

CHIN-HUI LEE
PROFESSOR
SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING
JANUARY 2018

I. EARNED DEGREES

- Ph.D. - Department of Electrical Engineering, University of Washington, Seattle, WA. 1981
- M.S. - Department of Engineering and Applied Science, Yale University, New Haven, CT. 1977
- B.S. - Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan, 1973

II. EMPLOYMENT

- Professor, School of Electrical and Computer Engineering, Georgia Tech, 9/2002 – Present.
- Professor, School of Computing, National University of Singapore, 8/2001-8/2002
- Director, Dialogue Research, Lucent Technologies Bell Labs, Murray Hill, NJ., 1997-2001
- Member of Technical Staff and Distinguished MTS, AT&T Bell Labs, Murray Hill, NJ., 1986-1996
- DSP Group Manager, Digital Sound Corporation, Santa Barbara, CA., 1984-1986
- Senior Research Scientist, Verbex Corporation, Bedford, MA., 1981-1983

III. TEACHING

A. INDIVIDUAL STUDENT GUIDANCE

A1. Ph.D. Students

A1.1. Graduated Ph.D. Students

1. Qiang Huo, University of Science and Technology, Hefei, China, and The University of Hong Kong, CS Department, PhD 1993, “Bayesian Learning of the Parameters of Hidden Markov Models” (Co-advisor, responsible for technical supervision)
2. Chih-Heng Lin, National Taiwan University, Taipei, Taiwan, EE Department, PhD 1994, “Speaker Adaptation Based on Hidden Markov Models” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
3. Chih-Shih Liu, National Tsing Hua University, Hsinchu, Taiwan, EE Department, PhD 1995, “Discriminative Training for Speaker Verification” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
4. Jen-Tzung Chien, National Tsing Hua University, Hsinchu, Taiwan, EE Department, PhD 1997, “Speaker Adaptation Using MAP Transformation and Adaptation” (Co-advisor, responsible for technical supervision)
5. Arun C. Surendran, Rutgers University, EE Department, PhD 1998, “Non-linear Maximum Likelihood Stochastic Matching for Robust Speech Recognition” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
6. Cristina Chesta, Politecnico di Torino, Italy, PhD 1999, “Joint Maximum A Posteriori Linear Regression for Robust Speech Recognition” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
7. Koichi Shinoda, Tokyo Institute of Technology, CS Department, PhD 2001, “A Structural Maximum A Posteriori (SMAP) Approach to Speech Recognition” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
8. Tor Andre Myrvoll, Norwegian University of Science and Technology, Department of Telecommunications, PhD 2002, “A Structural Maximum a Posteriori Linear Regression (SMAPLR) Approach to Speech Recognition” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
9. Chao-Shih Huang, National Tsing Hua University, Hsinchu, Taiwan, EE, PhD 2003, “Error Rate Reduction and Estimation for Robust Speech Recognition” (Co-advisor, responsible for technical

- supervision, most work done at Bell Labs, Murray Hill and National University of Singapore)
10. Namunu C. Maddage, National University of Singapore, CS Department, Ph.D. graduated Fall 2006 (Co-advisor, responsible for technical supervision, work done at National University of Singapore)
 11. Rui Shi, National University of Singapore, CS Department, PhD Graduating in Fall 2008 (Co-advisor, responsible for technical supervision, most work done at National University of Singapore)
 12. Jinyu Li, Georgia Institute of Technology, School of ECE, PhD, Fall 2008, “Soft Margin Estimation for Automatic Speech Recognition”
 13. Sibel Yaman, MSR Fellow, Georgia Tech, School of ECE, PhD, Fall 2008, “A Multi-objective Programming Perspective to Statistical Learning Problems”
 14. Yu Tsao, Georgia Institute of Technology, School of ECE, Ph.D., Fall 2008, “An Ensemble Speaker and Speaking Environment Modeling Approach to Robust Speech Recognition”
 15. Chengyuan Ma, Georgia Institute of Technology, School of ECE, PhD, Fall 2009, “A Detection-Based Pattern Recognition Framework and Its Applications”
 16. Jeremy Reed, Georgia Institute of Technology, School of ECE, PhD, Fall 2010, “Acoustic Segment Modeling and Preference Ranking for Music Information Retrieval”
 17. Byungki Byun, Georgia Institute of Technology, School of ECE, PhD, Fall 2011, “On Discriminative Semi-Supervised Incremental Learning with a Multi-View Perspective for Image Concept Modeling”
 18. Aleem Mushtaq, Georgia Institute of Technology, School of ECE, PhD, Spring 2013, “An Integrated Approach to Feature Compensation Combining Particle Filters and Hidden Markov Models for Robust Speech Recognition”
 19. Ilseo Kim, Georgia Institute of Technology, School of ECE, PhD, Spring 2013, “Per-exemplar Analysis with MFoM Fusion Learning for Multimedia Retrieval and Recounting”
 20. Zhiyuan Sheng, Harbin Institute of Technology, PhD, Spring 2014, “Blood Flow Estimation for Ultrasound Color Flow Imaging”
 21. You-Chi Cheng, Georgia Institute of Technology, School of ECE, PhD, Spring 2015, “Robust Gesture Recognition”
 22. Yong Xu, University of Science and Technology of China, PhD, Spring 2015, “Research on Deep Neural Network Based Speech Enhancement”
 23. I-Fan Chen, Georgia Institute of Technology, School of ECE, PhD, Fall 2015, “Resource-Dependent Spoken Keyword Search”
 24. Sadia Shakil, Georgia Institute of Technology, School of ECE, PhD, Spring 2016, “Windowing Effect and Adaptive Change Point Detection of Dynamic Functional Connectivity in the Brain”
 25. Yannan Wang, University of Science and Technology of China, PhD, Spring 2017, “Speaker-Independent Single-Channel Speech Separation Based on Deep Models”
 26. Zhen Huang, Georgia Institute of Technology, School of ECE, PhD, Summer 2017, “Bayesian Adaptation and Combination of Deep Models for Automatic Speech Recognition”
 27. Bo Wu, Xidian University (two-year visiting PhD student), Spring 2018, “Research on Deep Neural Network Based Speech Dereverberation”

A1.2. Current Ph.D. Students

1. Kehuang Li, Georgia Tech, ECE, PhD, started Spring 2013
2. Wei Li, Georgia Tech, ECE, PhD, started Fall 2014
3. Sicheng Wang, Georgia Tech, ECE, PhD, started Fall 2016

A2. Master Students

A2.1. Graduated Master Students

1. Jeff H.-K. Kuo, Massachusetts Institute of Technology, M.S. 1994, “Speaker Clustering for Talker Group Identification” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
2. Jorge Alvarez-Cercadillo, Technical University of Madrid, Spain, M.S. 1996, “Acoustic Modeling of Context Dependent Units for Large Vocabulary Speech Recognition in Spanish” (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
3. J.J. Molina-Perez, Technical University of Madrid, Spain, M.S. 1998, “Task-Independent Subword Selection and Modeling for Speech Recognition” (Co-advisor, responsible for technical supervision,

most work done at Bell Labs, Murray Hill)

4. Benoit Launay, Technical University of Munich, Germany, M.S. 2001, "Knowledge-Based Feature Extraction for Large Vocabulary Continuous Speech Recognition" (Co-advisor, responsible for technical supervision, most work done at Bell Labs, Murray Hill)
5. Wen Wu, National University of Singapore, CS Department, M.Sc. 2003, "A Maximal Figure-of-Merit Learning Approach to Text Categorization" (Co-advisor, responsible for technical supervision, most work done at National University of Singapore)
6. Namunu C. Maddage, National University of Singapore, CS Department, M.Sc. 2003, , "Statistical Analysis of Musical Instruments" (Co-advisor, responsible for technical supervision, most work done at National University of Singapore)
7. Dominik Loefer, Georgia Institute of Technology, ECE Department, M.Sc. 2006, "Instrument Timbres and Pitch Estimation in Polyphonic Music"

A3. Undergraduate Students

1. Toma Ioan, National University of Singapore, CS Department, Intern from Romania, B.S. 2002, "Discriminative Semantic Models for Topic Spotting"
2. Vivien Chua, Georgia Tech, School of ECE, "Identification of Phonemes Using Neural Networks"
3. Vincent Lacey, Georgia Tech, School of ECE, Ongoing undergraduate research
4. Shai Messinger, Georgia Tech, School of ECE, Ongoing undergraduate research
5. Alan Dong, Georgia Tech, School of ECE, Ongoing undergraduate research

B. OTHER TEACHING ACTIVITIES

- Developed Columbia University Course EE 6820: Fundamentals of Automatic Speech Recognition, Fall Semester 1998 (following Rabiner's textbook)
- Developed National University of Singapore Course CS6212: Speech and Language Processing, Fall Semester 2001 (Fundamentals of Speech and Language Processing)
- Developed National University of Singapore Course CS3242: Hypermedia Information Processing, Spring Semester, 2002 (multimedia systems and technologies and applications on internet)
- Developed ECE6255 at <http://www.ece.gatech.edu/~chl/ECE6255.sp04> (Digital Speech Processing)
- Developed ECE3075 at <http://www.ece.gatech.edu/~chl/ECE3075.sum04> (Random Signals)
- Developed ECE8813 at <http://www.ece.gatech.edu/~chl/ECE8133.sp07> (Statistical NLP)
- Developed ECE7252 at <http://www.ece.gatech.edu/~chl/ECE7252.sp08> (Machine Learning for DSP)
- Developed new ECE6254 in Spring 2012 on T-Square (Statistical Signal processing)
- Developed new course materials for ECE2026 in Spring 2012 on T-Square (DSP First)

