



Shogo MURAMATSU, Ph.D.

Associate Professor

Program: Electrical and Information Engineering

Area: Electrical and Electronic Engineering

Undergraduate: Dept. of Engineering

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Professional Expertise

His professional expertise encompasses multidimensional signal and image processing. Especially, he is working on design of multidimensional filter banks, image and volume data restoration, image and video analysis, and embedded vision systems. His contributions to the field of research include the development of directional lapped orthogonal transforms (DirLOTs), non-separable oversampled lapped transforms (NSOLTs) and fast algorithm of Gaussian-mixture-model-based pattern classifiers.

Research Fields of Interest

Multi-rate Signal Processing and Filter Banks

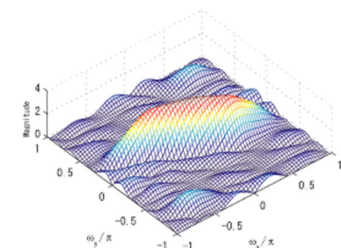
- Non-separable Oversampled Lapped Transforms (NSOLTs)
- Directional Lapped Orthogonal Transforms (DirLOTs)
- Symmetric Orthogonal Wavelets

FPGA/DSP Implementation of Image/Video Processing

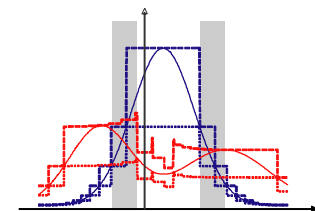
- Streaming Architecture for DirLOTs/NSOLTs
- Fast Algorithm of GMM-Based Pattern Classifiers

Image and Volume Data Processing

- Image and Volume Data Restoration with Sparse Representation
- Invertible Deinterlacers/Sampling lattice converters
- Lens Undistortion based on Phase only correlation (POC)



A scaling filter of DirLOT



Efficient GMM evaluation

Education

1998: Ph.D. received from Tokyo Metropolitan University, Japan

1995: Received the M.E. Deg. from Dept. of Electric Eng., Graduate school of Eng., Tokyo Metropolitan University, Japan

1993: Received the B.E. Deg. from Dept. of Electronics and information Eng., Faculty of Eng., Tokyo Metropolitan University, Japan

1991: Graduated from Dept. of Electronic Eng., Tokyo National College of Technology, Japan

Professional Societies and Activities

1. Senior Member, The Institute of Electrical and Electronic Engineers, (IEEE)
2. Senior Member, The Institute of Electronics, Information and Communication Engineers, Japan (IEICE)
3. Member, The Institute of Image Information and Television Engineers, Japan (ITE)
4. Member, The Asia-Pacific Signal and Information Processing Association (APSIPA)

Awards

1. Encouragement Award of IEICE Karuizawa Workshop on Circuits and Systems, 2006

Major Publications

Papers

- [1] "Structured Dictionary Learning with 2-D Non-separable Oversampled Lapped Transform," Proc. of IEEE ICASSP2014, pp.2643-2647, May 2014
- [2] "Poisson denoising with multiple Directional LOTs," Proc. of IEEE ICASSP2014, pp.1234-1238, May 2014
- [3] "Boundary Operation of 2-D non-separable Oversampled Lapped Transforms," Proc. of APSIPA ASC2013, Nov. 2013
- [4] "Image Restoration with Multiple DirLOTs," IEICE Trans. on Fundamentals, Vol.E96-A, No.10, pp.1954-1961, Oct. 2013
- [5] "Image Restoration with 2-D Non-separable Oversampled Lapped Transforms," Proc. of IEEE ICIP2013, Sep. 2013
- [6] "Lattice Structures for 2-D Non-separable Oversampled Lapped Transforms," Proc. of IEEE ICASSP2013, May 2013
- [7] "Look-Up-Table-Based Exponential Computation and Application to an EM Algorithm for GMM," IEICE Trans. on Fundamentals, Vol.E96-A, No.5, pp.935-939, May 2013
- [8] "SURE-LET Image Denoising with Multiple Directional LOTs," Proc. of Picture Coding Symp., pp.229-232, May 2012
- [9] "Directional Lapped Orthogonal Transform: Theory and Design," IEEE Trans. on Image Processing, Vol.21, No.5, pp.2434-2448, May 2012
- [10] "Boundary Operation of 2-D Non-separable Linear-Phase Paraunitary Filter Banks," IEEE Trans. on Image Processing, Vol.21, No.4, pp.2314-2318, Apr. 2012
- [11] "Fast Algorithm and Efficient Implementation of GMM-Based Pattern Classifiers," J. Signal Processing Systems, Springer, Vol.63, No.1, pp.107-116(10), DOI:10.1007/s11265-009-0439-z, Apr. 2011
- [12] "Constraints of Second-Order Vanishing Moments on Lattice Structures for Non-separable Orthogonal Symmetric Wavelets," IEICE Trans. Fundamentals, Vol. E92-A, No. 3, pp.788-797, Mar. 2009
- [13] "Motion-JPEG2000 Codec Compensated for Interlaced Scanning Videos," IEEE Trans. on Image Processing, Vol. 14, No. 12, pp. 2179-2191, Dec. 2005
- [14] "Invertible Deinterlacing with Sampling-Density Preservation: Theory and Design," IEEE Trans. on Signal Processing, Vol.51, No.9, pp.2343-2356, Sep. 2003

- [15] "A Bit-Operation Algorithm of the Median-Cut Quantization and Its Hardware Architecture," IEICE Trans. on Fundamentals, Vol.E83-A, No.2, pp.320-328, Feb. 2000
- [16] "A Design Method of Multidimensional Linear-Phase Paraunitary Filter Banks with a Lattice Structure," IEEE Trans. on Signal Processing, Vol.47, No.3, pp.690-700, Mar. 1999
- [17] "The Two-Dimensional Lapped Hadamard Transform," IEICE Trans. on Fundamentals, Vol.E81-A, No.8, pp.1542-1549, Aug. 1998
- [18] "Extended Overlap-Add and -Save Method for Multirate Signal Processing," IEEE Trans. on Signal Processing, Vol.45, No.9, pp.2376-2380, Sep. 1997
- [19] "A New Factorization Technique for the Generalized Linear-Phase LOT and Its Fast Implementation," IEICE Trans. on Fundamentals, Vol.E79-A, No.8, pp.1173-1179, Aug. 1996
- [20] "Parallel Processing Techniques for Multidimensional Sampling Lattice Alteration Based on Overlap-add and Overlap-save Methods," IEICE Trans. on Fundamentals, Vol.E78-A, No.8, pp.934-943, Aug. 1995

Books

- [1] Muramatsu, S, 2007. Image & Video Signal Processing with MATLAB, CQ Publishing Inc. (in Japanese)

Patents

- [1] Muramatsu, S and Watanabe H, 2012. Identification device, identification method, and identification processing program, U.S. Patent No.8,321,368

