



THE CHINESE UNIVERSITY OF HONG KONG
DEPARTMENT OF ELECTRONIC ENGINEERING
SEMINAR

**A New Adaptive Video Super-Resolution Algorithm With Improved Robustness
to Innovations**

by

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Abstract

Super-resolution reconstruction (SRR) is a well established approach for digital image quality improvement. SRR consists basically in combining multiple low-resolution (LR) images of the same scene or object in order to obtain one or more images of higher resolution (HR), outperforming physical limitations of image sensors. Video SRR algorithms often include a temporal regularization that constrains the norm of the changes in the solution between adjacent time instants. This introduces information about the correlation between adjacent frames, and tends to ensure video consistency over time, improving the quality of the reconstructed sequences. Although several techniques have led to considerable improvements in the quality of state of the art SRR algorithms, such improvements did not come for free. The computational cost of these algorithms is very high, which makes them unsuitable for real-time SRR applications. In particular, real-time video SRR applications require simple algorithms. The regularized least mean squares (R-LMS) is one notable example among the simpler SRR algorithms. Its quality in practical situations has been shown to be competitive even with that of costly and elaborated algorithms. Unfortunately, however, its performance is known to degrade severely in the presence of innovation outliers. This talk will describe a new adaptive video SRR algorithm with improved robustness to outliers when compared to the R-LMS algorithm. The algorithm is based on a new interpretation of the R-LMS update equation as the proximal regularization of the associated cost function, linearized about the previous estimate, which leads to a better understanding of its quality performance and robustness in different situations.

Biography

José Bermudez received the B.E.E. degree from the Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil, the M.Sc. degree in electrical engineering from COPPE/UFRJ, and the Ph.D. degree in electrical engineering from Concordia University, Montreal, Canada, in 1978, 1981, and 1985, respectively.

He joined the Department of Electrical Engineering, Federal University of Santa Catarina (UFSC), Florianopolis, Brazil, in 1985. He is currently a Professor of Electrical Engineering. He has held the position of Visiting Researcher several time for periods of one month at the Institut National Polytechnique de Toulouse, France, and at Université Nice Sophia-Antipolis, France. He spent sabbatical years at the Department of Electrical Engineering and Computer Science, University of California, Irvine (UCI), USA, in 1994, and at Institut National Polytechnique de Toulouse, France, in 2012.

His recent research interests are in statistical signal processing, including linear and nonlinear adaptive filtering, image processing, hyperspectral image processing and machine learning.

Prof. Bermudez served as an Associate Editor of the IEEE TRANSACTIONS ON SIGNAL PROCESSING in the area of adaptive filtering from 1994 to 1996 and from 1999 to 2001. He also served as an Associate Editor of the EURASIP Journal of Advances on Signal Processing from 2006 to 2010. He is presently serving as a Senior Area Editor of the IEEE TRANSACTIONS ON SIGNAL PROCESSING since 2015, and as an Associated Editor of the GRETSI journal Traitement du Signal. He is a member and Elect Chair of the Signal Processing Theory and Methods Technical Committee of the IEEE Signal Processing Society. Prof. Bermudez is a Senior Member of the IEEE.

***** ALL are welcome *****

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