
Foreword

Special Issue on Computer Vision, Graphics, And Image Processing

This special issue is devoted to papers presented at the 33rd IPPR Conference on Computer Vision, Graphics, And Image Processing (CVGIP 2020), held in National Chiao Tung University, Taiwan, August 16-18, 2021. The special issue of IPPR CVGIP Conference 2020 discusses the contemporary technologies on Computer Vision, Graphics, Image Processing, Pattern Recognition, Video Processing, and applications. Moreover, it covers an extensive landscape of the research topics:

- Computer Vision
 - Scene Analysis
 - Camera Calibration
 - Motion Analysis
 - 3D Reconstruction
 - Vision-based Surveillance
 - Vision Interface
 - Image Processing
 - Document Image Processing
 - Medical Image Processing
 - Remote Image Processing
 - Image/Video Watermarking
 - Super-resolution
 - Computer Graphics
 - Rendering
 - 3D Modeling
 - Visualization
 - Animation
 - Human-Computer Interaction
 - Augmented Reality / Virtual Reality
 - Pattern recognition
 - Face Detection & Recognition
 - Facial Expression Recognition
 - Gesture Recognition
 - Behavior Recognition
 - Video Processing
 - Video Object Segmentation
 - Video Object Tracking
 - Video Content Analysis
 - Video Indexing and Retrieval
 - Compression and Transmission of Videos
 - Video Adaptation
 - Video Networking
 - Applications and Systems
 - Industrial Visual Inspection
 - Robotic Vision
 - Intelligent Transportation System
 - Multimedia Communication Network
 - Digital Signal Processing
 - Multimedia SoC
 - Biomedical Application
 - Multimedia Security and Forensics
 - Multimedia in education
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Though many excellent contributions from over 500 authors are received, around 150 papers are accepted in CVGIP 2020 under rigorous review. Among them, five remarkable papers selected from the conferences have been recommended for submission and publication in this special issue of Journal of Information Science and Engineering (JISE). In this way, it is expected to build upon a proper environment to disseminate knowledge and allow state-of-the-art concepts to be further developed and enhanced.

The paper "Radar Automatic Target Recognition Based on Real-Life HRRP of Ship Target by Using Convolutional Neural Network" by Tsung-Pin Chen, Chih-Lung Lin, Kuo-Chin Fan, Wan-Yu Lin, and Chiao-Wen Kao constructs a ship radar HRRP(High-resolution range profile) dataset with the radar and AIS(automatic identification system) and proposes a CNN-based ship target recognition approach experimenting with this dataset. A novel two-dimensional binary-map HRRP data format is presented to achieve better recognition performance than the other state-of-the-art methods. The high accuracy and feasibility of this system could be extended to coastal surveillance and military radar automatic target recognition task.

The paper "Using a Region Growth Algorithm and Deep Reinforcement Learning for Detecting Breast Arterial Calcification in Mammograms" by Jinn-Yi Yeh, Sheng-You Wu and Siwa Chan applied a deep reinforcement learning (RL) network to construct a computer-aided diagnosis system for automatically detecting BAC (breast arterial calcification) in mammograms. The agent can iteratively shrink the initial bounding box, and a proper feature is learned to determine the following action, such as transforming or scaling the current bounding box or triggering the end of the search process. From the experimental results, the proposed system can assist radiologists in making preliminary auxiliary judgments and improve the diagnosis accuracy as well as efficiency.

The paper "Successive Multitask GAN for Age Progression and Regression" by Rui-Cang Xie, Zhi-Ting Chen, and Gee-Sern (Jison) Hsu proposes the SM-GAN (Successive Multitask GAN) to deal with unpaired age progression and regression problem. A multitask discriminator is included in GAN to distinguish fake from real images and classifies the identity and age of the real and generated images. In this way, better age traits can be generated. Experimental results also demonstrated the performance for facial age progression/regression with identity preservation and robustness against cluttered backgrounds.

The paper "Contactless Deception Detection System with Hybrid Facial Features" by Jing-Ming Guo, Chih-Hsien Hsia, Li-Wei Hsiao, and Chen-Chieh

Yao introduces a facial deception detection system based on visual clues. To achieve this goal, various useful features such as action unit features and geometrical features are extracted first and then integrated by Sequential Forward Floating Selection (SFFS). Finally, the Support Vector Machine (SVM) is applied for classification. Experimental results demonstrate the proposed method can be robust against factors such as illumination changes, various head poses, and facial sheltering.

