years. With the aid of ubiquitous mobile computing and unmanned aerial vehicles (UAVs), the image capturing process has never been easier. As a result, the scale of 3D reconstruction has increasingly become large due to the advent of big data era. This tutorial covers a wide range of topics regarding large-scale 3D reconstruction, and will be basically composed of two parts. The first focus is in the large-scale Structure-from-Motion (SfM) problem. A brief overview will be firstly presented about the prerequisite knowledge in multi-view geometry. Then we will discuss about the recent trend of optimizing match graph and robust optimization methods in large-scale SfM. The second part of this tutorial addresses the issues in large-scale multi-view stereo (MVS), with the focus of a state-of-the-art large-scale 3D reconstruction pipeline Altizure. Lessons can be learned both in terms of the state-of-the-art SfM and MVS techniques, as well as large-scale system design.



**T06: Mathematics of Deep Learning****Organizer:** *Raja Giryes***Time:** 08:45 - 12:30**Location:** 101B

**Description:** In the past five years there have seen a dramatic increase in the performance of recognition systems due to the introduction of deep neural networks for feature learning and classification. However, the theoretical foundation for this success remain elusive. This tutorial will present some of the theoretical results developed for deep neural networks that aim to provide a mathematical justification for properties such as the approximation capabilities, convergence, global optimality, invariance, stability of the learned representations, generalization error, etc. In addition, it will discuss the implication of the developed theory on practical training of neural networks.

The tutorial will start with the theory for neural networks from the early 90s (including the well-known results of Hornik et. al. and Cybenko). Then it will move to the recent theoretical findings established for deep learning in the past five year. The practical considerations that follow from the theory will be also discussed.

**T04: Deep Learning for Vision-guided Language and Image Generation****Organizers:** *MingYu Liu**Min Sun***Time:** 14:00 - 17:00**Location:** 101B

**Description:** We will introduce the standard deep learning model such as CNN and RNN. The introduction will include: a brief history of the development of both models, their model architectures and intuition, training methods and tips for learning a good model. Then, we will focus on introducing the latest advanced in (1) deep learning for vision and language: image captioning, image question answering, video captioning, video title generation, video question answering, etc., and (2) deep learning for image generation by highlighting the generative adversarial network.



## T08: Multi-view Geometry for Rolling Shutter Camera

**Organizers:** *Yuchao Dai*  
*Hongdong Li*  
*Laurent Kneip*

**Time:** 13:30 - 17:00

**Location:** 101A

**Description:** Rolling-Shutter CMOS cameras are getting more and more popularly used in real-world computer vision applications due to their low cost and simplicity in design. To use these cameras in 3D geometric computer vision tasks (such as 3D reconstruction, object pose, visual SLAM), the rolling shutter effect must be carefully accounted for. Simply ignoring this effect and relying on a global shutter method may lead to erroneous, undesirable and distorted results as reported in previous work. Recently, many classic 3D vision algorithms have been adapted to the rolling shutter case (such as absolute pose, bundle adjustment, relative pose, and stereo rectification).

In this tutorial, we will give a clear classification of all the multi-view geometry problems for rolling shutter camera, namely absolute pose, relative pose, stereo, triangulation, bundle adjustment, degenerate cases and etc. We will further relate the rolling shutter camera models with other non-conventional cameras such as push-broom camera, multi-camera system, X-slit camera, axis-camera, Lidar and etc. Build upon this pipeline, we will demonstrate how the rolling shutter multi-view geometry contributes to real world visual odometry, SLAM and large scale structure-from-motion.

## T10: Continuous User Authentication on Mobile Devices

**Organizer:** *Vishal M. Patel*

**Time:** 13:30 - 17:00

**Location:** 201D

**Description:** Recent developments in sensing and communication technologies have led to an explosion in the use of mobile devices such as smartphones and tablets. With the increase in use of mobile devices, one has to constantly worry about the security and privacy as the loss of a mobile device would compromise personal information of the user. To deal with this problem, continuous authentication (also known as active authentication) systems have been proposed in which users are continuously monitored after the initial access to the mobile device. This tutorial will provide an overview of different continuous authentication methods on mobile devices. We will discuss merits and drawbacks of available approaches and identify promising avenues of research in this rapidly evolving field. The tutorial should prove valuable to security and biometrics experts, exposing them to opportunities provided by continuous authentication approaches. It should also prove beneficial to experts in computer vision and signal processing, introducing them to a different tool with very interesting research problems.