IV. SCHOLARLY ACCOMPLISHMENTS

A. PUBLISHED BOOKS AND PARTS OF BOOKS

- [1] C.-H. Lee, F. K. Soong and K. K. Paliwal (eds), *Automatic Speech and Speaker Recognition: Advanced Topics*, Kluwer Academic Publishers, 1996.
- [2] Paul Dalsgaard, Chin-Hui Lee, Paul Heisterkamp, and Ron Cole (editors), *Proceedings ESCA Workshop on Interactive Dialogue in Multi-Modal Systems*, 1999.
- [3] C.-H. Lee, H. Li, L.-s. Lee, R.-H. Wang, and Q. Huo (eds), *Advances in Chinese Spoken Language Processing*, World Scientific Publishing Co., 2006.
- [4] C.-H. Lee (Part G Editor), "Language Identification," in *Springer Handbook on Speech Processing and Speech Communication*, J. Benesty, Y. Hunag. M. M. Sondhi, Editors, Springer-Verlag, 2008.
- [5] R. Pieraccini, C.-H. Lee, E. Giachin, and L. R. Rabiner, "An Efficient Structure for Continuous Speech Recognition," in *Speech Recognition and Understanding: Recent Advances, Trends and Applications*, NATO ASI Series F, P. Laface Editor, Springer-Verlag, 1991.
- [6] C.-H. Lee, L. R. Rabiner and R. Pieraccini, "Speaker-Independent Continuous Speech Recognition Using Continuous Density Hidden Markov Models," in *Speech Recognition and Understanding: Recent Advances, Trends and Applications*, NATO ASI Series F, P. Laface Editor, Springer-Verlag, 1991.
- [7] C.-H. Lee and J.-L. Gauvain, "Adaptive Learning in Acoustic and Language Modeling," in *New Advances and Trends in Speech Recognition and Coding*, NATO ASI Series F, A. Rubio Editor, Springer-Verlag, 1995.

- [8] B.-H. Juang, W. Chou, and C.-H. Lee, "Statistical and Discriminative Methods for Speech Recognition," in *New Advances and Trends in Speech Recognition and Coding*, NATO ASI Series F, A. Rubio Editor, Springer-Verlag, 1995.
- [9] C.-H. Lee and J.-L. Gauvain, "Bayesian Adaptive Learning and MAP Estimation of HMM," in *Automatic Speech and Speaker Recognition: Advanced Topics*, C.-H. Lee, F. K. Soong and K. K. Paliwal Editors, Kluwer Academic Publishers, 1996.
- [10] B.-H. Juang, W. Chou, and C.-H. Lee, "Statistical and Discriminative Methods for Speech Recognition," in *Automatic Speech and Speaker Recognition: Advanced Topics*, C.-H. Lee, F. K. Soong and K. K. Paliwal Editors, Kluwer Academic Publishers, 1996.
- [11] L. R. Rabiner, B.-H. Juang and C.-H. Lee, "An Overview of Automatic Speech Recognition," in *Automatic Speech and Speaker Recognition: Advanced Topics*, C.-H. Lee, F. K. Soong and K. K. Paliwal Editors, Kluwer Academic Publishers, 1996.
- [12] S. Katagiri, B.-H. Juang and C.-H. Lee, "Pattern Recognition Using A Family of Design Algorithms Based Upon Generalized Probability Descent Method," in *Intelligent Signal Processing*, S. Haykin and B. Kosko Editors, IEEE Press, 2001.
- [13] L. Chaisorn, T.-S. Chua and C.-H. Lee, "News Video Segmentation," *Handbook of Video Database*, CRC Publications, pp. 1133-1148, 2003.
- [14] R. Shi, H. Feng, C.-H. Lee and T.-S. Chua, "An Adaptive Image Content Representation and Segmentation Approach to Automatic Image Annotation," *Image and Video Retrieval*, P. Enser et al. (Eds.), pp. 545-554, Springer Berlin Heidelberg, 2004.
- [15] C.-H. Lee, "Back to Speech Science - Towards a Collaborative ASR Community of the 21st Century," *Dynamics in Speech Production and Perception*, P. Divenyi, S. Greenberg, and G. Meyer (eds), NATO Science Series, IOS Press, 2006.
- [16] H. Li, B. Ma and C.-H. Lee, "Vector Based Spoken Language Classification," in *Springer Handbook on Speech Processing and Speech Communication*, J. Benesty, Y. Hunag. M. M. Sondhi, Editors, Springer-Verlag, 2008.
- [17] C.-H. Lee, "Linking Statistical Signal Processing with Acoustic Phonetics: A New Speech Recognition and Analysis Framework Based on Automatic Speech Attribute Transcription (ASAT)," *Frontiers in Phonetics and Speech Science*, 2009.
- [18] C.-H. Lee, "Speech Recognition and Production by Machines," in : James D. Wright (Editor-in-Chief), W. S. Y. Wang Section Editor, H. Whitaker, Area Editor, *International Encyclopedia of Social and Behavior Sciences*, 2nd Edition, Vol. 23, pp. 259-263, Oxford: Elsevier, 2015.

B. REFEREED PUBLICATIONS

B1. Journal Publications:

- [1] C.-H. Lee and R. D. Martin, "Ordinary and Proper Location M-estimate for Autoregressive-Moving Average Models," *Biometrika*, Vol. 73, No. 3, pp. 679-686, December 1986.
- [2] C.-H. Lee, "On Robust Linear Prediction of Speech," *IEEE Trans. Acoustic, Speech and Signal Proc.*, Vol. ASSP-36, No.5, pp. 642-650, May 1988.
- [3] C.-H. Lee, "On the use of some robust modeling techniques for speech recognition," *Computer Speech and Language*, Vol.3, No.1, pp. 35-52, January 1989.
- [4] C.-H. Lee, "Applications of Dynamic Programming to Speech and Language Processing," *AT&T Technical Journal*, Special Issue on Optimization: Methodology, Algorithm and Applications, Vol. 68, No.3, pp. 114-130, May/June 1989.
- [5] C.-H. Lee and L. R. Rabiner, "A Frame-Synchronous Network Search Algorithm for Connected Word Recognition," *IEEE Trans. Acoustic, Speech and Signal Proc.*, Vol. ASSP-37, No. 11, pp. 1649-1658, Nov. 1989.
- [6] C.-H. Lee, L. R. Rabiner, R. Pieraccini and J. G. Wilpon, "Acoustic Modeling for Large Vocabulary Speech Recognition," *Computer, Speech and Language*, Vol. 4, No. 2, pp. 127-165, April 1990.
- [7] J. G. Wilpon, L. R. Rabiner, C.-H. Lee and E. R. Goldman, "Automatic Recognition of Keywords in Unconstrained Speech Using Hidden Markov Models," *IEEE Trans. Acoustic, Speech and Signal Proc.*, Vol. ASSP-38, pp. 1870-1878, Nov. 1990.
- [8] C.-H. Lee, C.-H. Lin and B.-H. Juang, "A Study on Speaker Adaptation of the Parameters of Continuous Density Hidden Markov Models," *IEEE Trans. Acoustic, Speech and Signal Proc.*, Vol. ASSP-39, No. 4, pp. 806-814, April 1991.

