Zhang ML, Wei XS, Huang G. Special section on self-learning with deep neural networks. JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY 37(3): 505–506 May 2022. DOI 10.1007/s11390-022-0002-y

Preface

It is our great pleasure to announce the publication of this special section in JCST: "Self-Learning with Deep Neural Networks".

Self-learning is an important skill for human beings as they journey through education and beyond to advisors, building independence and ability to progress without reliance on a teacher. Recently, as a crucial branch of artificial intelligence, self-learning with deep neural networks sheds its light on diverse research directions, e.g., self-supervised learning, self-distillation learning, self-attention learning, and adversarial learning. Also, excellent results have been achieved in many application tasks in computer vision and natural language processing by leveraging these self-learning approaches. Therefore, for better understanding and developing self-learning methods, it is desirable to conduct in-depth research on self-learning with deep neural networks from both theoretical and applied perspectives.

This special section is launched and aims to seek high quality research work on self-learning with deep neural networks. Each submission to this special section underwent a rigorous peer-review process overseen by the leading and guest editors. At least two rounds of peer-review were carried out on each accepted paper. Finally, three contributions were selected for publication in this special section out of 13 submissions. These contributions show advanced technologies on self-learning with deep neural networks, including a comprehensive review of self-supervised learning, improving the generalization performance of few-shot intent detection, and conducting music-driven motion generation.

The paper "Connecting the Dots in Self-Supervised Learning: A Brief Survey for Beginners" provides a comprehensive review of the important work on self-supervised learning from various research fields, e.g., natural language processing, computer vision, graph learning, audio processing and protein learning. The authors not only show the underlying relations among different existing studies, but also provide insight on future research directions for self-supervised learning. This review paper can help readers quickly get familiar with self-supervised learning and have a high-level picture of the development in this research field.

The paper "Self-Supervised Task Augmentation for Few-Shot Intent Detection" focuses on improving the generalization performance of few-shot intent detection. The authors propose a self-supervised task augmentation method under the meta-learning framework to address the potential overfitting problem due to insufficient meta training tasks. Two auxiliary losses have been devised and are used to incorporate self-supervised learning into meta-learning. The proposed method has yielded favorable results on multiple intent detection benchmark datasets under the few-shot setting.

The paper "Self-Supervised Music Motion Synchronization Learning for Music-Driven Conducting Motion Generation" tackles the task of music-driven conducting motion generation with deep learning. The authors propose a generative adversarial-network based model, which can automatically learn the temporal relationship between music and motion, removing the need to rely on human-designed rules. Notably, the model can be trained in a self-supervised manner with an adversarial loss and a synchronization loss. Experimental results show that plausible, diverse, and music-synchronized conducting motion can be generated.

We would like to thank all authors for submitting their work to this special section and all reviewers for their great efforts in offering constructive and timely reviews on each submission. We hope that readers will enjoy this special section.

Leading Editor

Min-Ling Zhang (张敏灵), Professor, School of Computer Science and Engineering, Southeast University, Nanjing
zhangml@seu.edu.cn

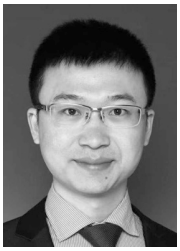
Guest Editors

Xiu-Shen Wei (魏秀参), Professor, School of Computer Science and Engineering, Nanjing University of Science and Technology, Nanjing weixs@njust.edu.cn

Gao Huang (黄 高), Associate Professor, Department of Automation, Tsinghua University, Beijing gaohuang@tsinghua.edu.cn

Min-Ling Zhang received his B.Sc., M.Sc., and Ph.D. degrees in computer science from Nanjing University, Nanjing, in 2001, 2004 and 2007, respectively. Currently, he is a professor at the School of Computer Science and Engineering, Southeast University, Nanjing. His main research interests include machine learning and data mining. In recent years, Dr. Zhang has served as the general co-chairs of ACML'18, program co-chairs of CCDM'20, PAKDD'19, CCF-ICAI'19, ACML'17, CCFAI'17, PRICAI'16, senior PC member or area chair of AAAI 2017-2020, IJCAI 2017-2022, KDD 2021-2022, ICDM 2015-2022, etc. He is also on the editorial board of IEEE Transactions on Pattern Analysis and Machine Intelligence, ACM Transactions on Intelligent Systems and Technology, Neural Networks, Science China Information Sciences, Journal of Computer Science and Technology, Frontiers of Computer Science, etc. Dr. Zhang is the steering committee member of ACML and PAKDD, vice chair of the CAAI Machine Learning Society and standing committee member of the CCF Artificial Intelligence & Pattern Recognition Society. He is a distinguished member of CCF and CAAI, and a senior member of AAAI, ACM, and IEEE.

Xiu-Shen Wei received his Ph.D. degree from Nanjing University, Nanjing. He is a professor at Nanjing University of Science and Technology (NJUST), Nanjing. Before joining NJUST, he served as the founding director of Megvii Research Nanjing, Megvii Technology. He has published more than 50 academic papers on the top-tier international journals and conferences, such as IEEE TPAMI, NeurIPS, CVPR, and ICCV. He won four world championships in international authoritative computer vision competitions, including iWildCam 2020, iNaturalist 2019, etc. He has served as a tutorial co-chair of ACCV 2022, a senior PC member/area chair of AAAI/IJCAI/BMVC, as well as a PC co-chair of workshops in IJCAI/ICCV/ACM Multimedia/ACCV.



Gao Huang is an associate professor in the Department of Automation at Tsinghua University, Beijing. He received his Ph.D. degree from Tsinghua University, Beijing, in 2015, and was a postdoc fellow at Cornell University, Ithaca, from 2015 to 2018. His current research interests include machine learning, computer vision, and reinforcement learning. He authored about 80 papers on top-tier conferences and journals, and have collected more than 30 000 citations. His work on DenseNet won the Best Paper Award of CVPR (2017). He serves as a senior PC member or the area chair for ICML, CVPR, AAAI, IJCAI and UAI, and an associate editor for IEEE Transactions on Big Data and Pattern Recognition.