



# Bilkent EEE

## Bilkent EEE Distinguished Seminar Series

Bilkent University - Department of Electrical and Electronics Engineering



### Image/Video Compression in the Era of Deep Learning: End-to-End Optimized vs. Content-Adaptive Encoding

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The landscape of image and video compression is undergoing a transformative shift with the advent of deep learning. While the performance of recent learned intra and sequential video compression models exceed that of respective traditional codecs, the performance of learned B-frame compression models surprisingly lag behind traditional hierarchical B-frame coding. An important reason for this is that we are faced with the problem of training a single model to handle varying motion ranges due to different temporal distances between reference frames at different levels of temporal hierarchy. Traditional video codecs have been endowed with tools to optimize mode selection for each individual coding unit of each frame for content-adaptive encoding, but they are not end-to-end optimized. On the other hand, learned codecs are end-to-end optimized but it is not easy to achieve adaptive inference. I will discuss potential solutions to this dilemma.

**Bio:** A. Murat Tekalp received Ph.D. degree in Electrical, Computer, and Systems Engineering from Rensselaer Polytechnic Institute (RPI), Troy, New York, in 1984, He has been with the Eastman Kodak Company, Rochester, New York, from 1984 to 1987, and with the University of Rochester, Rochester, New York, from July 1987 to June 2005, where he was promoted to Distinguished University Professor. He is currently Professor at Koc University, Istanbul, Turkey. He served as Dean of Engineering between 2010-2013.

Prof. Tekalp is a Fellow of IEEE. He has been elected a member of Turkish Academy of Sciences (TÜBA), Bilim Akademisi, and Academia Europaea. He received the TUBITAK Science Award (2004) and IEEE Turkey Section Lifetime Achievement Award (2018). His research interests are in digital image and video processing, including deep learning, video compression and streaming, multi-view and 3D video processing, and video networking. He has been the Editor-in-Chief of the EURASIP Journal Signal Processing: Image Communication published by Elsevier (1999-2010). He has been on the Editorial Board of the IEEE Signal Processing Magazine (2007-2010) and Proceedings of the IEEE (2014-2019).

He is currently serving in the Editorial Board of Wiley-IEEE Press since 2018. He has chaired the IEEE Signal Processing Society Technical Committee on Image and Multidimensional Signal Processing (Jan. 1996 - Dec. 1997). He was also a Founding member of IEEE Technical Committee on Multimedia Signal Processing in 1997 and served in the committee until 2002. He has been appointed as the Technical Program Co-Chair for IEEE ICASSP 2000 in Istanbul, Turkey, the General Chair of IEEE Int.Conf. On Image Processing (ICIP) at Rochester, NY in 2002, Technical Program Co-Chair of EUSIPCO 2005 in Antalya, Turkey and ICIP 2020 and ICIP 2024 in Abu Dhabi. He has served as a member of ERC Starting, Advanced and Synergy Grant Panels (2009-). He is a current member of IEEE Signal Processing Society Fellow Evaluation Committee and IEEE Signal Processing Society Future Directions Committee. Dr. Tekalp holds 10 US patents. He has authored the Prentice Hall book Digital Video Processing (1995), the second edition of which was published in 2015.

