

Transfer Learning for Multimedia Applications

Special Issue Proposal for Multimedia Tools and Applications

1. Motivation

In conventional machine learning protocols, we generally assume that the training domain and the test domain are from an identical data distribution. Multimedia applications, however, inherently involve multiple domains which have distinctive data distributions. For instance, cross-modal retrieval is a representative multimedia application which has to deal with images, videos and texts. Samples from different modalities usually have different data distributions, either marginal or conditional. Existing works have demonstrated that the performance of the learned model would drop dramatically when deploying it on datasets which are mismatched in terms of distribution. As a result, it is absolutely necessary, and without doubt valuable, to investigate and challenge the domain shift problem in multimedia applications.

Recently, transfer learning has received considerable attention for its merit of leveraging knowledge from a well-labeled source domain to an unlabeled target domain. In the past few years, plenty of approaches from both deep learning and traditional learning paradigms are proposed to challenge the domain adaptation problem. Compared with conventional learning methods, transfer learning is able to handle multiple domains with different data distributions. Thus, transfer learning is naturally suitable for multimedia applications. It can be used to mitigate the domain shift between different data modalities. It can be used to transfer knowledge from one data modality to another. It can also be used to manage novel media by only adapting from existing ones instead of learning from scratch. In a nutshell, transfer learning can not only stimulate the classical topics in multimedia applications, but also ignite brave and brand-new ideas.

The relevant research works of transfer learning have exploded and led to an exponential growth in the top-tier conferences and journals, such as MM, CVPR, ICCV, TPMAI, IJCV, TKDE, TIP, TMM, etc. However, existing approaches were overwhelmingly emphasizing on the applications in the field of computer vision. Although the community of multimedia and computer vision have some overlapping, multimedia applications have their specific characteristics, e.g., large-scale, streaming, multi-modal, heterogeneous, sparse, noisy and distributed. Thus, it is important to focus on the applications of transfer learning in the multimedia community. Such a proposal can not only benefit the development of multimedia applications but also extend the application scenarios of transfer learning.

This special issue highlights the **Novel applications/algorithms/problems/ideas/datasets/tools of transfer learning which focus on the field of multimedia**. In real-world multimedia applications, we might need to adapt knowledge from one domain to the other related domains, retrieval samples from one domain by querying samples in the other related domains, recommend contents to a user by referring his/her historical records from the other related domains, etc. Transfer learning offers a unique opportunity to convey its merits in the multimedia applications. In this special issue, we are eager to see practical multimedia applications which deploy transfer learning to challenge the specific characteristics of multimedia data, original algorithms which inspire the transfer learning in multimedia, brand-new datasets/tools which benefit the following researchers.

This special issue will offer a timely collection of works with original contribution to benefit the researchers and practitioners in the research fields of multimedia. The concerned research problems are well covered by the multimedia community as well as the Topic of Interest of **Multimedia Tools and Applications**. To the best of our knowledge, this is the very leading collection which addresses the transfer learning in the multimedia community. We are quite optimistic that a special issue with timely and mature publications is highly required, especially in a prestigious journal like **Multimedia Tools and Applications**. We also believe that it will attract enough high-quality contributions from the community.

2. Call for Papers (Multimedia Tools and Applications)

2.1 Summary and Scope

Multimedia applications naturally involve heterogeneous domain data, e.g., text, image, audio and video. Data from heterogeneous domains tend to have different marginal and conditional distributions. However, conventional machine learning approaches assume that the training data and the test data are from the same data distribution. Thus, there is an unavoidable obstacle in the multimedia applications—how to mitigate the domain shifts in cross-modal algorithms? Unfortunately, a majority of existing approaches in the multimedia community ignored the problem or just left it for the future research. Recently, transfer learning has been proven to be effective to handle the domain shift problem and transfer knowledge from one domain to the other related domains. Now it is the time to face the problem in multimedia and investigate it with transfer learning!

This special issue is devoted to the publication of high-quality research papers on transfer learning for various multimedia applications, such as, multimedia retrieval, classification, recommendation, multi-modal data mining, etc. The special issue will seek for original contribution of works, which address the key challenges and problems.

