Ron J. Weiss

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Current position

Postdoctoral researcher at New York University under the supervision of Prof. Juan Bello.

Research interests

Computer audition, including noise-robust speech recognition, audio source separation in underconstrained conditions, music information retrieval
Machine learning and Bayesian modeling for audio analysis

Education

2009 Oct
PhD in Electrical Engineering, Columbia University
- Dissertation: *Underdetermined Source Separation Using Speaker Subspace Models*
- Committee: Daniel Ellis (advisor), Juan Pablo Bello, Rui Castro, Shih-Fu Chang, Trausti Kristjansson

2007 Oct
MPhil in Electrical Engineering, Columbia University

2005 May
MS in Electrical Engineering, Columbia University
- GPA: 3.9/4.0
- Relevant course work: Speech and Audio Processing and Recognition, Advanced Machine Learning, Speech Recognition, Detection / Estimation Theory

2004 May
BS in Computer Engineering (magna cum laude), Columbia University
- GPA: 3.9/4.0, Major GPA: 4.1/4.0
- Relevant course work: Music Signal Processing, Digital Image Processing

Publications

Journal
M. I. Mandel, R. J. Weiss, and D. P. W. Ellis, "Model-based expectation-maximization source separation and localization," *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 18, pp. 382–394, Feb. 2010.

R. J. Weiss and D. P. W. Ellis, "Speech separation using speaker-adapted eigenvoice speech models," *Computer Speech and Language*, vol. 24, pp. 16–29, Jan. 2010. Special issue on the Speech Separation and Recognition Challenge.

R. J. Weiss, M. I. Mandel, and D. P. W. Ellis, "Combining localization cues and source model constraints for binaural source separation," *Speech Communication*. Special issue on Perceptual and Statistical Audition. in review.

Conference
R. J. Weiss and J. P. Bello, "Identifying Repeated Patterns in Music Using Sparse Convolutive Non-Negative Matrix Factorization," in *Proc. International Society for Music Information Retrieval Conference (ISMIR)*, (Utrecht, Netherlands), pp. 123–128, Aug. 2010. winner of ISMIR 2010 **Best Paper Award**.

T. Bertin-Mahieux, R. J. Weiss, and D. P. W. Ellis, "Clustering Beat-Chroma Patterns in a Large Music Database," in *Proc. International Society for Music Information Retrieval Conference (ISMIR)*, (Utrecht, Netherlands), pp. 111–116, Aug. 2010.

T. Cho, R. J. Weiss, and J. P. Bello, "Exploring Common Variations in State of the Art Chord Recognition Systems," in *Proc. Sound and Music Computing Conference (SMC)*, (Barcelona, Spain), pp. 1–8, July 2010.

R. J. Weiss and D. P. W. Ellis, "A Variational EM Algorithm for Learning Eigenvoice Parameters in Mixed Signals," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, (Taipei, Taiwan), pp. 113–116, Apr. 2009.

R. J. Weiss, M. I. Mandel, and D. P. W. Ellis, "Source separation based on binaural cues and source model constraints," in *Proc. Interspeech*, (Brisbane, Australia), pp. 419–422, Sept. 2008.

R. J. Weiss and T. Kristjansson, "DySANA: Dynamic speech and noise adaptation for voice activity detection," in *Proc. Interspeech*, (Brisbane, Australia), pp. 127–130, Sept. 2008.

R. J. Weiss and D. P. W. Ellis, "Monaural speech separation using source-adapted models," in *Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, (New Paltz, USA), pp. 114–117, Oct. 2007.

D. P. W. Ellis and R. J. Weiss, "Model-based monaural source separation using a vector-quantized phase-vocoder representation," in *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, (Toulouse, France), pp. V–957–960, May 2006.

Workshop   R. J. Weiss and D. P. W. Ellis, "Estimating single-channel source separation masks: Relevance vector machine classifiers vs. pitch-based masking," in *Proc. ISCA Tutorial and Research Workshop on Statistical and Perceptual Audition (SAPA)*, (Pittsburgh, USA), pp. 31–36, Sept. 2006.

