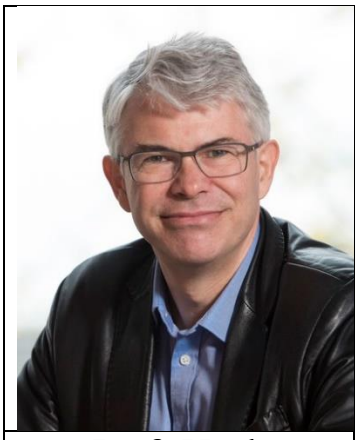
Applications of Machine Learning Workshop

27th National Conference on Communications

Schedule

Start Time (IST)	End Time (IST)	TOPIC	SPEAKERS
1520	1600	Machine learning for sound sensing	Prof. Mark Plumbley
1600	1640	Contextualized deep graph infomax for multi-layer networks	Prof. Balaraman Ravindran
1810	1850	Personalizing Federated Learning to the Edge Device	Prof. Venkatesh Saligrama
1850	1930	AI vs ML -- an introduction	Prof. Bhiksha Raj



Prof. Mark Plumbley

Machine learning for sound sensing

by

Prof. Mark Plumbley

Date & Time: 30th July 2021 (1520-1600 hours) Indian Standard Time

Abstract:

Imagine you are standing on a street corner in a city. Close your eyes: what do you hear? Perhaps some cars and busses driving on the road, footsteps of people on the pavement, beeps from a pedestrian crossing, and the hubbub of talking shoppers. You can do the same in a kitchen as someone is making breakfast, or as you are travelling in a vehicle. Now, following the success of AI and machine learning technologies for speech and image recognition, we are beginning to build computer systems to automatically recognize real-world sound scenes and events. In this talk, we will explore some of the work going on in this rapidly expanding research area, and discuss some of the potential applications emerging for sound recognition, from home security and assisted living to environmental noise and sound archives. We will also outline how we are adopting participatory methods, such as a virtual world cafe approach, to direct project outcomes from stakeholders, and so help us realise the potential benefit of sound sensing to society and the economy.

Bio:

Mark Plumbley is Professor of Signal Processing at the Centre for Vision, Speech and Signal Processing (CVSSP) and Head of School of Computer Science and Electronic Engineering at the University of Surrey, in Guildford, UK. He is an expert on analysis and processing of audio, using a wide range of signal processing and machine learning methods. He led the first international data challenge on Detection and Classification of Acoustic Scenes and

Events (DCASE), and is a co-editor of the recent book on "Computational Analysis of Sound Scenes and Events" (Springer, 2018). He currently holds a 5-year EPSRC Fellowship "AI for Sound" on automatic recognition of everyday sounds. He is a Member of the IEEE Signal Processing Society Technical Committee on Audio and Acoustic Signal Processing, and a Fellow of the IET and IEEE.

Prof. Balaraman Ravindran

TBA

by

Prof. Balaraman Ravindran

Date & Time: 30th July 2021 (1600-1640 hours) Indian Standard Time

Abstract:

The InfoMax principle has been gaining popularity as an approach to learning representations in deep neural networks. In this talk, I will introduce the graph InfoMax criterion and how it is applied in graph neural networks. Multiplex networks are complex graph structures in which a set of entities are connected to each other via multiple types of relations, each relation representing a distinct layer. Such graphs are used to investigate many complex biological, social, and technological systems. In this talk, I will present a novel semi-supervised approach for structure-aware representation learning on multiplex networks. Our approach relies on maximizing the mutual information between local node-wise patch representations and label correlated structure-aware global graph representations to model the nodes and cluster structures jointly. The proposed architecture outperforms state-of-the-art methods in a range of tasks: classification, clustering, visualization, and similarity search on seven real-world multiplex networks for various experiment settings. The work will appear in ACM SIGKDD 2021.

Bio:

Prof. Balaraman Ravindran is the Mindtree Faculty Fellow and a professor at the Department of Computer Science and Engineering. He heads the Robert Bosch Centre for Data Science and AI at the Indian Institute of Technology Madras. He completed my Ph.D. at the Department of Computer Science, University of Massachusetts, Amherst. He worked with Prof. Andrew G. Barto on an algebraic framework for abstraction in Reinforcement Learning.

His current research interests span the broader area of machine learning, ranging from Spatio-temporal Abstractions in Reinforcement Learning to social network analysis and

Data/Text Mining. Much of the work in his group is directed toward understanding interactions and learning from them.

Prof. Venkatesh Saligrama

IEEE Signal Processing Society Distinguished Lecture

Personalizing Federated Learning to the Edge Device

by

Prof. Venkatesh Saligrama

Date & Time: 30th July 2021 (1810-1850 hours) Indian Standard Time

Abstract:

We propose a novel method for federated learning that is customized to the objective of a given edge device. In our proposed method, a server trains a global meta-model by collaborating with devices without actually sharing data. The trained global meta-model is then customized locally by each device to meet its specific objective. Different from the conventional federated learning setting, training customized models for each device is hindered by both the inherent data biases of the various devices, as well as the requirements imposed by the federated architecture. We present an algorithm that locally de-biases model updates, while leveraging distributed data, so that each device can be effectively customized towards its objectives. Our method is fully agnostic to device heterogeneity and imbalanced data, scalable to massive number of devices, and allows for arbitrary partial participation. Our method has built-in convergence guarantees, and on benchmark datasets we demonstrate that it outperforms other state-of-art methods.

Bio:

Venkatesh Saligrama is a faculty member in the Department of Electrical and Computer Engineering, the Department of Computer Science (by courtesy), and a founding member of the Faculty of Computing and Data Sciences at Boston University. He holds a PhD from MIT. His research interests are broadly in the area of Artificial Intelligence, and his recent work has focused on machine learning with resource-constraints. He is an IEEE Fellow and recipient of several awards including Distinguished Lecturer for IEEE Signal Processing Society, the Presidential Early Career Award (PECASE), ONR Young Investigator Award, the

NSF Career Award. More information about his work is available at http://sites.bu.edu/data

Prof. Bhiksha Raj

AI vs ML – an introduction

by

Prof. Bhiksha Raj

Date & Time: 30th July 2021 (1850-1930 hours) Indian Standard Time

Abstract:

"Artificial Intelligence" and "Machine Learning" have become popular buzz phrases in both the technical and lay communities. Often the terms are used interchangeably. But what are AI and ML, and what is the difference between the two?

In this talk we will try to explain the concepts and distinguish between them using simple examples aimed at a lay audience. The talk will be somewhat interactive; the audience is required to arrive with no more than their smarts; no prior technical expertise is assumed.

Bio:

Bhiksha Raj is a professor in the language technologies institute of the school of computer science, at Carnegie Mellon University. He is also affiliated with the Machine Learning and Electrical at CMU. Prof Raj's research interests lie at the intersection of Machine Learning, Signal Processing, and Privacy and Security, particularly applied to voice signals. He is a fellow of the IEEE.