Potential topics of interest include but are not limited to the following

- Transfer learning for image/video/music/audio retrieval

- Transfer learning for recommendation/multimedia database
- Transfer learning for multimedia security
- Transfer learning for mobile-based multimedia applications
- Domain adaptation with deep/traditional models
- Multi-source domain adaptation for multimedia applications
- Heterogeneous domain adaptation for multimedia application
- Zero-shot learning and its applications for multimedia
- Multi-view learning and its applications for multimedia
- Fine-grained multimedia management with transfer learning
- Robust transfer learning algorithms for noisy multimedia data
- Distributed transfer learning for distributed multimedia data
- Binary transfer learning algorithms for large-scale multimedia analysis
- New multimedia applications of transfer learning
- Survey papers with regards of transfer learning for multimedia applications
- New multimedia datasets for transfer learning
- New transfer learning tools for multimedia analysis

2.2 Submission Guideline

Submitted papers should present original, unpublished work, relevant to one of the topics of the Special Issue. All submitted papers will be evaluated on the basis of relevance, significance of contribution, technical quality, scholarship, and quality of presentation, by at least three independent reviewers. It is the policy of the journal that no submission, or substantially overlapping submission, be published or be under review by another journal or conference at any time during the review process. Authors should prepare their manuscripts according to the online submission requirements of Multimedia Tools and Applications (MTAP) at <https://www.editorialmanager.com/mtap/default.aspx>. When you submit, please choose the Binary Representation Learning for Large-scale Multimedia Applications. All the papers will be peer-reviewed following the MTAP reviewing procedures. The submissions should clearly demonstrate the evidence of benefits to society or large communities. Originality and impact on society, in combination with the media nature and innovative technical aspects of the proposed solutions, will be the major evaluation criteria.

Intended number of submissions: 50-60 submissions

2.3 Important Dates

- Submission Deadline: Dec 31st, 2018
- First Review Decision: Mar 1st, 2019
- Second Review Decision: Apr 15th, 2019
- Final Manuscript Due: May 15th, 2019

2.4 Guest Editors

- **Dr. Jingjing Li**, School of Computer Science and Engineering, University of Electronic Science and Technology of China, China, Email: jjl@uestc.edu.cn
- **Dr. Zhengming Ding**, Department of Computer, Information and Technology, Indiana University-Purdue University Indianapolis (IUPUI), USA, Email: zd2@iu.edu
- **Dr. Weiqing Wang**, School of Information Technology, Monash University, Australia, Email: Teresa.Wang@monash.edu

2.5 Brief Biography of the Guest Editors

Jingjing Li is currently a national Postdoctoral Program for Innovative Talents research fellow with the School of Computer Science and Engineering, University of Electronic Science and Technology of China. He has great interest in machine learning, especially transfer learning, subspace learning and recommender systems. He has authored/co-authored over 10 scientific papers in these areas, which are published in the IEEE Transactions journals and top-tier multimedia and machine learning conferences. Related papers (selected):

- **Jingjing Li**, Lei Zhu, Zi Huang, Ke Lu and Jidong Zhao. I read, I saw, I tell: Texts Assisted Fine-Grained Visual Classification. ACM Multimedia (MM), 2018
- **Jingjing Li**, Ke Lu, Zi Huang and Heng Tao Shen. Two birds one stone: On both cold-start and long-tail recommendation. ACM Multimedia (MM), 898-906, 2017
- **Jingjing Li**, Ke Lu, Zi Huang, Lei Zhu and Heng Tao Shen. Transfer Independently Together: A Generalized Framework for Domain Adaptation. IEEE Transactions on Cybernetics (TCYB), 2018
- **Jingjing Li**, Ke Lu, Zi Huang, Lei Zhu and Heng Tao Shen. Heterogeneous Domain Adaptation through Progressive Alignment. IEEE Transactions on Neural Networks and Learning System (TNNLS), 2018
- **Jingjing Li**, Yue Wu, Jidong Zhao, Ke Lu. Low-rank discriminant embedding for multiview learning. IEEE Transactions on Cybernetics (TCYB) 47 (11), 3516-3529, 2017
- **Jingjing Li**, Jidong Zhao, Ke Lu. Joint Feature Selection and Structure Preservation for Domain Adaptation. International Joint Conference on Artificial Intelligence (IJCAI), 1697-1703, 2016
- **Jingjing Li**, Yue Wu, Jidong Zhao, Ke Lu. Multi-manifold Sparse Graph Embedding for Multimodal Image Classification. Neurocomputing, 173, 501-510, 2016