- [9] E. P. Giachin, C.-H. Lee and A. E. Rosenberg, "Word Juncture Modeling Using Phonological Rules for HMM-Based Continuous Speech Recognition," *Computer, Speech and Language*, Vol. 5, No. 2, pp. 155-168, April 1991.
- [10] C.-H. Lee, E. Giachin, L. R. Rabiner, R. Pieraccini and A. E. Rosenberg, "Improved Acoustic Modeling for Large Vocabulary Continuous Speech Recognition," *Computer, Speech and Language*, Vol. 6, No. 2, pp. 103-127, April 1992.
- [11] J.-L. Gauvain and C.-H. Lee, "Bayesian Learning for Hidden Markov Model with Gaussian Mixture State Observation Densities," *Speech Communication*, Vol. 11, Nos. 2-3, pp. 205-213, June 1992.
- [12] P. Ramesh, J. G. Wilpon, M. A. McGee, D. B. Roe, C.-H. Lee and L. R. Rabiner "Speaker-Independent Recognition of Spontaneously Spoken Connected Digits," *Speech Communication*, Vol. 11, Nos. 2-3, pp. 229-235, June 1992.
- [13] E. Giachin, C.-H. Lee, L. R. Rabiner, A. E. Rosenberg, and R. Pieraccini, "On the Use of Inter-word Context Dependent Units for Word Juncture Modeling," *Computer, Speech and Language*, Vol. 6, No. 3, pp. 197-213, July 1992.
- [14] N. Merhav and C.-H. Lee, "A Minimax Classification Approach with Application to Robust Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 1, No. 1, pp. 90-100, Jan. 1993.
- [15] J. G. Wilpon, C.-H. Lee and L. R. Rabiner, "Connected Digit Recognition Based on Improved Acoustic Resolution," *Computer, Speech and Language*, Vol. 7, No. 1, pp. 15-26, Jan. 1993.
- [16] N. Merhav and C.-H. Lee, "On the Asymptotic Statistical Behavior of Empirical Cepstral Coefficients," *IEEE Trans. on Signal Processing*, Vol. 41, No.5, pp. 1990-1993, May 1993.
- [17] C.-H. Lee and C.-H. Lin, "On the Use of A Family of Signal Limiters for Recognition of Noisy Speech," *Speech Communication*, Vol. 12, No. 4, pp. 383-392, August 1993.
- [18] S. Katagiri and C.-H. Lee, "A New Hybrid Algorithm for Speech Recognition Based on HMM Segmentation and Discriminative Classification," *IEEE Trans. on Speech and Audio Proc.*, Vol. 1, No. 4, pp. 421-430, Oct. 1993.
- [19] C.-H. Lee, J.-L. Gauvain, R. Pieraccini and L. R. Rabiner, "Large Vocabulary Speech Recognition Using Subword Units," *Speech Communication*, Vol. 13, Nos. 3-4, pp. 263-280, Nov. 1993.
- [20] C.-H. Lee, J.-L. Gauvain, R. Pieraccini and L. R. Rabiner, "Subword-Based Large Vocabulary Speech Recognition," *AT&T Technical Journal*, Vol. 72, No. 5, pp. 25-36, Sept./Oct. 1993.
- [21] K.-Y. Su and C.-H. Lee, "Speech Recognition using Weighted HMM and Subspace Projection Approaches," *IEEE Trans. on Speech and Audio Proc.*, Vol. 2, No. 1, pp. 69-79, Jan. 1994.
- [22] W. Chou, C.-H. Lee, B.-H. Juang and F. K. Soong, "A Minimum Error Rate Pattern Recognition Approach to Speech Recognition," *International Journal of Pattern Recognition for Artificial Intelligence (IJPRAI)*, Vol. 8, No. 1, pp. 5-31, Feb. 1994.
- [23] J.-L. Gauvain and C.-H. Lee, "Maximum A Posteriori Estimation for Multivariate Gaussian Mixture Observations of Markov Chains," *IEEE Trans. on Speech and Audio Proc.*, Vol. 2, No. 2, pp. 291-298, April 1994.
- [24] A. Sankar and C.-H. Lee, "Stochastic Matching for Robust Speech Recognition," *IEEE Signal Processing Letters*, Vol. 1, No. 8, pp. 124-125, August 1994.
- [25] C.-H. Lee, "Stochastic Modeling in Spoken Dialogue System Design," *Speech Communication*, Vol. 15, pp. 311-322, Nov. 1994.
- [26] C.-S. Liu, C.-H. Lee, W. Chou, A. E. Rosenberg and B.-H. Juang, "A Study on Minimum Error Discriminative Training for Speaker Recognition," *Jour. Acoust. Soc. Am.*, Vol. 97, No. 1, pp. 637-648, Jan. 1995.
- [27] C.-H. Lee and L. R. Rabiner, "Directions in Automatic Speech Recognition," *NTT Review*, Vol. 7, No. 2, pp. 19-29, March 1995; also in *NTT R&D Journal* (Japanese), pp. 1069-1080, Vol. 43, No. 10, August 1994.
- [28] Q. Huo, C. Chan and C.-H. Lee, "Bayesian Adaptive Learning of the Parameters of Hidden Markov Model for Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 3, No. 5, pp. 334-345, Sept. 1995.
- [29] C.-S. Liu, H.-C. Wang and C.-H. Lee, "Speaker Verification Using Normalized Log-Likelihood Score," *IEEE Trans. on Speech and Audio Proc.*, Vol. 4, No. 1, pp. 56-60, Jan. 1996.
- [30] Q. Huo, C. Chan and C.-H. Lee, "On-Line Adaptation of the SCHMM Parameters Based on the Segmental Quasi-Bayes Learning for Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 4, No. 2, pp. 141-144, March 1996.
- [31] A. Sankar and C.-H. Lee, "A Maximum-Likelihood Approach to Stochastic Matching for Robust Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 4, No. 3, pp. 190-202, May 1996.
- [32] C.-H. Lee and B.-H. Juang, "A Survey on Automatic Speech Recognition with an Illustrative Example on Continuous Speech Recognition of Mandarin," *International Journal of Computational Linguistics and Chinese Language Processing*, Vol. 1, No. 1, pp. 1-36, August 1996.

- [33] R. A. Sukkar and C.-H. Lee, "Vocabulary Independent Discriminative Utterance Verification for Non-Keyword Rejection in Subword Based Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 4, No. 6, pp. 420-429, Nov. 1996.
- [34] K. Wang, C.-H. Lee and B.-H. Juang, "Selective Feature Extraction via Signal Decomposition," *IEEE Signal Processing Letters*, Vol. 5, No. 1, pp. 8-11, 1997.
- [35] Q. Huo and C.-H. Lee, "On-line Adaptive Learning of the Continuous Density Hidden Markov Model Based on Approximate Recursive Bayes Estimate," *IEEE Trans. on Speech and Audio Proc.*, Vol. 5, No. 2, pp. 161-172, March 1997.
- [36] M. Rahim and C.-H. Lee, "String-Based Minimum Verification Error (SB-MVE) Training for Speech Recognition," *Computer, Speech and Language*, Vol. 11, No. 2, pp. 147-160, April 1997.
- [37] B.-H. Juang, W. Chou and C.-H. Lee, "Minimum Classification Error Rate Methods for Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 5, No. 3, pp. 257-265, May 1997.
- [38] M. Rahim, C.-H. Lee and B.-H. Juang, "Discriminative Utterance Verification for Connected Digit Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 5, No. 3, pp. 266-277, May 1997.
- [39] M. Rahim, C.-H. Lee and B.-H. Juang, "Utterance Verification for Robust Connected Digit Recognition," *Jour. Acous. Soc. Am.*, Vol. 101, No. 5, pp. 2892-2902, May 1997.
- [40] J.-T. Chien, C.-H. Lee and H.-C. Wang, "A Hybrid Algorithm for Speaker Adaptation Using MAP Transformation and Adaptation," *IEEE Signal Processing Letters*, Vol. 4, No. 6, pp. 167-168, June 1997.
- [41] O. Siohan and C.-H. Lee, "Iterative Noise and Channel Estimation under the Stochastic Matching Algorithm Framework," *IEEE Signal Processing Letters*, Vol. 4, No. 11, pp. 304-306, Nov. 1997.
- [42] R. Sukkar, A. R. Setlur, C.-H. Lee and J. Jacob, "Verifying and Correcting String Hypotheses Using Discriminative Utterance Verification," *Speech Communication*, Vol. 22, pp. 333-342, 1997.
- [43] Q. Huo and C.-H. Lee, "On-line Adaptive Learning of the Correlated Continuous Density Hidden Markov Model for Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 6, No. 4, pp. 386-397, July 1998.
- [44] C.-H. Lee, "On Stochastic Feature and Model Compensation Approaches to Robust Speech Recognition," *Speech Communication*, Vol. 25, pp. 29-47, 1998.
- [45] T. Kawahara, C.-H. Lee and B.-H. Juang, "Key-Phrase Detection and Verification for Flexible Speech Understanding," *IEEE Trans. on Speech and Audio Proc.*, Vol. 6, No. 6, pp. 558-568, Nov. 1998.
- [46] S. Katagiri, B.-H. Juang and C.-H. Lee, "Pattern Recognition Using A Generalized Probabilistic Descent Method," *Proceedings of the IEEE*, Vol. 86, No. 11, pp. 2345-2373, Nov. 1998.
- [47] Q. Li, B.-H. Juang, C.-H. Lee, Q. Zhou and F. K. Soong, "On Recent Advancements in Automatic Speaker Authentication," *IEEE Robotics & Automation Magazine*, Vol. 6, No. 1, pp. 24-32, 1999.
- [48] C. Yen, S.-S. Kuo and C.-H. Lee, "Minimum Error Rate Training for PHMM-Based Text Recognition," *IEEE Trans. on Image Processing*, Vol. 8, No. 8, pp. 1120-1124, August 1999.
- [49] A. C. Surendran, C.-H. Lee and M. Rahim, "Non-Linear Compensation for Stochastic Matching," *IEEE Trans. on Speech and Audio Proc.*, Vol. 7, No. 6, pp. 643-655, Nov. 1999.
- [50] Q. Huo and C.-H. Lee, "A Bayesian Predictive Classification Approach to Robust Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 8, No. 2, pp. 200-204, March 2000.
- [51] C.-H. Lee, R. Carpenter, W. Chou, J. Chu-Carroll, W. Reichl, A. Saad, and Q. Zhou, "On Natural Language Call Routing," *Speech Communication*, Vol. 31, pp. 309-320, 2000.
- [52] Q. Li, B.-H. Juang, Q. Zhou and C.-H. Lee, "Automatic Verbal Information Verification for User Authentication," *IEEE Trans. on Speech and Audio Proc.*, Vol. 8, No. 5, pp. 585-596, Nov. 2000.
- [53] C.-H. Lee and Q. Huo, "On Adaptive Decision Rules and Decision Parameter Adaptation for Automatic Speech Recognition," *Proceedings of the IEEE*, Vol. 88, No. 8, pp. 1241-1269, August 2000.
- [54] A. C. Surendran and C.-H. Lee, "Transformation Based Bayesian Prediction for Adaptation of HMMs," *Speech Communication*, Vol. 34, Nos. 1-2, pp. 159-174, 2001.
- [55] Q. Huo and C.-H. Lee, "Robust Speech Recognition Based on Adaptive Classification and Decision Strategies," *Speech Communication*, Vol. 34, Nos. 1-2, pp. 175-194, 2001.
- [56] K. Shinoda and C.-H. Lee, "A Structural Bayes Approach to Speaker Adaptation," *IEEE Trans. on Speech and Audio Proc.*, Vol. 9, No. 3, pp. 276-287, March 2001.
- [57] O. Siohan, C. Chesta and C.-H. Lee, "Joint Maximum a Posteriori Adaptation of Transformation and HMM Parameters," *IEEE Trans. on Speech and Audio Proc.*, Vol. 9, No. 4, pp. 417-428, May 2001.
- [58] M.-W. Koo, C.-H. Lee and B.-H. Juang, "Speech Recognition and Utterance Verification Based on a Generalized Confidence Score," *IEEE Trans. on Speech and Audio Proc.*, Vol. 9, No. 8, pp. 821-832, Nov. 2001.

