Byung-Jun Yoon

Contact Information

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Current Position

Ph.D. Candidate
Digital Signal Processing Group (Professor P. P. Vaidyanathan)
Department of Electrical Engineering
California Institute of Technology, Pasadena, CA.

Education

California Institute of Technology, Pasadena, CA.
Ph.D. in Electrical Engineering, expected in Fall 2006.
Thesis Advisor: Professor P. P. Vaidyanathan

California Institute of Technology, Pasadena, CA.
M.S. in Electrical Engineering, June 2002.

Seoul National University, Seoul, Korea.
B.S.E. in Electrical Engineering (Summa Cum Laude), February 1998.

Research Interest

Signal Processing Methods and Algorithms – especially in the theory of context-sensitive hidden Markov model (csHMM) and the algorithms for optimal alignment, scoring, and training.

Genomic Signal Processing and Bioinformatics – especially in modeling and predicting RNA secondary structures and identification of noncoding RNA (ncRNA) genes and RNA homologues.

Filter Bank Theory and Applications – especially in audio and image processing.

Awards & Honors

Microsoft Research Graduate Fellowship, 2004.

Second prize in the Student Paper Contest at the 37th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2003.

Killgore Fellowship at California Institute of Technology, 2001.

Best Graduate of the Year in College of Engineering, Seoul National University, Seoul, Korea, 1998.

Honor Scholarship, Seoul National University, Seoul, Korea, 1994-1998. (Awarded to the best student in the department.)

Work Experience

Microsoft Research, Redmond, WA, Intern, Summer 2005. Worked with Dr. Henrique. S. Malvar on the design of nonuniform lapped transforms.

Microsoft Research, Redmond, WA, Intern, Summer 2004. Worked with Dr. Henrique. S. Malvar on developing a novel audio coding scheme based on complex transforms.

SecureSoft, Seoul, Korea, Software Developer and Assistant Manager, 2000-2001. Worked on various software development projects including:

- Wireless public-key infrastructure (WPKI) solution for SK Telecom mobile-commerce service.
- SecureDesk™: Windows file encryption software.

Junghwa Systems (Linux Security), Seoul, Korea, Software Developer, 1998-2000. Worked on various software development projects including:

- Web-based LDAP client program for secure user authentication.
- Internet firewall key-exchange server.
- Security enhanced SMTP server.

Academic Experience

Research Assistant, DSP Group, California Institute of Technology, 2002-2006.

Teaching Assistant, “Signal, Systems, and Transforms (EE111)”, Fall 2004.

Teaching Assistant, “Digital Signal Processing (EE112b)”, Spring 2004.

Teaching Assistant, “Digital Signal Processing (EE112a)”, Winter 2003.

Teaching Assistant, “Signal, Systems, and Transforms (EE111)”, Fall 2003.

Teaching Assistant, “Digital Signal Processing (EE112b)”, Spring 2003.

Teaching Assistant, “Digital Signal Processing (EE112a)”, Winter 2002.

Teaching Assistant, “Signal, Systems, and Transforms (EE111)”, Fall 2002.

Journal Publications

Byung-Jun Yoon and Henrique S. Malvar, "A practical approach for the design of nonuniform lapped transforms ", IEEE Signal Processing Letters, to appear.

Byung-Jun Yoon and P. P. Vaidyanathan, "Context-sensitive hidden Markov models for modeling long-range dependencies in symbol sequences", IEEE Transactions on Signal Processing, to appear.

Byung-Jun Yoon and P. P. Vaidyanathan, "A multirate DSP model for non-parametric estimation of discrete probability density functions", IEEE Transactions on Signal Processing, vol. 53, pp. 252-264, 2005.

P. P. Vaidyanathan and **Byung-Jun Yoon**, "The role of signal-processing concepts in Genomics and Proteomics", Journal of the Franklin Institute (Invited paper), Special Issue on Genomics, 2004.

Conference Publications

Byung-Jun Yoon and P. P. Vaidyanathan, “Modeling and identification of alternative folding in regulatory RNAs using context-sensitive HMMs”, IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS), College Station, Texas, May 2006.

Byung-Jun Yoon and P. P. Vaidyanathan, "Profile context-sensitive HMMs for probabilistic modeling of sequences with complex correlations", Proc. 31st International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Toulouse, May 2006.

Byung-Jun Yoon and P. P. Vaidyanathan, "An overview of the role of context-sensitive HMMs in the prediction of ncRNA genes", Proc. IEEE Workshop on Statistical Signal Processing (SSP), Bordeaux, France, July 2005.

Byung-Jun Yoon and P. P. Vaidyanathan, "Scoring algorithm for context-sensitive HMMs with application to RNA secondary structure analysis", Proc. IEEE International Workshop on Genomic Signal Processing and Statistics (GENSIPS), Newport, RI, May 2005.

Byung-Jun Yoon and P. P. Vaidyanathan, "Optimal alignment algorithm for context-sensitive hidden Markov models", Proc. 30th International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Philadelphia, Mar. 2005.

Byung-Jun Yoon and P. P. Vaidyanathan, "RNA secondary structure prediction using context-sensitive hidden Markov models", Proc. International Workshop on Biomedical Circuits and Systems (BioCAS), Singapore, Dec. 2004.

Byung-Jun Yoon and P. P. Vaidyanathan, "HMM with auxiliary memory: a new tool for modeling RNA secondary structures", Proc. 38th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2004.

Byung-Jun Yoon and P. P. Vaidyanathan, "Identification of CpG islands using a bank of simple IIR lowpass filters", Proc. 11th Digital Signal Processing Workshop, Taos Ski Valley, New Mexico, Aug. 2004.

Byung-Jun Yoon and P. P. Vaidyanathan, "Wavelet-based denoising by customized thresholding", Proc. International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Montreal, May 2004.

Byung-Jun Yoon and P. P. Vaidyanathan, "Discrete PDF estimation in the presence of noise", Proc. International Symposium on Circuits and Systems (ISCAS), Vancouver, May 2004.

Byung-Jun Yoon and P. P. Vaidyanathan, "Improved estimation of discrete probability density functions using multirate models", Proc. 37th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2003.

P. P. Vaidyanathan and **Byung-Jun Yoon**, "Discrete probability density estimation using multirate DSP models", Proc. 28th International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Hong Kong, Apr. 2003.

P. P. Vaidyanathan and **Byung-Jun Yoon**, "Digital filters for gene prediction applications", Proc. 36th Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 2002.

P. P. Vaidyanathan and **Byung-Jun Yoon**, "Gene and exon prediction using allpass-based filters", Workshop on Genomic Signal Processing and Statistics, Raleigh, NC, Oct. 2002.

Technical Reports

Byung-Jun Yoon and Henrique S. Malvar, "The design of nonuniform lapped transforms", Microsoft Research Technical Report TR-2005-116, Sep. 2005.

Byung-Jun Yoon and P. P. Vaidyanathan, "Non-parametric estimation of discrete probability density functions using multirate DSP models", Internal Report, Electrical Engineering, Caltech, May 2003.

Professional Service

Served as a reviewer for the following journals:

- IEEE Transactions on Signal Processing
- IEEE Transactions on Image Processing
- IEEE Signal Processing Letters
- IEEE/ACM Transactions on Computational Biology and Bioinformatics

References

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Additional references are available upon request.