

**Report on**

**IEEE Technical Talk Series 2021**



**Expert: Dr. Dong Xu**

**March 5<sup>th</sup> 2021**

**Title: Transfer learning for Image and Video Recognition**

**IEEE Signal Processing Society**

**Gujarat Section**

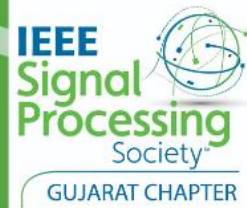
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✚ Poster for the talk



IEEE Signal Processing Society  
Gujarat Chapter  
presents  
Expert Talk Series



*Transfer learning make use of the knowledge gained while solving one problem and applying it to a different but related problem. From the practical standpoint, reusing or transferring information from previously learned tasks for the learning of new tasks has the potential to significantly improve the sample efficiency*



**Dr. Dong Xu**  
Chair in Computer Engineering and  
ARC Future Fellow at the School of  
Electrical and Information  
Engineering, University of Sydney,  
Australia

Transfer learning for image and video  
recognition

March 5, 2021 | 12:00 Noon. IST

Scan to Register



(WebEx link will be sent to registered participants)



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**Expert Profile**

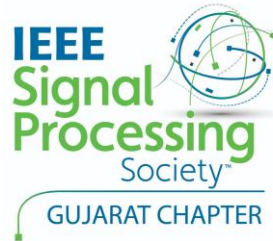


**Dr. Dong Xu**

**Chair in Computer Engineering and ARC Future Fellow at the School of Electrical and Information Engineering, University of Sydney, Australia**

Professor Dong Xu is Chair in Computer Engineering and ARC Future Fellow at the School of Electrical and Information Engineering, The University of Sydney, Australia. He received the B.Eng. and PhD degrees from University of Science and Technology of China, in 2001 and 2005, respectively. Before joining The University of Sydney, he worked as a postdoctoral research scientist at Columbia University (2006-2007) and a faculty member at Nanyang Technological University (2007-2015).

Prof. Xu is an active researcher in the areas of image and video processing, computer vision and multimedia. He was selected as the Clarivate Analytics Highly Cited Researcher in the field of Engineering in 2018 and awarded the IEEE Computational Intelligence Society Outstanding Early Career Award in 2017. He



was also selected to serve as an IEEE Signal Processing Society Distinguished Lecturer (2021-2022). Prof. Xu has published more than 150 papers in leading journals and conferences, among which two of his co-authored works (with his former PhD students) won the IEEE T-MM Prize Paper Award in 2014 and the CVPR Best Student Paper Award in 2010. According to Google Scholar, his publications have received over 19,000 citations.

Prof. Xu is/was on the editorial boards of ACM Computing Surveys, IEEE T-IP, T-PAMI, T-NNLS, T-MM and T-CSVT as well as other five journals, and he is serving/served as a guest editor of more than ten special issues in IJCV, T-NNLS, T-CSVT, T-CYB, IEEE Multimedia, ACM TOMM, CVIU and other journals. He is serving/served as a Program Co-chair of three international conferences including MLSP 2021, ICME 2014 and PCM 2012. He is also involved in the organization committees of many international conferences such as ACM MM 2021, GlobalSIP 2019, MMSP 2019, ICIP 2017, MMSP 2016 and VCIP 2015. He served as a steering committee member of ICME (2016-2017) and a track chair of ICPR 2016 as well as an area chair of AAAI 2020, ICCV 2017, ACM MM 2017, ECCV 2016 and CVPR 2012. He received the Best Associate Editor Award of T-CSVT in 2017. He is a Fellow of the IEEE and IAPR.

## Glimpses of the Talk

Domain Adaptation vs. Traditional Machine Learning Approaches

- Traditional machine Learning approaches: *Training data and test data are from the same distribution*
- Domain Adaptation: Training and test data can be from different distributions

Domain Adaptation in Computer Vision

- Image and video recognition
  - Image dataset bias (Torralba and Efros, CVPR 2011)

- Web videos => Personal Videos (Duan et al., CVPR 2010)

Exploiting Privileged Information from Web Data for Action and Event Recognition

How to handle label noise?

Weakly labeled web videos

W. LL L. Niu and D. Xu, ECCV 2014 and IJCV 2016

Multi-instance learning using privileged information

- Partition the relevant and irrelevant videos as a set of clusters
- By treating each cluster as a "bag" and the videos in each bag as "instances", we formulate this task as a **multi-instance learning (MIL)** problem

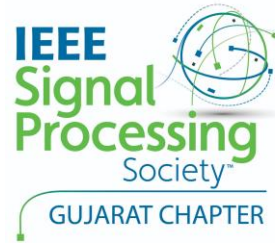
Experiments: datasets and experimental setting

- Training datasets**
  - For event recognition, we crawl the training videos from Flickr.com and construct 60 positive bags and 60 negative bags with each bag having 5 training videos
  - For human action recognition, we crawl the training videos from YouTube and construct 40 positive training bags and 40 negative training bags with each bag having 5 training videos
- Testing datasets**
  - Kodak: 195 personal videos from 6 event classes: "wedding", "birthday", "picnic", "parade", "show", "sports"
  - CCV: 2440 videos from 5 event classes (after merging some event classes): "birthday", "parade", "show", "sports", "wedding"
  - HMDB51: 6766 clips from 51 action classes (three testing splits with each split containing 30 videos for each action class).

Domain Adversarial Neural Network (DANN)

Loss for image classifier: 
$$\mathcal{L}_{D,P,C} = \frac{1}{N} \sum_{i=1}^N \mathcal{L}_c(C(F(x_i; \Theta_F); c)) y_i^c$$

Y. Ganin et al., "Domain-Adversarial Training of Neural Networks," ICML 2015 and JMLR 2016



## **+ Number of Participants**

**Total: 456**

**Report Prepared by: Prof. Arpan Desai**