- [59] C.-S. Huang, H.-C. Wang and C.-H. Lee, "An SNR-Incremental Stochastic Matching Algorithm for Noisy Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 9, No. 8, pp. 866-873, Nov. 2001.
- [60] M. Affify, O. Siohan and C.-H. Lee, "Upper and Lower Bounds on the Mean of Speech: Application to Minimax Classification," *IEEE Trans. on Speech and Audio Proc.*, Vol. 10, No. 2, pp. 79-88, Jan. 2002.
- [61] O. Siohan, T. A. Myrvoll and C.-H. Lee, "Structural Maximum A Posteriori Linear Regression for HMM Adaptation," *Computer Speech and Language*, Vol. 16, No. 1, pp. 5-24, Jan. 2002.
- [62] L. Chaisorn, T.-S. Chua and C.-H. Lee, "A Multimodal Framework to Story Segmentation for News Video," to appear in *Journal of World Wide Web*, Vol. 6, No. 2, pp. 187-208, Kluwer Academic Publishers, 2003.
- [63] H.-K. J. Kuo and C.-H. Lee, "Discriminative Training for Robust Natural Language Call Routing," *IEEE Trans. on Speech and Audio Proc.*, Vol. 11, No.1, pp. 24-35, Jan. 2003.
- [64] C.-S. Huang, C.-H. Lee and H.-C. Wang, "A Decision Rule Based on Ordered-Nearest-Neighbor with Application to Utterance Verification," *IEE Electronics Letters*, Feb. 2003.
- [65] C.-H. Lee, "On Automatic Speech Recognition at the Dawn of the 21st Century," *IEICE Trans. on Information and Systems, Special Issue on Speech Information Processing*, Vol.E86-D, No. 3, pp. 377-396, March 2003.
- [66] S. Gao, W. Wu, C.-H. Lee and T.-S. Chua, "A Maximal Figure-of-Merit Learning Approach to Text Categorization," *ACM SIGIR*, pp. 174-181, Toronto, Canada, July 2003.
- [67] H. Jiang and C.-H. Lee, "A New Approach to Utterance Verification Based on Neighborhood Information in Model Space," *IEEE Trans. on Speech and Audio Proc.*, Vol. 11, No. 5, pp. 425-435, 2003.
- [68] I. Zitouni, H.-K. J. Kuo and C.-H. Lee, "Boosting and Combination of Classifiers for Natural Language Call Routing Systems," *Speech Communication*, Vol. 41, No. 4, pp. 647-661, Nov. 2003.
- [69] C.-S. Huang, C.-H. Lee and H.-C. Wang, "A Study on Model-Based Error Rate Estimation for Automatic Speech Recognition," *IEEE Trans. on Speech and Audio Proc.*, Vol. 11, No. 6, pp. 581-589, Nov. 2003.
- [70] A. N. Pargellis, H.-K. J. Kuo and C.-H. Lee, "An Automatic Dialogue Generation Platform for Personalized Dialogue Applications," *Speech Communication*, Vol. 42, Nos. 3-4, pp. 329-351, 2004.
- [71] S. Gao, W. Wu, C.-H. Lee and T.-S. Chua, "An MFoM Learning Approach to Robust Multiclass Multi-Label Text Categorization," *International Conference on Machine Learning (ICML)*, Calgary, Alberta, July 2004.
- [72] A. N. Pargellis, A. Potamianos, E. Folsler-Lussier and C.-H. Lee, "Auto-induced Semantic Classes," *Speech Communication*, Vol. 43, No. 3, pp. 183-203, 2005.
- [73] H. Jiang, C.-H. Lee and F. K. Soong, "A Dynamic In-Search Data Selection Method with its Applications to Acoustic Modeling and Utterance Verification," *IEEE Trans. on Speech and Audio Proc.*, Vol. 13, No.5, pp. 945-955, Sept. 2005.
- [74] S. Gao, W. Wu, C.-H. Lee and T.-S. Chua, "A Maximal Figure-of-Merit (MFoM) Learning Approach to Robust Classifier Design for Text Categorization," *ACM Trans. on Information Systems*, Vol. 2, No. 4, Issue 2, pp. 190-216, April 2006.
- [75] H. Li, B. Ma and C.-H. Lee, "An Acoustic Segment Modeling Approach to Universal Acoustic Characterization and Spoken Language Identification," *IEEE Trans. Audio, Speech and Language Proc.*, Vol. 15, No. 1, pp. 271-284, January 2007.
- [76] J. Li, M. Yuan, and C.-H. Lee, "Approximate Test Risk Bound Minimization through Soft Margin Estimation," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 15, No. 8, pp. 2393- 2404, 2007.
- [77] S. Yaman and C.-H. Lee, "A Multi-Objective Programming Approach to Compromising Classification Performance Metrics," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 16, No. 4, pp. 779-789, May 2008.
- [78] D. Zhu, H. Li, B. Ma and C.-H. Lee, "Optimizing the Performance of Spoken Language Recognition with Discriminative Learning," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 16, No. 8, pp. 1642-1653, November 2008.
- [79] J. M. Baker, L. Deng, J. Glass, S. Khundanpur, C.-H. Lee, N. Morgen, and D. O'Shaughnessy, "Research Developments and Directions in Speech Recognition, and Understanding, Part I," *IEEE Signal Processing Magazine*, Vol. 26, No. 3, pp. 75-80, May 2009.
- [80] J. M. Baker, L. Deng, J. Glass, S. Khundanpur, C.-H. Lee, N. Morgen, and D. O'shaughnessy, "Research Developments and Directions in Speech Recognition, and Understanding, Part II," *IEEE Signal Processing Magazine*, Vol. 26, No. 4, pp. 78-85, July 2009.
- [81] Y. Tsao and C.-H. Lee, "An Ensemble Speakers and Speaking Environments Modeling Approach to Robust Speech Recognition," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 17, No. 5, pp. 1025-1035, 2009.
- [82] S. M. Siniscalchi and C.-H. Lee, "A Study on Integrating Acoustic-Phonetic Information into Lattice Rescoring for Automatic Speech Recognition," *Speech Communication*, Vol. 51, Issue 11, pp. 1139-1153, Nov. 2009.

- [83] S. Yaman and C.-H. Lee, "A Comparison of Single- and Multi-Objective Programming Approaches to Problems with Multiple Design Objectives," *Journal of Signal Processing Systems*, Vol. 61, No. 1, pp. 39-50, January 2010.
- [84] X. Xiao, J. Li, E. S. Chng, H. Li and C.-H. Lee, "A Study of the Generalization Capability of Acoustic Models for Robust Speech Recognition," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 18, No. 6, pp. 1158-1169, June 2010.
- [85] C. Ma and C.-H. Lee, "A Regularized Maximum Figure-of-Merit (rMFoM) Approach to Supervised and Semi-supervised Learning," *IEEE Trans. Audio, Speech and Language Proc.*, Vol. 19, No. 5, pp. 1316-1327, July 2011.
- [86] J. Reed and C.-H. Lee, "Preference Music Ratings Prediction Using Tokenization and Minimum Classification Error Training," *IEEE Trans. Audio, Speech and Language Proc.*, Vol. 19, No. 8, pp. 2394-2303, Nov. 2011.
- [87] Z.-S. Chen, J.-S. R. Jang and C.-H. Lee, "A Kernel Framework for Content-Based Artist Recommendation System in Music," *IEEE Trans. Multimedia*, Vol. 13, No. 6, pp. 1371-1380, Dec. 2011.
- [88] S. M. Siniscalchi, D.-C. Lyu, T. Svendsen, and C.-H. Lee, "Experiments on Cross-Language Attribute Detection and Phone Recognition with No Target-Specific Training Speech Data," *IEEE Trans. Audio, Speech and Language Proc.* Vol. 20, No.3, pp. 875-887, March 2012.
- [89] S. M. Siniscalchi, D. Yu, L. Deng, and C.-H. Lee, "Exploiting Deep Neural Networks for Detection-Based Speech Recognition," *Neurocomputing* (106), pp. 148-157, 2013.
- [90] S. M. Siniscalchi, J. Reed, T. Svendsen and C.-H. Lee, "Universal Attribute Characterization of Spoken Languages for Automatic Spoken Language Recognition," *Computer, Speech and Language*, Vol. 27, No. 1, pp. 209-227, January 2013.
- [91] Z. Shen, N. Feng, and C.-H. Lee, "A Single-Ensemble Based Hybrid Approach for Clutter Rejection Combining Bilinear Hankel with Regression," *Journal of Medical Ultrasonics*, Vol. 40, No. 2, pp. 209-227, February 2013.
- [92] Z. Shen, N. Feng, and C.-H. Lee, "A Parametric Relaxation Approach to Blood flow Estimation with Single-Ensemble Sample for Color Flow Imaging," *Journal of Medical and Biological Engineering*, Vol. 33, No. 3, pp. 309-318, March 2013.
- [93] S. M. Siniscalchi, D. Yu, L. Deng, and C.-H. Lee, "Speech Recognition Using Long-Span Temporal Patterns in a Deep Network Model," *IEEE Signal Processing Letter*, Vol. 20, No. 3, pp. 201-204, March 2013.
- [94] S. M. Siniscalchi, T. Svendsen and C.-H. Lee, "A Bottom-Up Modular Search Approach to Large Vocabulary Continuous Speech Recognition," *IEEE Trans. on Audio, Speech and Language Proc.*, Vol. 21, No. 4, pp. 786-797, April 2013.
- [95] C.-H. Lee and S. M. Siniscalchi, "An Information-Extraction Approach to Speech Processing: Analysis, Detection, Verification and Recognition," *Proc. IEEE*, Vol. 101, No. 5, pp. 1089-1115, May 2013.
- [96] Z. Shen, N. Feng, Y. Shen, and C.-H. Lee, "A Ridge Ensemble Empirical Mode Decomposition Approach to Clutter Rejection for Ultrasound Color Flow Imaging," *IEEE Transaction on Biomedical Engineering*, Vol. 60, No. 6, pp. 1477-1487, June 2013.
- [97] I. Kim and C.-H. Lee, "An Efficient Gradient-based Approach to Optimizing Average Precision through Maximal Figure-of-Merit Learning," *Journal of Signal Processing Systems*, Vol. 64, No. 9, pp. 1-11, Sept. 2013.
- [98] S. M. Siniscalchi, J. Li, and C.-H. Lee, "Model-Based Margin Estimation for Hidden Markov Model Learning and Generalization," *IET Signal Processing Journal*, Vol. 7, Issue 8, pp. 704-709, Oct. 2013.
- [99] C. Zhang, Y. Liu, Y. Xia, and C.-H. Lee, "Reliable Accent-Specific Unit Generation with Discriminative Dynamic Gaussian Mixture Selection for Multi-Accent Chinese Speech Recognition," *IEEE Trans. on Audio, Speech and Language Proc.*, Vol. 21, No. 10, pp. 2073-2084, Oct. 2013.
- [100] S. M. Siniscalchi, J. Li, and C.-H. Lee, "Hermitian Polynomial for Speaker Adaptation of Connectionist Speech Recognition Systems," *IEEE Trans. on Audio, Speech and Language Proc.*, Vol. 21, No. 10, pp. 2152-2161, Oct. 2013.
- [101] Y. Xu, J. Du, L.-R. Dai and C.-H. Lee, "An Experimental Study on Speech Enhancement Based on Deep Neural Networks," *IEEE Signal Processing Letters*, Vol. 21, No. 1, pp. 65-68, January 2014.
- [102] Y. Tsao, S. Matsuda, C. Hori, H. Kashioka, and C.-H. Lee, "A MAP-based Online Estimation Approach to Ensemble Speaker and Speaking Environment Modeling," *IEEE/ACM Trans. on Audio, Speech and Language Proc.*, Vol. 22, No. 2, pp. 403-416, February 2014.
- [103] Siniscalchi, S. M., & Lee, C.-H., "An attribute detection based approach to automatic speech processing," *Loquens* 1(1), e005. doi: <http://dx.doi.org/10.3989/loquens.2014.005>, 2014.
- [104] I. Kim and C.-H. Lee, "An Efficient Gradient-based Approach to Optimizing Average Precision through Maximal Figure-of-Merit Learning," *VLSI Signal Processing Systems*, Vol. 74, No. 3, pp. 279-289, 2014.