Patents   R. J. Weiss and T. Kristjansson, "Speech Detection", covers DySANA algorithm for signal-to-noise ratio adaptive voice activity detection developed at Google, filed Mar 2008.

Experience

2009 – present   **New York University**, Postdoctoral Researcher, Music and Audio Research Lab

- Investigating sequential models of music audio for content-based retrieval.
- Advising graduate students, taught graduate level class on digital signal processing.
- Maintained open source database management system for very large music collections. Available at `http://bitbucket.org/ronw/gordon`

2004 – 2009   **Columbia University**, Graduate Research Assistant, LabROSA

- Studied applications of machine learning to underdetermined source separation.
- Studied music signal analysis and algorithmic composition.
- Developed MEAPsoft, open source software package for audio/music analysis and reorganization. Available at `http://www.meapsoft.org`

2008 Jan – Mar   **Google, Inc.**, Software Engineering Intern
2007 Jun – Sep
- Studied voice activity detection (VAD) algorithms to improve performance of Goog411 (`http://www.google.com/goog411`) speech recognition in adverse environments.
- Developed novel VAD algorithm that adapts to changing environmental noise conditions. See related publication and patent above.
- Developed speech endpointing evaluation framework in Python.

2003 Fall	**Columbia University**, Research Assistant, Multimedia Signal Processing Lab

- Explored the feasibility of designing low power MPEG-4 video processors based on the logarithmic number system.
- Performed software simulations of MPEG-4 video encoder/decoder and evaluated testing procedures.

2003 May – Aug	**Desktop Laboratories, Inc.**, Software Engineer

- Developed elementary school math and science education software using LabVIEW.
- Developed web-based product registration system in PHP.

2002–2003 May	**Columbia University Dept. of Computer Science**, Systems Administrator, Central Research Facility

- Assisted in maintenance of the compute resources for the CS department.
- Maintained 500+ Sun Solaris, Microsoft Windows, and RedHat Linux machines including user accounts, backups, upgrading and installing software, security, and printers. Managed DHCP, DNS, NIS, NFS, and mail systems.

Teaching

2010 Spring	Adjunct Professor (NYU): E85.2607 - Advanced Digital Signal Theory
2007 Spring	Co-lecturer (Columbia): ELEN E4896 - Music Signal Processing
2005 Spring	Teaching Assistant (Columbia): ELEN E4896 - Music Signal Processing
2004 Fall	Teaching Assistant (Columbia): ECBM E4060 - Introduction to Genomic Information Systems
2003 Fall	Teaching Assistant (Columbia): COMS W4118 - Operating Systems I

Skills

Software design and implementation in Python (including NumPy/SciPy), Matlab, Java (including Swing and audio libraries), C/C++ , UNIX shell scripting.

Design and implementation of machine learning and signal processing algorithms.

Extensive Unix/Linux system administration experience.

Facility with GNU programming tools, distributed version control systems, LaTeX, Emacs.

Other contributions

Awards	11th International Society for Music Information Retrieval Conference Best Paper Award, 2010
	Department of Electrical Engineering Teaching Fellowship, 2004-2005
	Inducted into Tau Beta Pi engineering honor society, 2003
	Columbia University Dean's List, 2000 – 2002
Service	Co-organizer of North Eastern Music Information Special Interest Group (NEMISIG) workshop, January 2010
Reviews	EURASIP Journal on Audio, Speech, and Music Processing, 2008
	IEEE International Conference on Audio, Speech and Signal Processing, 2006–2010
	IEEE Signal Processing Letters, 2010
	IEEE Transactions on Audio, Speech and Language Processing, 2007–2010

International Conference on Music Information Retrieval, 2006–2007, 2010
ISCA Workshop on Statistical and Perceptual Audio Processing, 2006–2010
Pattern Recognition, 2009
Speech Communication, 2010

Associations   Member of the Institute of Electrical and Electronics Engineers since 2005.

Member of the International Speech Communications Association since 2006.

New York, August 16, 2010