

Contact

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Education

Ph.D. Computer Science, Columbia University, May, 2009.

Dissertation Title: Automatic Detection and Classification of Prosodic Events

Awarded Distinction

Advisor: Prof. Julia Hirschberg

Committee: Prof. Kathy McKeown, Prof. Dan Ellis, Prof. Mari Ostendorf, Dr. Martin Jansche

M.Sc. Computer Science, Columbia University, 2005.

B.A. Computer Science, Cognitive Science, Vassar College, 2001. Distinction in Computer Science.

Positions

Director, Computational Linguistics Program
NYC, NY

CUNY Graduate Center
September 2013 - Present

Led the Computational Linguistics Program, a sub-program of the Linguistics Program at the CUNY Graduate Center, conferring MA's with concentrations in Computational Linguistics, and PhD certificates.

Assistant Professor of Computer Science
Queens, NY

Queens College (CUNY)
September 2009 - Present

Joint Appointments to the Doctoral Faculty in the Computer Science and Linguistics Programs at the CUNY Graduate Center.

Senior Software Engineer
IBM TJ Watson Research Center
Yorktown Heights, NY

Manager: Bhuvana Ramabhadran
December 2009 - Present

Speech Synthesis Quality improvements and prosody modeling contributing to the IBM Jeopardy! Challenge.

Software Engineering Intern
Google Inc.

Host: Terry Tai
Summer 2008

Worked as part of the Speech Team in NYC to develop and implement prosody assignment for Google's Speech Synthesis system.

Software Engineering Intern
Google Inc.

Host: Vida Ha
Summer 2007

Worked as part of the Mobile Team in NYC to improve Mobile and SMS (Text Message) Search Quality.

Assistant Statistician
Data Analysis Services

Ed Binkowski
2001-2003

Verified compliance with HIPAA privacy regulation and developed HIPAA-compliant information products for Merck Medco (now Medco Health).

Academic Research

Representing Prosodic Information 2005–Present
Speech recognition and translation systems, as well as spoken dialog systems, can be improved if we can identify focussed or *salient* information. We are developing a system that identifies *pitch accent* and *phrase boundaries* in American English spontaneous and read speech. Current performance approaches human levels. Further research works to identify the the most efficient and reliable representation of prosodic information for spoken language processing applications.

Deceptive Speech across Cultures 2011–Present
Deception in speech is indicated by a wide range of spoken behaviors. These vary both within and across speakers. We are currently examining the cultural contributions to deceptive behavior. There is also evidence that a listener’s personality can have a significant impact in their ability to detect deception. We are expanding this investigation to explore the impact of a *speaker’s* personality on cues of deception in their speech.

Using Prosody to Improve Speech Indexing in Low-Resource Languages 2012–Present
Prosody has been shown to improve speech recognition in small scale experiments, but its impact is overwhelmed by the amount of data available to state-of-the-art speech recognizers. We are exploring the use of prosody for those languages where the thousands of hours of training material necessary for training commercial system is unavailable.

Using Keystroke Dynamics as a User Authentication Modality 2012–Present
As users of keyboards, we are constantly generating keystroke data. Along with collaborators at NYIT and Louisiana Tech, we are exploring novel ways to perform user authentication based on keystroke data coupled with linguistic and cognitive information.

Charismatic and Political Speech 2004–2007, 2011–Present
Automatic analysis of a speakers’ charisma can serve as a diagnostic/instructional tool for public speakers, or a tool to identify potentially influential future leaders. We investigated acoustic and lexical correlates in American politicians based on subject perceptions of spoken and read stimuli. Moreover, we examined the cultural influences of perceptions of charisma by collecting responses from Palestinian Arabic and Swedish subjects. Corresponding studies were also performed on Palestinian Arabic political speech. We are currently studying the use of rhetoric in US Presidential debates.

Broadcast News Story Segmentation 2005–2009
Information retrieval and question answering procedures often make the assumption that a document will contain information only on a single topic, which is not the case for Broadcast News. In order to apply these techniques to news transcripts, individual stories must be identified. As part of the DARPA GALE program, we are developing a module to perform story segmentation of broadcast news in English, Mandarin and Arabic. Acoustic and lexical features are used as cues to boundaries.