- [105] S. M. Siniscalchi, T. Svendsen, and C.-H. Lee, "An Artificial Neural Network Approach to Automatic Speech Recognition," *Neurocomputing*, 140, pp. 326-338, 2014.
- [106] Y. Xu, J. Du, L.-R. Dai and C.-H. Lee, "A Regression Approach to Speech Enhancement Based on Deep Neural Networks," *IEEE/ACM Trans. Audio, Speech and Language Proc.*, Vol. 23, No. 1, pp. 7-19, January 2015.
- [107] J. Wu, M. Li and C.-H. Lee, "A Probabilistic Framework for Representing Dialog Systems and Entropy-Based Dialog Management through Dynamic Stochastic State Evolution," *IEEE/ACM Trans. Audio, Speech and Language Proc.* Vol. 23, No. 11, pp. 2026-2035, Nov. 2015.
- [108] H. Behravan, V. Hautamaki, S. M. Siniscalchi, T. Kinnunen and C.-H. Lee, "i-Vector Modeling of Speech Attributes for Automatic Foreign Accent Recognition," *IEEE/ACM Trans. Audio, Speech and Language Proc.* Vol. 24, No. 1, pp. 29-41, January 2016.
- [109] K. Li, Z. Zhou and C.-H. Lee, "Sign Transition Modeling and a Scalable Solution to Continuous Sign Language Recognition for Real-World Applications," *ACM Transactions on Accessible Computing (TACCESS), Special Issue on Speech and Language Interaction for Daily Assistive Technology*, Vol. 8, No. 2, Article 7, January 2016.
- [110] I.-F. Chen, C. Ni, B. P. Lim, N. F. Chen and C.-H. Lee, "A Keyword-Aware Language Modeling Approach to Spoken Keyword Search," *Journal of Signal Processing Systems*, Vol. 8, No. 2, pp. 197-206, Feb. 2016.
- [111] S. Shakil, S. D. Keiholz, and C.-H. Lee, "Evaluation of sliding window correlation performance for characterizing dynamic functional connectivity and brain states," *Journal NeuroImage*, Vol. 133, pp. 111-128, June 2016.
- [112] J. Du, Y. Tu, L.-R. Dai and C.-H. Lee, "A Regression Approach to Single-Channel Speech Separation via High-Resolution Deep Neural Networks," *IEEE/ACM Trans. Audio, Speech and Language Proc.*, Vol. 24, No. 8, pp. 1424-1436, August 2016.
- [113] Z. Huang, S. M. Siniscalchi and C.-H. Lee, "A Unified Approach to Transfer Learning of Deep Neural Networks with Applications to Speaker Adaptation in Automatic Speech Recognition," *Neurocomputing*, September 2016.
- [114] T. Gao, J. Du, Y. Xu, C. Liu, L.-R. Dai and C.-H. Lee, "Joint training of DNNs by incorporating an explicit dereverberation structure for distant Mandarin speech recognition," *EURASIP Journal on Advances in Signal Processing*, December 2016.
- [115] Z. Huang, S. M. Siniscalchi, and C.-H. Lee, "Bayesian Unsupervised Batch and Online Speaker Adaptation of Activation Function Parameters in Deep Models for Automatic Speech Recognition," *IEEE/ACM Trans. Audio, Speech and Language Proc.*, Vol. 25, No. 1, pp. 60-71, January 2017.
- [116] Z. Huang, S. M. Siniscalchi, and C.-H. Lee, "Hierarchical Bayesian Combinations of Plug-in Maximum A Posteriori Decoder in DNN-Based Speech Recognition and Speaker Adaptation," *Pattern Recognition Letters*, pp. 1-7, Vol. 98, No.1, 2017.
- [117] B. Wu, K. Li, M. Yang, and C.-H. Lee, "A Reverberant-Time-Aware Approach to Speech Dereverberation Based on Deep Neural Networks," *IEEE/ACM Trans. Audio, Speech and Language Proc.*, Vol. 25, No. 1, pp. 98-107, January 2017.
- [118] Y. Wang, J. Du, L.-R. Dai and C.-H. Lee, "A Gender Mixture Detection Approach to Unsupervised Single-Channel Speech Separation Based on Deep Neural Networks," *IEEE/ACM Trans. Audio, Speech and Language Proc.*, Vol. 25, No. 7, pp. 1535-1546, July 2017.
- [119] Y.-H. Lai, F. Chen, X. L, Y. Tsao and C.-H. Lee, "A Deep Denoising Autoencoder Approach to Improving Intelligibility of Vcoded Speech with A Dynamic Range Compressed Envelop in Cochlear Implantation," *IEEE Transactions on Biomedical Engineering*, Vol. 64, Issue 7, pp. 1568-1578, July 2017.
- [120] Y.-H. Tu, J. Du, Q. Wang, X. Bao, L.-R. Dai and C.-H. Lee, "An Information Fusion Framework with Multi-Channel Feature Concatenation and Multi-Perspective System Combination for Deep Learning Based Robust Recognition of Microphone Array Speech," *Computer Speech & Language*, Vol. 46, pp. 517-534, 2017.
- [121] B. Wu, K. Li, F. Ge, Z. Huang, M. Yang, S. M. Siniscalchi, and C.-H. Lee, "An End-to-End Deep Learning Approach to Simultaneous Dereverberation and Acoustic Modeling for Robust Speech Recognition," *IEEE Journal on Selective Topics in Signal Processing*, Vol. 11, Issue 8, pp. 1932-1300, December 2017.
- [122] T. Gao, J. Du, L.-R. Dai and C.-H. Lee, "A unified DNN approach to speaker-dependent simultaneous speech enhancement and speech separation in low SNR environments," Vol. 95, pp. 28-39, *Speech Comm.*, Dec. 2017.
- [123] S. Shakil, C.-H. Lee, and S. D. Keiholz, "Mathematical Formulation of Frequency Dependencies in Sliding Window Correlation," *to appear in IEEE Trans. on BME*, January 2018.
- [124] Y.-H. Lai, Y. Tsao, X. Lu, F. Chen, Y.-T. Su, J. K.-C. Chen, M.-J. Lien, H.-Y. Chen, L. P.-H. Li and C.-H. Lee, "A Noise Classification Based Deep Learning Noise Reduction Approach to Improving Speech Intelligibility for Cochlear Implant Recipients," *to appear in Ear and Hearing*. 2018.

