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PROCEEDINGS

Imaging and Multimedia Analytics in a Web and Mobile World 2021

Editors: **Jan P. Allebach**, Purdue Univ. (United States),
Zhigang Fan, Apple Inc. (United States), and
Qian Lin, HP Labs, HP Inc. (United States)

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Imaging and Multimedia Analytics in a Web and Mobile World 2021

Conference overview

Recent progress at the intersection of deep learning and imaging has created a new wave of interest in imaging and multimedia analytics topics, from social media sharing to augmented reality, from food and nutrition to health surveillance, from remote sensing and agriculture to wildlife and environment monitoring. Compared to many subjects in traditional imaging, these topics are more multi-disciplinary in nature. This conference will provide a forum for researchers and engineers from various related areas, both academic and industrial, to exchange ideas and share research results in this rapidly evolving field.

Paper authors listed as of 1 January 2021; refer to manuscript for final authors. Titles that are not listed with the proceedings files were presentation-only.

Imaging and Multimedia Analytics in a Web and Mobile World 2021

TUESDAY 19 JANUARY 2021

PLENARY: DEEP INTERNAL LEARNING—DEEP LEARNING WITH ZERO EXAMPLES

Session Chair: Charles Bouman, Purdue University (United States)
10:00 – 11:10

Deep internal learning—Deep learning with zero examples
Michal Irani, *professor, Department of Computer Science and Applied Mathematics, Weizmann Institute of Science (Israel)*

Michal Irani is a professor at the Weizmann Institute of Science. Her research interests include computer vision, AI, and deep learning. Irani's prizes and honors include the Maria Petrou Prize (2016), the Helmholtz "Test of Time Award" (2017), the Landau Prize in AI (2019), and the Rothschild Prize in Mathematics and Computer Science (2020). She also received the ECCV Best Paper Awards (2000 and 2002), and the Marr Prize Honorable Mention (2001 and 2005).

THURSDAY 21 JANUARY 2021

PLENARY: THE DEVELOPMENT OF INTEGRAL COLOR IMAGE SENSORS AND CAMERAS

Session Chair: Jonathan B. Phillips, Google Inc. (United States)
10:00 – 11:10

The development of integral color image sensors and cameras
Kenneth A. Parulski, *expert consultant: mobile imaging (United States)*

Kenneth Parulski is an expert consultant to mobile imaging companies and leads the development of ISO standards for digital photography. He joined Kodak in 1980 after graduating from MIT and retired in 2012 as research fellow and chief scientist in Kodak's digital photography division. His work has been recognized with a Technical Emmy and other major awards. Parulski is a SMPTE fellow and an inventor on more than 225 US patents.

MONDAY 25 JANUARY 2021

PLENARY: MAKING INVISIBLE VISIBLE

Session Chair: Jonathan B. Phillips, Google Inc. (United States)
10:00 – 11:10

Making invisible visible
Ramesh Raskar, *associate professor, MIT Media Lab (United States)*

Ramesh Raskar is an associate professor at MIT Media Lab and directs the Camera Culture research group. His focus is on AI and imaging for health and sustainability. They span research in physical (e.g., sensors, health-tech), digital (e.g., automated and privacy-aware machine learning), and global (e.g., geomaps, autonomous mobility) domains. He received the Lemelson Award (2016), ACM SIGGRAPH Achievement Award (2017), DARPA Young Faculty Award (2009), Alfred P. Sloan Research Fellowship (2009), TR100 Award from MIT Technology Review (2004), and Global Indus Technovator Award (2003). He has worked on special research projects at Google [X] and Facebook and co-founded/advised several companies.

TUESDAY 26 JANUARY 2021

DEEP LEARNING DETECTION

Moderator: Zhigang Fan, Apple Inc. (United States) / **Session Chair:** Qian Lin, HP Labs, HP Inc. (United States)
18:15 – 19:15

18:15 IMAWM-231
Efficient, domain enriched deep learning for mobile image enhancement, *Vishal Monga, Pennsylvania State University (United States)*

18:35 IMAWM-232
Turkey behavior identification system with a GUI using deep learning and video analytics, *Shengtai Ju, Sneha Mahapatra, Marisa Erasmus, Amy Reibman, and Fengqing Zhu, Purdue University (United States)*

18:55 IMAWM-233
Real-time detection of early drowsiness using convolution neural networks, *Chinh Tran and Nader Namazi, The Catholic University of America (United States)*

CONFERENCE DEMONSTRATION

19:15 – 19:45

IMAWM-233D
IMAWM DEMO: "Real-time detection of early drowsiness using convolution neural networks", *Chinh Tran and Nader Namazi, The Catholic University of America (United States)*

In the IMAWM demo, following up the oral presentation of the same title, Chinh Tran will demonstrate a system for detecting levels of drowsiness in a real-time video stream. A camera is set up for observing the symptoms of drowsiness such as yawning, eye blinking, etc. The system then counts the number of yawning and eye blinking, according to this count the system will decide the level of drowsiness.