Teaching

Methods in Computational Linguistics II, CUNY Graduate Center, Spring 2014.
Natural Language Processing, Machine Learning and The Web, Fall 2013.
Research Practicum, Queens College, Fall 2012.
Machine Learning, Queens College, Spring 2012.
Methods in Computational Linguistics II, CUNY Graduate Center, Spring 2012.
Spoken Language Processing, Queens College, Fall 2011.
Algorithms I, Queens College, Fall 2011.
Machine Learning, CUNY Graduate Center, Spring 2011.
Algorithms I, Queens College, Spring 2011.
Methods in Computational Linguistics I, CUNY Graduate Center, Fall 2010.
Algorithms I, Queens College, Fall 2010.
Machine Learning, CUNY Graduate Center, Spring 2010.
Machine Learning, Queens College, Spring 2010.
Algorithms I, Queens College, Fall 2009.
Teaching Assistant, Natural Language Processing, Columbia University, Fall 2006.
Prof. Julia Hirschberg
Head Teaching Assistant, Artificial Intelligence, Columbia University, Fall 2004.
Prof. Kathy McKeown

Activities

Member	ACL (2004-) IEEE (2012-) ISCA (2005-) Sigma Xi (2011-)
Journal Reviewer	Computational Linguistics (2011) Computer Speech and Language (2010, 2011) Corpus Linguistics and Linguistic Theory (2007) EURASIP (2013, 2014) IEEE Transactions on Affective Computing (2013) IEEE Transactions on Audio, Speech and Language Processing (2008, 2012) International Journal of Digital Multimedia Broadcasting (2009, 2010) Journal of the Acoustical Society of America (2011) Journal of Speech Sciences (2012) Journal of Phonetics (2014) Language and Speech (2014) Multimedia Systems (2007, 2008) Pattern Recognition (2010, 2011, 2012) Speech Communication (2010, 2013, 2014) Universal Access in the Information Society (2014)

- Conference Activities** IJCAI 2016 **Local Arrangements Committee Member, Volunteer Chair**
HLT-NAACL 2015 Program Committee Member
ICASSP 2015 Reviewer
Innovative Use of NLP for Building Educational Applications, BEA9 (2014)
EMNLP 2014 Program Committee Member
Interspeech 2014 Program Committee Member
ICASSP 2014 Reviewer
*SEM 2013 Committee Member
Tools and Resources for the Analysis of
Speech Prosody (TRASP) 2013 Scientific Committee Member
Interspeech 2013 Program Committee Member
Innovative Use of NLP for Building Educational Applications, BEA8 (2013)
ACL 2013 Program Committee Member
AAAI 2013 Program Committee Member
HLT-NAACL 2013 Program Committee Member
Interspeech 2013 Program Committee Member
IEEE SLT 2012 **Publication Co-Chair**
Interspeech 2012 Program Committee Member, **Session Chair**
LREC 2012 Program Committee Member
ACL 2012 Program Committee Member
NAACL HLT 2012 Program Committee Member
Innovative Use of NLP for Building Educational Applications, BEA7 (2012)
Workshop on Unsupervised Learning in NLP (2012) PC Member
EMNLP 2011 Program Committee Member
Interspeech 2011 Scientific Review Committee Member
ICJAI 2011 Program Committee Member
The 6th Workshop on Innovative Use of NLP
for Building Educational Applications (2011)
ACL 2010 Program Committee Member
Interspeech 2010 Scientific Review Committee Member
- Ad Hoc Reviewing** U.S. NSF IIS Program Ad Hoc Reviewer (Spring 2014)
U.S. NSF BCS Program Ad Hoc Reviewer (Spring 2012)
Indiana 21st Century Research and Technology Fund (Spring 2011)
U.S. NSF IIS Program Ad Hoc Reviewer (Spring 2011)
PSC-CUNY Grant Program (Spring 2011)
National Sciences and Engineering Research Council of Canada (Winter 2011)
U.S. NSF IIS Program Panel Member (Spring 2010)
- Organizing** Data Issues in Prosody Research Workshop **Organizer** (Jan 11-12, 2013)
Organizer for the North American Computational Linguistics Olympiad
(NACLO) 2010 (New York area)
Organizer of CUNY Natural Language Processing Seminar 2009-Present
- Research Blog** Spoken Language Processing (since 2010)
<http://spokenlanguageprocessing.blogspot.com>