- [125] B. Wu, M. Yang, K. Li, Z. Huang, M. Siniscalchi, T. Wang and C.-H. Lee, "A Reverberation-Time-Aware Approach Leveraging Spatial Information for Microphone Array Dereverberation," *to appear in EURASIP Journal on Advances in Signal Processing*, 2018.
- [126] Z. Wen, K. Li, Z. Huang, J. Tao, and C.-H. Lee, "Improving Deep Neural Network Based Speech Synthesis through Contexture Feature Parametrization and Multi-Task Learning," *to appear in Special Issue on Deep Learning, Journal of Signal Processing Systems*, 2018.
- [127] Y. Tu, J. Du, L.-R. Dai and C.-H. Lee, "A Speaker-Dependent Deep Learning Approach to Joint Speech Separation and Acoustic Modeling for Robust Recognition of Multi-Talker Speech," *to appear in Special Issue on Deep Learning, Journal of Signal Processing Systems*, 2018.
- [128] J. Lin, W. Li, Y. Gao, Y. Xie, N. F. Chen, S. M. Siniscalchi, J. Zhang, and C.-H. Lee, "Improving Mandarin Tone Recognition Based on DNN by Combining Acoustic and Articulatory Features Using Extended Recognition Network," *to appear in Special Issue on Deep Learning, Journal of Signal Processing Systems*, 2018.
- [129] Q. Wang, J. Du, L.-R. Dai and C.-H. Lee, "A Multi-Information Learning and Ensembling (MILE) Approach to High-Performance Speech Enhancement with Compact Neural Network Architectures," *submitted to IEEE/ACM Trans. Audio, Speech and Language Proc.*, October 2017.
- [130] Y. Tu, J. Du, L. Sun, F. Ma, H. Wang, J. Chen and C.-H. Lee, "An Iterative Mask Estimation Approach to Deep Learning Based Multi-Channel Speech Recognition," *submitted to IEEE/ACM Trans. Audio, Speech and Language Proc.*, October 2017.
- [131] S. Wen, J. Du and C.-H. Lee, "On Generalization of Mixing Noise Signals for Learning DNN-Based Speech Enhancement Models," *submitted to IEEE Signal Processing Letters*, August 2016.
- [132] H. Sun, J. Liao, J. Wang, Q. Qi and C.-H. Lee, "DICM: A Document Clustering Approach Based on a Centrality Measure of Term Co-occurrence Graphs," *submitted to Data Knowledge and Engineering*, March 2016.
- [133] K. Li and C.-H. Lee, "A Deep Neural Network Approach to Speech Bandwidth Expansion with Iterative Phase Recovery," *submitted to IEEE Signal Processing Letters*, July 2014.
- [134] J. Zhang, S.-W. Feng, Y.-W. Gao, K. Li, Y.-B. Yuan and C.-H. Lee, "Automatic Image Region Annotation through Segmentation Based Semantic Correlation Analysis," *submitted to Signal Processing*, January 2017.
- [135] Z. Chen, F. Yin and C.-H. Lee, "A Wavelet Transform Modulus Maxima Approach to Bandwidth Expansion of Speech," *submitted to IEEE Trans. Audio, Speech and Language Proc.* 2011.
- [136] S. Yaman, J.-T. Chien and C.-H. Lee, "A Structural Maximum a Posteriori Approach to Language Modeling and Adaptation," *submitted to IEEE Trans. Audio, Speech and Language Proc.* 2011.

B2. Conference and Workshop Publications:

- [1] P. F. Brown, C.-H. Lee and J. S. Spohrer, "Bayesian Adaptation in Speech Recognition," *Proc. ICASSP-83*, pp. 761-764, Boston, MA, April 1983.
- [2] C.-H. Lee and K. Ganesan, "Speech Recognition under Additive Noise," *Proc. ICASSP-84*, pp. 35.7.1-4, San Diego, CA, April 1984.
- [3] D. Y. Wong and C.-H. Lee, "Signal Processing Software for a Voice Messaging System Using The TMS32010 Processor," *Proc. ICASSP-85*, pp. 1417-1420, Tampa, FL, April 1985.
- [4] C.-H. Lee and D. Y. Wong, "An Integrated Voice-Controlled Voice Messaging System," *Proc. Speech Tech-86*, pp. 131-134, New York, NY, April 1986.
- [5] C.-H. Lee, "Robust Linear Prediction for Speech Analysis," *Proc. ICASSP-87*, pp. 289-292, Dallas, TX, April 1987.
- [6] C.-H. Lee and L.R. Rabiner, "A Network-based Frame-Synchronous Level Building Algorithm for Connected Word Recognition," *Proc. ICASSP-88*, S10.1, pp. 410-413, New York, NY, April 1988.
- [7] C.-H. Lee, F. K. Soong and B.-H. Juang, "A Segment Model Based Approach to Speech Recognition," *Proc. ICASSP-88*, S11.4, pp. 501-504, New York, NY, April 1988.
- [8] R. Pieraccini, C.-H. Lee, L. R. Rabiner and J. G. Wilpon, "Some Preliminary Results on Speaker Independent Recognition of the DARPA Resource Management Task", *Proc. First Joint Speech and Natural Language Workshop*, Philadelphia, PA, February 1989.
- [9] C.-H. Lee, B.-H. Juang, F. K. Soong and L. R. Rabiner, "Word Recognition Using Whole Word and Subword Models," *Proc. ICASSP-89*, pp. 683-686, Glasgow, Scotland, May 1989.
- [10] L. R. Rabiner, C.-H. Lee, B.-H. Juang and J. G. Wilpon, "HMM Clustering for Connected Word Recognition," *Proc. ICASSP-89*, pp. 405-408, Glasgow, Scotland, May 1989.

- [11] J. G. Wilpon, C.-H. Lee and L. R. Rabiner, "Application of Hidden Markov Models for Recognition of a Limited Set of Words in Unconstrained Speech," *Proc. ICASSP-89*, pp. 254-257, Glasgow, Scotland, May 1989.
- [12] C.-H. Lee, L. R. Rabiner, R. Pieraccini and J. G. Wilpon, "Acoustic Modeling of Subword Units for Speaker Independent Large Vocabulary Speech Recognition," *Proc. DARPA Speech and Natural Language Workshop*, pp. 280-292, Cape Cod, MA, Oct. 1989.
- [13] S. Euler, C.-H. Lee, B.-H. Juang and F. K. Soong, "Statistical Segmentation and Word Modeling Techniques in Isolated Word Recognition," *Proc. ICASSP-90*, pp. 745-748, Albuquerque, NM, April 1990.
- [14] E. P. Giachin, C.-H. Lee and A. E. Rosenberg, "Word Juncture Modeling Using Phonological Rules for HMM-based Continuous Speech Recognition," *Proc. ICASSP-90*, pp. 737-740, Albuquerque, NM, April 1990.
- [15] C.-H. Lee, L. R. Rabiner, R. Pieraccini and J. G. Wilpon, "Acoustic Modeling of Subword Units for Speech Recognition," *Proc. ICASSP-90*, pp. 721-724, Albuquerque, NM, April 1990.
- [16] A. E. Rosenberg, C.-H. Lee and F. K. Soong, "Sub-word Talker Verification Using Hidden Markov Models," *Proc. ICASSP-90*, pp. 269-272, Albuquerque, NM, April 1990.
- [17] C.-H. Lee, C.-H. Lin and B.-H. Juang, "A Study on Speaker Adaptation of Continuous Density HMM Parameters," *Proc. ICASSP-90*, pp. 145-148, Albuquerque, NM, April 1990.
- [18] R. Pieraccini, C.-H. Lee, E. Giachin and L. R. Rabiner, "Implementation Aspects of Large Vocabulary Recognition Based on Intra-word and Inter-word Phonetic Units," *Proc. DARPA Speech and Natural Language Workshop*, Somerset, PA, June 1990.
- [19] C.-H. Lee, E. Giachin, L. R. Rabiner, R. Pieraccini and A. E. Rosenberg, "Improved Acoustic Modeling for Continuous Speech Recognition," *Proc. DARPA Speech and Natural Language Workshop*, Somerset, PA, June 1990.
- [20] E. P. Giachin, C.-H. Lee and A. E. Rosenberg, "Word Juncture Modeling Using Phonological Rules for HMM-based Continuous Speech Recognition," *CSELT Technical Report*, Vol. 18, No. 3, pp. 189-194, June 1990.
- [21] S. Katagiri, C.-H. Lee and B.-H. Juang, "A Generalized Probabilistic Descent Method," *Proc. Acous. Soc. of Japan*, 2-p-6, pp. 141-142, Nagoya, Japan, Sept. 1990.
- [22] A. E. Rosenberg, C.-H. Lee, F. K. Soong, and M. A. McGee, "Experiments in Automatic Talker Verification Using Sub-Word Unit Hidden Markov Models," *Proc. ICSLP-90*, Kobe, Japan, November 1990.
- [23] S. Katagiri and C.-H. Lee, "A New HMM/LVQ Hybrid Algorithm for Speech Recognition," *Proc. GLOBECOM-90*, Vol. 2, pp. 1032-1036, San Diego, CA, Dec. 1990.
- [24] E. Giachin, C.-H. Lee, R. Pieraccini, and L. R. Rabiner, "Implementation aspects of large vocabulary recognition based on intra word and interword phonetic units," *CSELT Technical Report*, Vol. 19, No. 1, pp. 45-53, Feb. 1991.
- [25] J.-L. Gauvain and C.-H. Lee, "Bayesian Learning of Gaussian Mixture Densities for Hidden Markov Models," *Proc. DARPA Speech and Natural Language Workshop (HLT)*, pp. 272-277, Pacific Grove, CA, Feb. 1991.
- [26] R. Pieraccini, E. Levin and C.-H. Lee, "Stochastic representation of conceptual structure in the ATIS tasks," *Proc. DARPA Speech and Natural Language Workshop (HLT)*, pp. 121-124, Pacific Grove, CA, Feb. 1991.
- [27] R. Pieraccini, C.-H. Lee, E. Giachin, and L. R. Rabiner, "Complexity Reduction in Large Vocabulary Speech Recognition," *Proc. ICASSP-91*, S1, pp. 729-732, Toronto, Canada, May 1991.
- [28] K.-Y. Su and C.-H. Lee, "Robustness and Discrimination Based Speech Recognition Using Weighted HMM and Subspace Projection Approaches," *Proc. ICASSP-91*, S1, pp. 541-544, Toronto, Canada, May 1991.
- [29] A. E. Rosenberg, C.-H. Lee and S. Gokcen, "Connected Word Talker Verification Using Whole-Word Hidden Markov Models," *Proc. ICASSP-91*, S1, pp. 381-384, Toronto, Canada, May 1991.
- [30] J. G. Wilpon, C.-H. Lee and L. R. Rabiner, "Improvements in Connected Digit Recognition Using Higher Order Spectral and Energy Features," *Proc. ICASSP-91*, S1, pp. 349-352, Toronto, Canada, May 1991.
- [31] C.-H. Lee, E. Giachin, L. R. Rabiner, R. Pieraccini and A. E. Rosenberg, "Improved Acoustic Modeling for Speaker Independent Large Vocabulary Continuous Speech Recognition," *Proc. ICASSP-91*, S1, pp. 161-164, Toronto, Canada, May 1991.
- [32] P. Ramesh, S. Katagiri, and C.-H. Lee, "A New Connected Word Recognition Algorithm Based on HMM/LVQ Segmentation and LVQ Classification," *Proc. ICASSP-91*, S1, pp. 113-116, Toronto, Canada, May 1991.
- [33] R. Pieraccini and C.-H. Lee, "Factorization of Language Constraints in Speech Recognition," *Proc. ACL-91*, pp. 299-306, Berkeley, CA, June 1991.
- [34] S. Katagiri, C.-H. Lee, B.-H. Juang and T. Komori, "New Discriminative Training Algorithms Based on Generalized Probabilistic Descent Method," *Proc. IEEE-SP Workshop on Neural Networks for Signal Processing*, Princeton, NJ, Sept. 1991.

