HSN Lab Research Seminar

HSN Lab and the Department of Telecommunications and Media Informatics invites you to attend the talk of

Prof. Yonina Eldar

- Faculty of Mathematics and Computer Science, Weizmann Institute of Science, Israel

Title Model Based Deep Learning: Applications to Imaging and Communications

Place Thursday, January 25, from 1 PM, in Room IB 023

Abstract

Deep neural networks provide unprecedented performance gains in many real-world problems in signal and image processing. Despite these gains, the future development and practical deployment of deep networks are hindered by their black-box nature, i.e., a lack of interpretability and the need for very large training sets. On the other hand, signal processing and communications have traditionally relied on classical statistical modeling techniques that utilize mathematical formulations representing the underlying physics, prior information and additional domain knowledge. Simple classical models are useful but sensitive to inaccuracies and may lead to poor performance when real systems display complex or dynamic behaviour. Here we introduce various approaches to model based learning which merge parametric models with optimization tools and classical algorithms leading to efficient, interpretable networks from reasonably sized training sets. We will consider examples of such model-based deep networks to image deblurring, image separation, super resolution in ultrasound and microscopy, efficient communication and tracking systems.

Short Bio

Yonina C. Eldar received the B.Sc. degree in Physics in 1995 and the B.Sc. degree in Electrical Engineering in 1996 both from Tel-Aviv University (TAU), Israel, and the Ph.D. degree in Electrical Engineering and Computer Science in 2002 from the Massachusetts Institute of Technology (MIT), Cambridge. From January 2002 to July 2002 she was a Postdoctoral Fellow at the Digital Signal Processing Group at MIT. She is currently a Professor in the Department of Mathematics and Computer Science, Weizmann Institute of Science, Israel, where she holds the Dorothy and Patrick Gorman Professorial Chair and heads the Center for Biomedical Engineering. She was previously a Professor in the Department of Electrical Engineering at the Technion, where she held the Edwards Chair in Engineering. She is also a Visiting Professor at MIT, a Visiting Scientist at the Broad Institute, a Visiting Research Collaborator at Princeton, an Adjunct Professor at Northeastern University and Duke University, an Advisory Professor of Fudan University, a Distinguished Visiting Professor of Tsinghua University, and was a Visiting Professor at Stanford. She is a member of the Israel Academy of Sciences and Humanities (elected 2017) and of the Academia Europaea (elected 2023), an IEEE Fellow, a EURASIP Fellow, a Fellow of the Asia-Pacific Artificial Intelligence Association, and a Fellow of the 8400 Health Network.

Dr. Eldar has received numerous awards for excellence in research and teaching, including the IEEE Signal Processing Society Technical Achievement Award (2013), the IEEE/AESS Fred Nathanson Memorial Radar Award (2014), and the IEEE Kiyo Tomiyasu Award (2016). She was a Horev Fellow of the Leaders in Science and Technology program at the Technion and an Alon Fellow. She received the Landau Science and Arts Award in Mathematics, and the Michael Bruno Memorial Award from the Rothschild Foundation, the Weizmann Prize for Exact Sciences, the Wolf Foundation Krill Prize for Excellence in Scientific Research, the Henry Taub Prize for Excellence in Research (twice), the Hershel Rich Innovation Award (three times), the Award for Women with Distinguished Contributions, the Andre and Bella Meyer Lectureship, the Career Development Chair at the Technion, the Muriel & David Jacknow Award for Excellence in Teaching, and the Technion's Award for Excellence in Teaching (twice). She received several best paper awards and best demo awards together with her research students and colleagues including the SIAM outstanding Paper Prize and the IET Circuits, Devices and Systems Premium Award, and was selected as one of the 50 most influential women in Israel, and one of the 50 distinguished women scientists in Asia.

She was a member of the Young Israel Academy of Science and Humanities and the Israel Committee for Higher Education and heads the Committee for Gender Fairness in Higher Education in Israel. She is the Editor in Chief of Foundations and Trends in Signal Processing, and a member of several IEEE Technical Committees and Award Committees. She served as a Signal Processing Society Distinguished Lecturer, and as an associate editor for several journals of the IEEE, EURASIP and SIAM. She was Co-Chair and Technical Co-Chair of several international conferences and workshops.

She is author of the book "Sampling Theory: Beyond Bandlimited Systems" and co-author of eight other books in the areas of convex optimization, compressed sensing, radar, communications, imaging, information theory and machine learning. According to Google Scholar she has nearly 54.000 citations, and an h-index of 108.