The paper "Design of a Lightweight Palmf-Vein Authentication System Based on Model Compression" by Zih-Ching Chen, Sin-Ye Jhong, and Chin-Hsien Hsia proposes a lightweight MobileNet for Palm-vein authentication. MobileNet is based on depthwise separable convolution (DSC), which can reduce the number of model parameters. Besides, the knowledge distillation (KD) method is adopted to condense the knowledge from a complex CNN network to a simpler and more effective one. The results show that the proposed lightweight MobileNet can achieve both competitive accuracy and high speed.

• Introduction to Guest Editors •



Ching-Chun Huang received the Ph.D. degree in Electronics Engineering from National Chiao Tung University, Hsinchu, Taiwan, in Sept. 2010. He then worked for Largon Precision Co., Ltd. as a senior engineer. After gaining profound practical experiences, he started to devote himself to academia and been dedicated to the research of computer vision, image/video processing, multimedia, and their applications. From 2010 to 2014, he was an Assistant Professor at the Department of Electronics Engineering, National Kaohsiung University of Science and Technology. Then, he joined the Department of Electronics Engineering, National Chung Cheng University as an Associate Professor. For the past two years, he has been in the Department of Computer Science, National Yang Ming Chiao Tung University as an Associate Professor.

His research mainly focuses on (1) Smart Transportation System; (2) Smart Building; (3) 3D Behavior Analysis and AR/VR (4) Image Analysis and its applications. In the past five years, he has published over 100 research works in international conference, international journal, and patents. He has been the

reviewer of JISE, IEEE TIP, IEEE TCSVT, IEEE TMM, IEEE ACCESS, Eurasip Journal on Advances in Signal Processing, ACM MM, IEEE ICIP, ICME, ICASSP, and VCIP. He was also awarded the outstanding Area Chair of IEEE Circuits and System Society in 2018 and was invited as Session Chair of the 11th IEEE Vehicular Technology Society Asia Pacific Wireless Communications Symposium (IEEE VTS APWCS), Keynote Speaker of International Conference on Multimedia Analysis and Pattern Recognition (MAPR) 2019, Session Chair of IEEE International Conference On Consumer Electronics - Taiwan (IEEE 2020 ICCE-TW), and Area Chair of IEEE International Conference on Multimedia and Expo(ICME) 2020. In CVGIP 2020, he acted as the Session Chair of the MOST (Ministry of Science and Technology) Smart Computing Result Presentation Session.



Chia-Wen Lin received his Ph.D. degree from the Department of Electrical Engineering, National Tsing Hua University (EE/NTHU), Hsinchu, Taiwan, in January 2000. He has been with EE/NTHU since August 2007. Prior to joining EE/NTHU, he worked for the Department of Computer Science and Information Engineering, National Chung Cheng University (CSIE/CCU), Chiayi, Taiwan from August 2000 to July 2007. He was with the Information and Communications Research Laboratories, Industrial Technology Research Institute (ICL/ITRI), Hsinchu, Taiwan, during 1992-2000, where his final post was Section Manager. He served as a visiting scholar at the Information Processing Laboratory, Department of Electrical Engineering, University of Washington, USA during April-August 2000, a visiting professor at Microsoft Research Asia, Beijing, China, during July-August 2002. His research interests include visual content analysis and processing, and video networking.

Dr. Lin was named IEEE Fellow for his contributions to multimedia coding and editing in 2018. He is also a Distinguished Lecturer of IEEE Circuits and Systems Society (2018-2019). He was a recipient of the 2000 and 2001 Ph.D. Thesis Awards presented by the Acer Foundation and the Ministry of Education, R.O.C., respectively. His paper won the Young Investigator Award presented by SPIE VCIP 2005. He was awarded the Young Faculty Awards (2005-2007) presented by National Chung Cheng University and the Ta-You Wu Memorial Awards (2006-2009) presented by National Science Council (NSC), Taiwan. He also receives the Young Investigator Project Awards (2011-2014) from NSC, Taiwan. He has served on the editorial board of IEEE Transac-

tions on Image Processing, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Multimedia, IEEE Multimedia Magazine, Journal of Visual Communication and Image Representation, and Signal Processing: Image Communication. He has served as a Guest Co-Editor of five special issues for IEEE Journal of Selected Topics in Signal Processing, IEEE Transactions on Multimedia, EURASIP Journal on Advances in Signal Processing, and Journal of Visual Communication and Image Representation, respectively. He is Chair of the Multimedia Systems and Applications Technical Committee of IEEE Circuits and Systems Society. He was TPC Co-Chair of IEEE International Conference on Multimedia & Expo (ICME) 2010 and Special Session Co-Chair of IEEE ICME 2009. He will serve as General Co-Chair of IEEE VCIP 2018 and TPC Co-Chair of IEEE ICIP 2019.