- [35] S. Katagiri, C.-H. Lee and B.-H. Juang, "Discriminative Multi-Layer Feed-Forward Networks," *Proc. IEEE-SP Workshop on Neural Networks for Signal Processing*, Princeton, NJ, Sept. 1991.
- [36] P. Ramesh, J. G. Wilpon, M. A. McGee, D. B. Roe, C.-H. Lee and L. R. Rabiner, "Speaker-Independent Recognition of Spontaneously Spoken Connected Digits," *Proc. EuroSpeech-91*, Genova, Italy, Sept. 1991.
- [37] E. Giachin, C.-H. Lee, L. R. Rabiner, A. E. Rosenberg, and R. Pieraccini, "Word Juncture Modeling Using Intra-Word Context-Dependent Phone-Like Units," *Proc. EuroSpeech-91*, Genova, Italy, Sept. 1991.
- [38] J.-L. Gauvain and C.-H. Lee, "Bayesian Learning for Hidden Markov Model with Gaussian Mixture State Observation Densities," *Proc. EuroSpeech-91*, Genova, Italy, Sept. 1991.
- [39] R. Pieraccini, E. Levin, J.-L. Gauvain, C.-H. Lee, Z. Gorelov, E. Tzoukermann and J. G. Wilpon, "A Speech Understanding System Based on Statistical Representation of Semantics," *Proc. 1991 IEEE Workshop on Automatic Speech Recognition*, pp. 60-61, Arden House, Harriman, NY, Dec. 1991.
- [40] B.-H. Juang, W. Chou, C.-H. Lee and P.-C. Chang, "Minimum Error Rate Training for Dynamic Time Warping and Hidden Markov Recognizers," *Proc. 1991 IEEE Workshop on Automatic Speech Recognition*, pp. 14-15, Arden House, Harriman, NY, Dec. 1991.
- [41] R. Pieraccini, E. Tzoukermann, Z. Gorelov, J.-L. Gauvain, E. Levin and C.-H. Lee, "Progress Report on the Chronus System: ATIS Benchmark Results," *Proc. 5th DARPA Workshop on Speech and Natural Language*, Arden House, Harriman, NY, Feb. 1992.
- [42] J.-L. Gauvain and C.-H. Lee, "MAP Estimation of Continuous Density HMM: Theory and Applications," *Proc. 5th DARPA Workshop on Speech and Natural Language*, Arden House, Harriman, NY, Feb. 1992.
- [43] R. Pieraccini, E. Tzoukermann, Z. Gorelov, J.-L. Gauvain, E. Levin, C.-H. Lee and J. G. Wilpon, "A Speech Understanding System Based on Statistical Representation of Semantics," *Proc. ICASSP-92*, pp. 193-196, San Francisco, CA, March 1992.
- [44] W. Chou, B.-H. Juang, and C.-H. Lee, "Segmental GPD Training of HMM Based Speech Recognizer," *Proc. ICASSP-92*, pp. 473-476, San Francisco, CA, March 1992.
- [45] J.-L. Gauvain and C.-H. Lee, "Improved Acoustic Modeling with Bayesian Learning," *Proc. ICASSP-92*, pp. 481-484, San Francisco, CA, March 1992.
- [46] C.-H. Lee and J.-L. Gauvain, "A Study on Speaker Adaptation for Continuous Speech Recognition," *Proc. DARPA ANN Technology Program CSR Meeting*, Stanford, CA., September 1992.
- [47] W. Chou, C.-H. Lee and B.-H. Juang, "Speech Recognition Based on Combined String Models," *Proc. DARPA ANN Technology Program CSR Meeting*, Stanford, CA, September 1992.
- [48] J. Kuo, C.-H. Lee and A. E. Rosenberg, "Speaker set identification through speaker group modeling," *Proc. ICSLP-92*, pp. 1391-1394, Banff, Canada, October 1992.
- [49] A. E. Rosenberg, J. DeLong, C.-H. Lee, B.-H. Juang and F. K. Soong, "The use of cohort normalized scores for speaker verification," *Proc. ICSLP-92*, pp. 599-562, Banff, Canada, October 1992.
- [50] C.-H. Lee, J.-L. Gauvain, R. Pieraccini and L. R. Rabiner, "Large Vocabulary Speech Recognition Using Subword Units," *Proc. Australian SST-92*, pp. 324-329, Brisbane, Australia, November 1992.
- [51] W. Chou, C.-H. Lee and B.H. Juang, "Minimum Error Rate Training Based on the N-Best String Models," *Proc. ICASSP-93*, pp. II-652 - 655, Minneapolis, MN, April 1993.
- [52] C.-H. Lee and J.-L. Gauvain, "Speaker Adaptation Based on MAP Estimation of HMM Parameters," *Proc. ICASSP-93*, pp. II-588 - 591, Minneapolis, MN, April 1993.
- [53] Q. Huo, C. Chan and C.-H. Lee, "Bayesian Learning of the Parameters of Discrete and Tied-Mixture HMMs for Speech Recognition," *Proc. EuroSpeech-93*, Berlin, Germany, Sept. 1993.
- [54] T. Matsuoka and C.-H. Lee, "A Study of On-line Bayesian Adaptation for HMM-based Speech Recognition," *Proc. EuroSpeech-93*, Berlin, Germany, Sept. 1993.
- [55] C.-H. Lee and L. R. Rabiner, "Automatic Speech Recognition -- Present State and Future Directions," invited paper in *Proc. ATR International Workshop on Speech Translation*, Kyoto, Japan, Nov. 1993.
- [56] C.-H. Lee, "Stochastic Modeling in Spoken Dialogue System Design," invited paper in *Proc. International Symposium on Spoken Dialogue*, Waseda University, Tokyo, Japan, Nov. 1993.
- [57] C.-H. Lee and J.-L. Gauvain, "Bayesian Techniques in Stochastic Modeling," invited paper in *Proc. IEEE ASR Workshop*, Snowbird, UT, Dec. 1993.
- [58] Q. Huo, C. Chan and C.-H. Lee, "Segmental Quasi-Bayesian Learning of the Mixture Coefficients in SCHMM for Speech Recognition," *Proc. ISSIPNN-94*, Hong Kong, April 1994.
- [59] Q. Huo, C. Chan and C.-H. Lee, "Bayesian Learning of the SCHMM Parameters for Speech Recognition," *Proc. ICASSP-94*, Adelaide, Australia, April 1994.
- [60] C.-S. Liu, C.-H. Lee, W. Chou, A. E. Rosenberg and B.-H. Juang, "Speaker Recognition Based on Minimum Error Discriminative Training," *Proc. ICASSP-94*, Adelaide, Australia, April 1994.