Invited Talks

- “More than Words: Advancing Prosodic Analysis”, CUNY CS Colloquium, November 14, 2014
- “Incremental TTS Discussion” Panel, Workshop on Simultaneous Interpretation and Multimodal Translation, March 25-26, 2013
- “Teaching Computers to Talk” Queens College Computer Science and Math Alumni Reception. March 7, 2013
- “Cross-Language Prosodic Analysis” January 25, 2013, AT&T Shannon Labs
- “Noisy Text – Techniques and Tools for Prosodic Analysis” October 8, 2012, USC SAIL Lab
- “Reciprosody: Requirements for a Successful Repository of Prosodically Annotated Material” April 14, 2012, Ohio State Workshop on Prosodic Annotation
- “The Sound of Speech: Prosody in Spoken Language Understanding” November 22, 2011, Queens College Sigma Xi Faculty Forum
- “It’s not just what you say but how you say it: Prosodic analysis and its application to training and assessment of non-native speakers” November 8, 2011, CUNY Psycholinguistics Supper
- “More than Words Can Say: Prosodic Analysis Techniques and Applications” August 29, 2011, Interspeech 2011 Tutorial
- “Symbolic and Direct Modeling of Prosody” July 19, 2011, Educational Testing Service
- “Speech is More than Noisy Text: Prosodic Analysis and Core NLP Tasks” April 29, 2011, CUNY-NLP Seminar, The CUNY Graduate Center.
- “What is Watson?” March 2, 2011. Queens College Chapter of ACM Meeting
- “What is Watson?” February 15, 2011. City College. IBM Jeopardy! Challenge Watch Event.
- “Speech is More than Noisy Text: Prosodic Analysis Application and Techniques” December 1, 2010. AT&T Shannon Labs.
- “Biometric Voice Applications: Speaker Verification and Recognition” August 23, 2010. Biometric Seminar Day at Queens College.

Publications**2014**

- Rosenberg, A., Enos, F. and Hirschberg, J. “Measuring the Voice” in “APA Handbook of Nonverbal Communication”, ed. Nakamoto, D. American Psychological Association. (in press)
- Katerenchuk, D., Brizan, D. G. and Rosenberg, A. “Was that your mother on the phone?: Classifying Interpersonal Relationships between Dialog Participants with Lexical and Acoustic Properties” Interspeech 2014, Singapore.
- Katerenchuk, D. and Rosenberg, A. “Improving Named Entity Recognition with Prosodic Features” Interspeech 2014, Singapore.
- Ma, M., Richards, J., Soto, V., Hirschberg, J. and Rosenberg, A. “Strategies for Rescoring Keyword Search Results Using Word-Burst and Acoustic Features”, Interspeech 2014, Singapore.
- Soto, V., Mangu, L., Rosenberg, A. and Hirschberg, J., “A Comparison of Multiple Methods for Rescoring Keyword Search Lists for Low Resource Languages”, Interspeech 2014, Singapore.
- Fernandez, R., Cui, J., Rosenberg, A., Ramabhadran, B., and Cui, X. “Exploiting Vocal-Source Features to Improve ASR Accuracy for Low-Resource Languages” Interspeech 2014, Singapore.
- Cui, X., Kingsbury, B., Cui, J., Ramabhadran, B., Rosenberg, A., Rasooli, M. S., Rambow, O., Habash, N. and Goel, V. “Improving Deep Neural Network Acoustic Modeling For Audio Corpus Indexing Under The IARPA Babel Program” Interspeech 2014, Singapore.

Cui, J., Ramabhadran, B., Cui, X., Rosenberg, A., Kingsbury, B. and Sethy, A., “Recent Improvements in Neural Network Acoustic Modeling for LVCSR in Low Resource Languages” Interspeech 2014, Singapore.

Richards, J., Ma, M. and Rosenberg, A. “Using Word Burst Analysis to Rescore Keyword Search Candidates on Low-Resource Languages”, ICASSP 2014, Florence, Italy

Soto, V., Cooper, E., Mangu, L., Rosenberg, A. and Hirschberg, J. “Rescoring Confusion Networks For Keyword Search”, ICASSP 2014, Florence, Italy

Moniz, H., Mata, A. I., Hirschberg, J., Batistia, F., Rosenberg, A. and Trancoso, I. “Extending AuToBI to prominence detection in European Portuguese”, Speech Prosody 2014, Dublin, Ireland

2013

Grezes, F., Richards, J., and Rosenberg, A. “Let Me Finish: Automatic Conflict Detection Using Speaker Overlap”. Interspeech 2013. Lyon, France

Rakov, R., and Rosenbert, A. “Sure I Did the Right Thing: A System for Sarcasm Detection in Speech”. Interspeech 2013. Lyon, France

Rosenberg, A. “Modeling Prosodic Sequences with K-Means and Dirichlet Process GMMs” Interspeech 2013. Lyon, France

Brizan, D. G., An, G., Rosenberg A. “Detecting Laughter and Filled Pauses Using Syllable-based Features”. Interspeech 2013. Lyon, France