Zhengming Ding is currently an assistant professor affiliated with Department of Computer, Information and Technology, Indiana University-Purdue University Indianapolis. His research interests include machine learning and computer vision. Specifically, he devotes himself to develop scalable algorithms for challenging problems in transfer learning and deep learning scenario. He received the National Institute of Justice Fellowship during 2016-2018. He was the recipients of the best paper award (SPIE 2016) and best paper candidate (ACM MM 2017). Related papers(selected):

- **Zhengming Ding**, and Yun Fu. Deep Transfer Low-Rank Coding for Cross-Domain Learning. IEEE Transactions on Neural Networks and Learning Systems (TNNLS), 2018
- **Zhengming Ding** Ming Shao, and Yun Fu. Generative Zero-Shot Learning via Low-Rank Embedded Semantic Dictionary. IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2018
- **Zhengming Ding**, Nasser Nasrabadi, and Yun Fu. Semi-supervised Deep Domain Adaptation via Coupled Neural Networks, IEEE Transactions on Image Processing (TIP), vol. 27, no. 11, pp. 5214-5224, Nov. 2018
- **Zhengming Ding**, and Yun Fu. Deep Domain Generalization with Structured Low-Rank Constraint, IEEE Transactions on Image Processing (TIP), vol. 27, no. 1, pp. 304-313, 2018
- **Zhengming Ding**, Ming Shao, and Yun Fu. Incomplete Multisource Transfer Learning. IEEE Transactions on Neural Networks and Learning Systems (TNNLS), vol. 29, no. 2, pp. 310-323, 2018.
- **Zhengming Ding**, Sheng Li, Ming Shao and Yun Fu. Graph Adaptive Knowledge Transfer for Unsupervised Domain Adaptation. European Conference on Computer Vision (ECCV), 2018
- **Zhengming Ding**, Ming Shao, and Yun Fu. Robust Multi-view Representation: A Unified Perspective from Multi-view Learning to Domain Adaption. International Joint Conference on Artificial Intelligence (IJCAI), 2018

Weiqing Wang is currently a lecturer with the Faculty of Information Technology, Monash University. She previously worked as a post-doctoral research fellow at the Data and Knowledge Engineering (DKE) Group, the University of Queensland where she also obtained my Ph.D. degree. She's main research interest are recommender system and user modeling. She also has a great passion in multimedia database and data mining. Related papers(selected):

- **Weiqing Wang**, Hingzhi Yin, Zi Huang, Qinyong Wang, Xingzhong Du and Quoc Viet Hung Nguyen. Streaming Ranking Based Recommender Systems. International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR), 2018
- **Weiqing Wang**, Hongzhi Yin, Shazia Sadiq, Ling Chen, Min Xie, Xiaofang Zhou. SPORE: A Sequential Personalized Spatial Item Recommender System. IEEE Conference on Data Engineering (ICDE), 2016

- **Weiqing Wang**, Hongzhi Yin, Ling Chen, Yizhou Sun, Shazia Sadiq, Xiaofang Zhou. Geo-SAGE: A Geographical Sparse Additive Generative Model for Spatial Item Recommendation. ACM SIGKDD 2015
- **Weiqing Wang**, Hongzhi Yin, Xingzhong Du, Nguyen Quoc Viet Hung and Xiaofang Zhou. TPM: A Temporal Personalized Model for Spatial Item Recommendation. ACM Transactions on Intelligent Systems and Technology (ACM TIST), 2018
- **Weiqing Wang**, Hongzhi Yin, Ling Chen, Yizhou Sun, Shazia Sadiq, Xiaofang Zhou. ST-SAGE: A Spatial-Temporal Sparse Additive Generative Model for Spatial Item Recommendation. ACM Transactions on Intelligent Systems and Technology (ACM TIST), 2017
- Hongzhi Yin, **Weiqing Wang**, Hao Wang, Ling Chen and Xiaofang Zhou. Spatial-aware Hierarchical Collaborative Deep Learning for POI Recommendation. IEEE Transactions on Knowledge and Data Engineering (TKDE), 2017