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THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Distributed Video coding – Architecture, tools and performance
by
Dr Frederic Dufaux
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Date	**:**	**29 September, 2010 (Wednesday)**
Time	**:**	**3:30-4:30pm**
Venue	**:**	**Room 1009, William M.W. Mong Engineering Building** **The Chinese University of Hong Kong**

Abstract
Most past research activities on video coding has relied on the two principles of predictive and transform coding. All present MPEG and ITU-T video coding standards are based on motion compensated block-based Discrete Cosine Transform (DCT) hybrid design. The state-of-the-art H.264/Advanced Video Coding (AVC) standard is the latest installment in this series.

Distributed Source Coding (DSC) is a new coding paradigm which has appeared a few years ago. It based on the Slepian-Wolf and Wyner-Ziv Information Theory theorems from the 70's. The Slepian-Wolf theorem considers the lossless coding of two or more correlated sources and characterizes lower bounds on the achievable rates. More specifically, it proves that when performing distributed coding (i.e. separate encoding and joint decoding), the same optimal rates can be achieved as when performing conventional coding (i.e. joint encoding and decoding), with a residual error probability which converges towards 0 for long sequences. The Wyner-Ziv theorem extends this result for lossy coding with Side Information (SI), under the assumptions that the sources are jointly Gaussian and a Mean Square Error (MSE) distortion measure is used.

The principle of distributed coding can also be applied to video coding. More specifically, Distributed Video Coding (DVC) relies on a statistical framework, unlike the deterministic approach of conventional MPEG and ITU-T coding schemes. Thanks to its properties, DVC offers a number of potential advantages and functionalities: flexible complexity allocation between the encoder and decoder, strong resilience in the presence of transmission errors, codec independent scalability, and multi-view coding. DVC is especially appealing for a new class of up-link applications such as low-power sensor networks, wireless video surveillance cameras and mobile communication devices.

In this presentation, we offer a survey of trends and perspectives in DVC. We then present recent research results addressing some open issues such as coding efficiency, complexity, error resilience, scalability, and multi-view coding.

Biography
Dr Frederic Dufaux received the M.Sc. in physics and Ph.D. in electrical engineering from the Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland, in 1990 and 1994 respectively.

Frederic has over 20 years of experience in research and project management. Since 2010, he is a CNRS Research Director at Telecom ParisTech. From 2003 to 2010, he was a senior research staff at EPFL. From 2003 to 2009, he was also chief scientist of Emitall SA / Emitall Surveillance SA, a spin-off from EPFL. In 2001 and 2002, he was with Genimedia SA / Genista Corp., Lausanne, Switzerland, as a principal solutions architect. From 1995 till 2001, he was a senior member of research staff at the Cambridge Research Laboratory of Digital Equipment Corp. / Compaq Computer Corp., Cambridge, MA. In 1994 and 1995, he was a Postdoctoral Fellow at the Media Laboratory of the Massachusetts Institute of Technology, Cambridge, MA. From 1990 to 1994, he was a research assistant at the Signal Processing Laboratory at EPFL.

Frederic has been involved in the standardization of digital video and imaging technologies for more than 15 years, participating both in the MPEG and JPEG committees. He is currently co-chairman of JPEG 2000 over wireless (JPWL) and co-chairman of JPSearch. He is the recipient of two ISO awards for these contributions.

Frederic is Editor-in-Chief of Signal Processing: Image Communication. He is the author or co-author of more than 90 research publications, hold 10 patents in the field of media technologies, and has more than 35 contributions to JPEG and MPEG.

His research interests include image and video coding, distributed video coding, compressed sensing, subjective visual quality assessment, objective quality metrics, video surveillance, privacy protection, multimedia security, video transmission over wireless network, image and video analysis, motion estimation, object segmentation and tracking, and multimedia content search and retrieval.

**** ALL ARE WELCOME ****

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