Soto, V., Cooper, E., Rosenberg, A., and Hirschberg, J. “Cross-Language Phrase Boundary Prediction”. ICASSP 2013. Vancouver, Canada

2012

Rosenberg, A. “Rethinking the Corpus: Moving towards Dynamic Linguistic Resources”, Interspeech 2012

Rosenberg, A. “Classifying Skewed Data: Importance Weighting to Optimize Average Recall”, Interspeech 2012

Rosenberg, A., Fernandez R., and Ramabhadran, B. “Prosody Modeling for Phrase Boundary Assignment from Text in Multiple Domains”, Interspeech 2012

Rosenberg, A. “Using Prominence and Phrasing Predictions to Improve Weighted Dictionary Pronunciation Models”, Interspeech 2012

Maskey, S., and Rosenberg, A. “Power mean Pyramid Scores for Summarization Evaluation”, Interspeech 2012

Kaplan, I., and Rosenberg, A. “Analysis of Speech Transcripts to Predict Winners of Presidential and Vice-Presidential Debates”, IEEE SLT 2012

Rosenberg, A. “Modeling Intensity Contours and the Interaction between Pitch and Intensity to Improve Automatic Prosodic Event Detection and Classification”, IEEE SLT 2012

Rosenberg, A., Cooper, E., Levitan, R., and Hirschberg, J. “Cross-Language Prominence Detection”, Speech Prosody 2012.

2011

Wang, W., Biadsy, F., Rosenberg, A., and Hirschberg, J. Automatic Detection of Speaker State: Lexical, Prosodic, and Phonetic Approaches to Level-of-Interest and Intoxication Classification. Computer Speech and Language 2011 (accepted).

Rosenberg, A. Using Mutual Information to Identify Regions of Analysis for Prosodic Analysis. INTERSPEECH 2011

Rosenberg, A. Symbolic and Direct Sequential Modeling of Prosody for Classification of Speaking-Style and Nativeness. INTERSPEECH 2011

Wang, W., Biadys, F., Rosenberg, A., and Hirschberg, J. Intoxication Detection using Phonetic, Phonotactic and Prosodic Cues. INTERSPEECH 2011

Rosenberg, A., Fernandez, R. and Ramabhadran, B. “What is Dengue Fever...” Modeling and Predicting Pronunciation Errors in a Text-to-Speech System. INTERSPEECH 2011

Huenerfauth, M., Lu P., and Rosenberg, A. Evaluating Importance of Facial Expression in American Sign Language and Pidgin Signed English Animations. The 13th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS) 2011.

Icke, I. and Rosenberg A. Multiobjective Genetic Programming for Visual Analytics. EuroGP 2011.

2010

Rosenberg, A. AuToBI – A tool for Automatic ToBI annotation. INTERSPEECH. 2010

Rosenberg, A. Classification of Prosodic Events using Quantized Contour Modeling. HLT-NAACL 2010.

Rosenberg, A. and Hirschberg, J. Production of English Prominence by Native Mandarin Chinese Speakers. Prosodic Prominence Workshop at Speech Prosody. 2010

Rosenberg, A. and Hirschberg, J. Perception of English Prominence by Native Mandarin Chinese Speakers. Speech Prosody. 2010

Icke, I. and Rosenberg, A. Dimensionality Reduction Using Symbolic Regression. GECCO. 2010

2009

Rosenberg, A. Automatic Detection and Classification of Prosodic Events. Ph.D. Thesis. Columbia University. 2009.

Rosenberg, A. and Hirschberg, J. Detecting Pitch Accents at the Word, Syllable and Vowel Level. HLT/NAACL. 2009.

2008

Rosenberg, A. and Hirschberg, J. Charisma Perception from Text and Speech. Speech Communication. 2008, 51 (7), 640-655.

Ostendorf, M., Favre, B., Grishman, R., Hakkani-Tur, D., Harper, M., Hillard, D., Hirschberg, J., Heng Ji, Kahn, J.G., Yang Liu, Maskey, S., Matusov, E., Ney, H., Rosenberg, A., Shriberg, E., Wen Wang, Wooters, C. Speech Segmentation and Spoken Document Processing. IEEE Signal Processing Magazine 25(3). May 2008. 59–69.

Maskey, S., Rosenberg, A. and Hirschberg, J. Extractive Speech Summarization: What Speech Unit to Extract?. INTERSPEECH '08.

Biadys, F., Rosenberg, A., Carlson, R., Hirschberg, J, and Strangert, E. A Cross-Cultural Comparison of American, Palestinian, and Swedish Perception of Charismatic Speech. Speech Prosody. May 2008.