WEDNESDAY 27 JANUARY 2021

PLENARY: REVEALING THE INVISIBLE TO MACHINES WITH NEUROMORPHIC VISION SYSTEMS: TECHNOLOGY AND APPLICATIONS OVERVIEW

Session Chair: Radka Tezaur, Intel Corporation (United States)
10:00 – 11:10

Revealing the invisible to machines with neuromorphic vision systems: Technology and applications overview
Luca Verre, *CEO and cc-founder, Prophesee (France)*

Luca Verre is cc-founder and CEO of Prophesee, the inventor of the world's most advanced neuromorphic vision systems. Verre is a World Economic Forum technology pioneer. His experience includes project and product management, marketing, and business development roles at Schneider Electric. Prior to Schneider Electric, Verre worked as a research assistant in photonics at the Imperial College of London. Verre holds a MSc in physics, electronic and industrial engineering from Politecnico di Milano and Ecole Centrale and an MBA from Institut Européen d'Administration des Affaires, INSEAD.

DEEP LEARNING: HEALTH CARE SYSTEMS

Moderator: Zhigang Fan, Apple Inc. (United States) / **Session Chair:** Jochen Meyer, OFFIS Institute for Information Technology (Germany)
11:40 – 13:00

11:40 IMAWM-267
Remote estimation of respiration rate by optical flow using convolutional neural networks, *Tianqi Guo[1], Qian Lin[2], and Jan Allebach[1]; [1]Purdue University and [2]HP Labs, HP Inc. (United States)*

12:00 IMAWM-268
Robust real-time heart rate measurement from face videos, *Yang Cheng[1], Qian Lin[2], and Jan Allebach[1]; [1]Purdue University and [2]HP Labs, HP Inc. (United States)*

12:20 IMAWM-269
Bed exit detection network (BED net) for patients bed-exit monitoring based on color camera images, *Fan Bu[1,2], Qian Lin[2], and Jan Allebach[1]; [1]Purdue University and [2]HP Labs, HP Inc. (United States)*

12:40 IMAWM-270
Long term self-tracking of personal health, *Jochen Meyer, OFFIS - Institute for IT (Germany)*

MULTIMEDIA ANALYSIS I

Moderator: Qian Lin, HP Labs, HP Inc. (United States) / **Session Chair:** Zhigang Fan, Apple Inc. (United States)
13:30 – 14:30

13:30 IMAWM-279
Visual document tracking and blockchain technologies in mobile world, *Mohamed Allouche, Marina Ljubojevic, and Mihai Mitrea, Institut Mines-Telecom (France)*

13:50 IMAWM-280
Interactive 3D modeling with virtual reality, *Xunyu Pan and Andrew Haberkorn, Frostburg State University (United States)*

14:10 IMAWM-281
Industrial defect detection by comparison with reference 3D CAD model, *Deangeli Neves[1], Guilherme Megetc[1], Augusto Valente[1], and Qian Lin[2]; [1]Eldorado Research Institute (Brazil) and [2]HP Labs, HP Inc. (United States)*

MULTIMEDIA ANALYSIS II

Moderator: Raja Bala, Palo Alto Research Center Incorporated (United States) / **Session Chair:** Jan Allebach, Purdue University (United States)
18:15 – 19:15

18:15 IMAWM-282
Computer vision on the edge of the open sea, *Matthew Shreve, Eric Cocker, Julie Bert, Vijay Kumar, and Raja Bala, Palo Alto Research Center Incorporated (United States)*

18:35 IMAWM-283
Practical automatic thumbnail generation for short videos, *Bin Shen, Nikil Pancha, Andrew Zhai, and Charles Rosenberg, Pinterest Labs (United States)*

18:55 IMAWM-284
Computer vision for mobile autonomous robots in multi-scale dynamic environments, *Bob Price[1], Kent Evans[1], Gaurang Gavai[1], Hiroshi Shinji[2], Eugene Bart[1], and Raja Bala[1]; [1]PARC (United States) and [2]Kabushiki Kaisha Meidensha (Japan)*

MULTIMEDIA FOR DIET APPLICATIONS

Moderator: Jan Allebach, Purdue University (United States) / **Session Chair:** Fengqing Zhu, Purdue University (United States)
19:45 – 20:45

19:45 IMAWM-285
An end-to-end food image analysis system, *Jiangpeng He[1], Runyu Mao[1], Zeman Shao[1], Janine Wright[2], Deborah Kerr[2], Carol Boushey[3], and Fengqing Zhu[1]; [1]Purdue University (United States), [2]Curtin University (Australia), and [3]University of Hawaii Cancer Center (United States)*

20:05 IMAWM-286
Improving food detection for images from a wearable egocentric camera, *Yue Han[1], Sri Kalyan Yarlagadda[1], Tonmoy Ghosh[2], Fengqing Zhu[1], Edward Sazonov[2], and Edward Delp[1]; [1]Purdue University and [2]The University of Alabama (United States)*

20:25 IMAWM-287
Informing food image identification with the most frequently consumed and the largest energy contributing food subcategories among U.S. insulin takers in NHANES 2009–2016, *Luotao Lin, Fengqing Zhu, and Heather Eicher-Miller, Purdue University (United States)*