Chu-Song Chen received a B.S. degree in Control Engineering from National Chiao-Tung University, Taiwan, in 1989. He received an M.S. degree in 1991 and a Ph.D. degree in 1996, respectively, both from the Department of Computer Science and Information Engineering, National Taiwan University. He was a Research Fellow of the Institute of Information Science, Academia Sinica, Taiwan, and also an adjunct professor of the Graduate Institute of Networking and Multimedia, National Taiwan University. From November 2008 to March 2015, Dr. Chen served as a deputy director of Research Center for Information Technology Innovation, Academia Sinica. Dr. Chen's research interests include computer vision, signal/image processing, multimedia analysis and pattern recognition. In 2007-2008, he served as the Secretary-General of the Image Processing and Pattern Recognition (IPPR) Society, Taiwan, which is one of the regional societies of the International Association of Pattern Recognition (IAPR), and he is currently a governing board member of IPPR. He has been on the editorial board of The Open Virtual Reality Journal (Bengham Science Publishers), 2008-2009, and IPSJ Transactions on Computer Vision and Applications (Information Processing Society of Japan), 2010-2013. He is currently on the editorial board of Journal of Machine Vision and Applications (Springer), Multimedia (Academy Publisher), and Journal of Information Science and Engineering (IIS, Academia Sinica). He served as the program co-chair of ICDAT2005 and ICDAT2006, theme chair of PSIVT2009, area chair of ACCV2009, ACCV2010, and NBIS2010, program co-chair of IMV2012, IMV

2013, tutorial chair of ACCV2014, general chair of IMEV2014, and workshop chair of ACCV 2016.



Jing-Ming Guo received the Ph.D. degree from the Institute of Communication Engineering, National Taiwan University, Taipei, Taiwan, in 2004. He is currently a full Professor with the Department of Electrical Engineering, and Director of Advanced Intelligent Image and Vision Technology Research Center. He was the former Vice Dean of the College of Electrical Engineering and Computer Science, National Taiwan University of Science and Technology, Taipei, Taiwan. He was also Director of the Innovative Business Incubation Center, Office of Research and Development. He was Visiting Scholar at the Digital Video and Multimedia Lab, Department of Electrical Engineering, Columbia University, USA from June to August, 2015, and the Signal Processing Lab, Department of Electrical and Computer Engineering, University of California, Santa Barbara, USA from July 2002 to June 2003 and June-November, 2014. His research interests include multimedia signal processing, biometrics, computer vision, and digital halftoning.



Wen-Huang Cheng is Distinguished Professor with the Institute of Electronics, National Yang Ming Chiao Tung University (NYCU), Hsinchu, Taiwan. His current research interests include multimedia content analysis, computer vision and deep learning. He has actively participated in international events and played important leading roles in prestigious conferences, journals and professional organizations, like General co-chair for IEEE ICCE-TW (2022), IEEE ICME (2022) and ACM ICMR (2021), Associate Editor for IEEE Transactions on Multimedia and IEEE Multimedia Magazine. He has received numerous research and service awards, including the 2020 Outstanding Associate Editor Award of IEEE Transactions on Multimedia and the 2018 MSRA Collaborative Research Award. He is Fellow of Institution of Engineering and Technology (IET) and ACM Distinguished Member.



Wei-Ta Chu received the B.S. and M.S. degrees in Computer Science from National Chi Nan University, Taiwan, in 2000 and 2002, and received the Ph.D. degree in Computer Science from National Taiwan University, Taiwan, in 2006. He was a Professor in National Chung Cheng University from 2007 to 2019, and is now a Professor in the Department of Computer Science and Information Engineering, National Cheng Kung University, Taiwan. His research interests include digital content analysis, multimedia indexing, deep learning, and pattern recognition.