2007

Rosenberg, A. and Hirschberg, J. 2007. Detecting Pitch Accent Using Pitch-corrected Energy-based Predictors. INTERSPEECH '07

Rosenberg, A., Sharifi, M. and Hirschberg, J. 2007. Varying Input Segmentation for Story Boundary Detection in English, Arabic and Mandarin Broadcast News. INTERSPEECH '07

Rosenberg, A. and Hirschberg, J. 2007. V-Measure: A conditional entropy-based external cluster evaluation measure. EMNLP '07

Biadys, F., Hirschberg, J., Dakka, W., and Rosenberg, A. 2007. Comparing American and Palestinian Perceptions of Charisma Using Acoustic-Prosodic and Lexical Analysis. INTERSPEECH '07

2006 and earlier

Rosenberg, A. and Hirschberg, J. 2006. On the Correlation of Energy and Pitch Accent in Read English Speech. INTERSPEECH '06

Rosenberg, A. and Hirschberg, J. 2006. Story Segmentation of Broadcast News in English, Mandarin and Arabic. HLT/NAACL '06

Rosenberg, A. and Hirschberg, J. 2005. Acoustic/Prosodic and Lexical Correlates of Charismatic Speech. EUROSPEECH'05

Rosenberg, A. and Binkowski, E. 2004. Augmenting the Kappa Statistic to Determine Interannotator Reliability for Multiply Labeled Data Points. HLT/NAACL '04

Grants and Awards

CUNY Junior Faculty Research Award in Science and Engineering. 2014. \$50,000

NSF CAREER: "More than Words: Advancing to Prosodic Analysis". June 2014-May 2019, \$507,568

Defense Advanced Research Projects Agency (DARPA) Active Authentication Phase II. "Context Aware Active Authentication using Touch Gestures, Typing Patterns, and Body Movements", 2013 (18 mos.), \$251,493

PSC-CUNY Research Enhancement Fund "Development and Pilot Testing of a Computerized Personal Reading Tutoring Program" 2012 \$20,000

2012 IBM Watson Solutions Faculty Award \$10,000

Defense Advanced Research Projects Agency (DARPA) "SPARKLER: Scalable Prosodic, Anomaly and Relational Knowledge exploration of Language with Enhanced Robustness" 2012-2017 \$500,231

NSF IGERT: "From Data to Solutions: A New PhD Program in Transformational Data & Information Sciences Research and Innovation." 2012-2017 \$210,566

NSF-CRI "RUI: Collaborative Research: CI-P: Reciprosody - A Repository for Prosodically Annotated Material" 2012-2013 \$50,000

Defense Advanced Research Projects Agency (DARPA) Active Authentication "Investigating Cognitive Rhythms as a New Modality for Continuous Authentication" 2012-2013 (11mos.) \$151,091

Intelligence Advanced Research Projects Activity (IARPA) "LORELEI - Low Resource Language Indexing" 2012-2014 (27 of 51 mos.) \$263,162 of \$501,790

Air Force Office of Scientific Research (AFOSR) "Identifying Deceptive Speech Across Cultures" 2011-2015 \$400,869

PSC-CUNY Research Enhancement Fund "Generating Expressive Cued Speech from Audio Speech Signals" 2010 \$12,800

2009 PhD Thesis awarded Distinction (Columbia University)

Patents

"Computer system and method for de-identification of patient and/or individual health and/or medical related information, such as patient micro-data" US #8447738, granted 5/21/2013 (with E. Binkowski and M. Rosenwein)

"Generating Prosodic Contours for Synthesized Speech" US #8321225 granted 11/27/2012 (with M. Jansche, M. Riley and T. Tai)

Software – all available from <http://eniac.cs.qc.cuny.edu/andrew/>

AuToBI – An open source package and models for detecting and classifying prosodic events. Written in java.

V-Measure – A java implementation to calculate external cluster evaluation measures, including V-measure.

Skills

Language: English (native); familiar with Spanish.

Computer: C++, Java, Python, Perl, Unix, Linux, Windows, Mac, L^AT_EX, Praat, Weka, Matlab, PL/SQL, MS Access, php, Ruby on Rails.

Other: ToBI annotation (150 minutes: Columbia Games Corpus; 168 mins: Educational Testing Service; 24 mins: Mandarin Chinese accented Read English)

PhD Students

Ilknur Icke (Graduated 2011), Guozhen An, David-Guy Brizan, Felix Grezes, Denys Katerenchuk, Min Ma, Michelle Morales, Rachel Rakov, Ali Raza Syed