He won the Best Full Technical Paper Award in ACM Multimedia 2006. He was awarded Outstanding Youth Electrical Engineer Award by the Chinese Institute of Electrical Engineering in 2017, the Distinguished Alumni Award presented by National Chi Nan University in 2014, Best GOLD Member Award presented by IEEE Tainan Section in 2013, the K. T. Li Young Researcher Award presented by Institute of Information and Computing Machinery in 2012, and the Young Faculty Awards presented by National Chung Cheng University in 2011. His advised master students received several thesis awards from Taiwan Institute of Electrical and Electronic Engineering, Institute of Information and Computing Machinery, and the Chinese Institute of Electrical Engineering. He was a visiting professor at Nagoya University from January to March 2017, and a visiting scholar at Digital Video and Multimedia Laboratory, Columbia University, from July to August 2008. He was an associate editor of IEICE Transactions on Information and Systems from 2016 to 2020. He serves as Program Co-Chair of ICMR 2022, ICMR 2021, MMM 2020, and MMSP 2019.



Min-Chun Hu an Associate Professor in the Department of Computer Science, National Tsing Hua University, Taiwan. She received the B.S. and M.S. degrees in Computer Science and Information Engineering from National Chiao Tung University, Hsinchu, Taiwan, in 2004 and 2006, respectively. In 2011, she received the Ph.D. degree in the Graduate Institute of Networking and Multimedia, National Taiwan University, Taipei, Taiwan. She was a postdoctoral research fellow of Research Center for Information Technology Innovation, Academia Sinica, from 2011 to 2012. From 2012 to 2017, she was an Assistant Professor in the Department of Computer Science and Information Engineer-

ing, National Cheng Kung University, Tainan, Taiwan, and she was promoted as an associate professor in 2018. She was awarded the Exploration Research Award from Pan Wen Yuan Foundation, the Outstanding Youth Award from the Computer Society of the Republic Of China (CSROC), and the Best Young Professional Member Award of IEEE Tainan Section in 2015, 2017, and 2018, respectively. Her research interests include digital signal processing, multimedia content analysis, machine learning, computer vision, computer graphics, virtual reality and augmented reality.



Chih-Chung Hsu received his B.S. degree in Information Management from Ling-Tung University of Science and Technology, Taiwan, in 2004, and the M.S. and Ph.D. degrees in Electrical Engineering from National Yunlin University of Science and Technology and National Tsing-Hua University (NTHU), Taiwan, in 2007 and 2014, respectively.

Dr. Hsu was a postdoctoral researcher with the Institute of Communications Engineering, NTHU, from 2014 to 2017. He is currently an Assistant Professor with the Institute of Data Science, National Cheng Kung University (NCKU), Taiwan. Before joining NCKU, He was an Assistant Professor with the Department of Management Information Systems, National Pingtung University of Science and Technology as an Assistant Professor since February 2018. His research interests mainly lie in computer vision and machine/deep learning with applications to image and video processing. Dr. Hsu is Senior Member of Institute of Electrical and Electronics Engineers (IEEE) since Oct. 2020. He received the first-place award of ACM Multimedia Social Media Prediction Challenge in 2017 and 2019, and a top 10% paper award from IEEE International Workshop on Multimedia Signal Processing (MMSP) 2013. In 2019, Dr. Hsu received the best student paper award from IEEE International Conference on Image Processing (ICIP) in 2019. He also won the 3rd place award of Learning to Drive Challenge from IEEE International Conference on Computer Vision (ICCV) and has been invited to give a talk in it. Dr. Hsu received the 3rd place award of Visual Inductive Priors for Data-Efficient Computer Vision Challenge from European Conference on Computer Vision (ECCV).



Hong-Han Shuai received the B.S. degree from the Department of Electrical Engineering, National Taiwan University (NTU), Taipei, Taiwan, in 2007, the M.S. degree in computer science from NTU in 2009, and the Ph.D. degree from Graduate Institute of Communication Engineering, NTU, in 2015. He is now an associate professor in National Yang Ming Chiao Tung University (NYCU). His research interests include multimedia processing, machine learning, social network analysis, and data mining. His works have appeared in top-tier conferences such as MM, CVPR, AAAI, KDD, WWW, ICDM, CIKM and VLDB, and top-tier journals such as TKDE, TMM and JIOT. Moreover, he has served as the PC member for international conferences including MM, ECCV, ICCV, AAAI, IJCAI, WWW, and the invited reviewer for journals including TKDE, TIP, TMM, JVCJ and JIOT.