- [61] W. Chou, T. Matsuoka, B.-H. Juang and C.-H. Lee, "An Algorithm of High Resolution and Efficient Multiple Pass Hypothesis for Continuous Speech Recognition for Inter-Word Models," *Proc. ICASSP-94*, Adelaide, Australia, April 1994.
- [62] A. E. Rosenberg, C.-H. Lee and F. K. Soong, "Cepstral Channel Normalization Techniques for HMM-Based Speaker Verification," *Proc. ICSLP-94*, Yokohama, Japan, Sept. 1994.
- [63] W. Chou, C.-H. Lee and B.-H. Juang, "Minimum Error Rate Training of Inter-word Context Dependent Acoustic Model Units in Speech Recognition," *Proc. ICSLP-94*, pp.439-442, Yokohama, Japan, Sept. 1994.
- [64] C.-H. Lee and L. R. Rabiner, "An Overview of Automatic Speech Recognition," invited paper in *Proc. International Workshop on Human Interface Technology*, Aizu, Japan, Sept. 1994.
- [65] A. Sankar and C.-H. Lee, "Robust Speech Recognition Based on Stochastic Matching," *Proc. ICASSP-95*, Detroit, MI, May 1995.
- [66] M. Rahim, C.-H. Lee and B.-H. Juang, "Robust Utterance Verification for Connected Digit Recognition," *Proc. ICASSP-95*, Detroit, MI., May 1995.
- [67] R. C. Rose, B.-H. Juang and C.-H. Lee, "A Training Procedure for Verifying String Hypotheses in Continuous Speech Recognition," *Proc. ICASSP-95*, Detroit, MN, May 1995.
- [68] J. Alvarez-Cercadillo, C.-H. Lee and L. A. Hernandez-Gomez, "Acoustic Modeling of Context Dependent Units for Large Vocabulary Speech Recognition in Spanish," *Proc. EuroSpeech-95*, Madrid, Spain, Sept. 1995.
- [69] R. Sukkar, C.-H. Lee and B.-H. Juang, "A Vocabulary-Independent Discriminatively Trained Method for Rejection of Non-Keywords in Subword Based Speech Recognition", *Proc. EuroSpeech-95*, Madrid, Spain, Sept. 1995.
- [70] M. Rahim, C.-H. Lee and B.-H. Juang, "Discriminative Utterance Verification for Connected Digit Recognition," *Proc. EuroSpeech-95*, Madrid, Spain, Sept. 1995.
- [71] M. Rahim and C.-H. Lee, "An Integrated ANN-HMM Speech Recognition System Based on Minimum Classification Error Training," *Proc. IEEE ASR Workshop*, Snowbird, UT, Dec. 1995.
- [72] Q. Huo and C.-H. Lee, "Incremental Adaptive Learning of the Continuous Density Hidden Markov Model for Speech Recognition," *Proc. IEEE ASR Workshop*, Snowbird, UT, Dec. 1995.
- [73] S. Furui and C.-H. Lee, "Robust Speech Recognition - An Overview," invited paper in *Proc. IEEE ASR Workshop*, Snowbird, UT, Dec. 1995.
- [74] R. Rose, C.-H. Lee and B.-H. Juang, "Model Compensation for Robust ASR," invited paper in *Proc. IEEE ASR Workshop*, Snowbird, UT, Dec. 1995.
- [75] M. Rahim, C.-H. Lee, B.-H. Juang and W. Chou, "Discriminative Utterance Verification Using Minimum String Verification Error (MSVE) Training," *Proc. ICASSP-96*, pp. 3585-3588, Atlanta, GA, May 1996.
- [76] R. Sukkar, A. Setlur, M. Rahim and C.-H. Lee, "Utterance Verification of Keyword Strings Using Word Based Minimum Verification Error (WB-MVE) Training," *Proc. ICASSP-96*, pp. 516-519, Atlanta, GA, May 1996.
- [77] Q. Huo and C.-H. Lee, "A Study of On-Line Quasi-Bayes Adaptation for CDHMM-Based Speech Recognition," *Proc. ICASSP-96*, pp. 705-708, Atlanta, GA, May 1996.
- [78] C.-H. Lee, "An Overview on Spoken Language Processing," *Proc. ROCLING IX*, pp. 1-36, Tainan, Taiwan, August 1996.
- [79] M. Rahim and C.-H. Lee, "Joint ANN Feature and HMM Recognizer Design Using String-Based Minimum Classification Error (MCE) Training," *Proc. WCNN-96*, San Diego, CA, Sept. 1996.
- [80] T. Kawahara, C.-H. Lee and B.-H. Juang, "Key-Phrase Detection and Verification for Flexible Speech Understanding," *Proc. ASJ Fall Meeting*, pp. 21-22, Okayama, Japan, Sept. 1996.
- [81] Q. Huo and C.-H. Lee, "On-Line Adaptive Learning of the Correlated Continuous Density Hidden Markov Models for Speech Recognition," *Proc. ICSLP-96*, pp. 981-984, Philadelphia, PA, Oct. 1996.
- [82] A. C. Surendran, C.-H. Lee and M. Rahim, "A Maximum Likelihood Stochastic Matching Approach to Non-linear Equalization for Robust Speech Recognition," *Proc. ICSLP-96*, pp. 1832-1835, Philadelphia, PA, Oct. 1996.
- [83] K. Wang, C.-H. Lee and B.-H. Juang, "Maximum Likelihood Learning of Auditory Feature Maps for Stationary Vowels," *Proc. ICSLP-96*, pp. 1261-1264, Philadelphia, PA, Oct. 1996.
- [84] T. Kawahara, C.-H. Lee and B.-H. Juang, "Key-Phrase Detection and Verification for Flexible Speech Understanding," *Proc. ICSLP-96*, pp. 957-960, Philadelphia, PA, Oct. 1996.
- [85] M. Rahim and C.-H. Lee, "Simultaneous Feature and HMM Design Using String-Based Minimum Classification Error Training Criterion," *Proc. ICSLP-96*, pp. 1820-1823, Philadelphia, PA, Oct. 1996.
- [86] C.-H. Lee, B.-H. Juang, W. Chou and J. J. Molina-Perez, "A Study on Task-Independent Subword Selection and Modeling for Speech Recognition," *Proc. ICSLP-96*, pp. 1816-1819, Philadelphia, PA, Oct. 1996.

- [87] C.-H. Lee, "On Feature and Model Compensation Approach to Robust Speech Recognition," *Proc. ESCA-NATO Workshop on Robust Speech Recognition for Unknown Communication Channels*, pp.45-54, Pont-a-Mousson, France, April 1997.
- [88] J.-T. Chien, C.-H. Lee and H.-C. Wang, "Improved Bayesian Learning of Hidden Markov Models for Speaker Adaptation," *Proc. ICASSP-97*, pp. 1027-1030, Munich, Germany, April 1997.
- [89] Q. Huo, H. Jiang and C.-H. Lee, "A Bayesian Predictive Classification Approach to Robust Speech Recognition," *Proc. ICASSP-97*, pp. 1549-1550, Munich, Germany, April 1997.
- [90] T. Kawahara, C.-H. Lee and B.-H. Juang, "Combining Key-Phrase Detection and Subword-Based Verification for Flexible Speech Understanding," *Proc. ICASSP-97*, pp. 1159-1162, Munich, Germany, April 1997.
- [91] J.-T. Chien, H.-C. Wang and C.-H. Lee, "Bayesian Affine Transformation of HMM Parameters for Instantaneous and Supervised Adaptation in Telephone Speech Recognition," *Proc. EuroSpeech-97*, pp. 2563-2566, Rhode, Greece, September 1997.
- [92] Q. Huo and C.-H. Lee, "Combined On-Line Model Adaptation and Bayesian Predictive Classification for Robust Speech Recognition," *Proc. EuroSpeech-97*, pp. 1847-1850, Rhode, Greece, September 1997.
- [93] Q. Li, B.-H. Juang, Q. Zhou and C.-H. Lee, "Verbal Information Verification," *Proc. EuroSpeech-97*, pp. 839-842, Rhode, Greece, September 1997.
- [94] Q. Zhou, C.-H. Lee, W. Chou and A. Pargellis, "Speech Technology Integration and Response Platform: A System Study," *Proc. EuroSpeech-97*, pp. 621-624, Rhode, Greece, September 1997.
- [95] C.-H. Lee, "A Unified Statistical Hypothesis Testing Approach to Speaker Verification and Verbal Information Verification," invited paper in *Proc. COST Workshop on Speech Technology in the Public Telephone Network: Where are we today?*, pp.62-73, Rhode, Greece, September 1997.
- [96] Q. Li, B.-H. Juang, C.-H. Lee, Q. Zhou and F. K. Soong, "On Speaker Authentication," *Proc. IEEE Workshop on Automatic Identification*, Stony Brook, NY, November 1997.
- [97] T. Kawahara, S. Doshita and C.-H. Lee, "Phrase Language Models for Detection and Verification-based Speech Understanding," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 49-56, Santa Barbara, CA, December 1997.
- [98] M.-W. Koo, C.-H. Lee and B.-H. Juang, "A New Hybrid Decoding Algorithm for Speech Recognition and Utterance Verification," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 303-310, Santa Barbara, CA, December 1997.
- [99] C.-H. Lee, "Robust Speech Recognition Based on Adaptive Compensation," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 357-364, Santa Barbara, CA, December 1997.
- [100] K. Shinoda and C.-H. Lee, "Structural MAP Speaker Adaptation Using Hierarchical Priors," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 381-388, Santa Barbara, CA, December 1997.
- [101] A. Surendran, C.-H. Lee, and M. Rahim, "Unsupervised Smooth Training of Feed-Forward Neural Networks for Mismatch Compensation," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 482-489, Santa Barbara, CA, December 1997.
- [102] C. Garcia-Mateo and C.-H. Lee, "A Study on Subword Modeling for Utterance Verification in Mexican Spanish," *Proc. 1997 IEEE Workshop on Automatic Speech Recognition and Understanding*, pp. 614-621, Santa Barbara, CA, December 1997.
- [103] M.-W. Koo, C.-H. Lee and B.-H. Juang, "A New Decoder Based on a Generalized Confidence Score", *Proc. ICASSP-98*, pp. 213-216, Seattle, WA, May 1998.
- [104] Q. Huo and C.-H. Lee, "A Study of Prior Sensitivity for Bayesian Predictive Classification Based Robust Speech Recognition," *Proc. ICASSP-98*, pp. 741-744, Seattle, WA, May 1998.
- [105] K. Shinoda and C.-H. Lee, "Unsupervised Adaptation Using Structural Bayes Approach," *Proc. ICASSP-98*, pp.793-796, Seattle, WA, May 1998.
- [106] C.-H. Lee, "A Tutorial on Speaker and Speech Verification," *Proc. NORSIG-98*, pp. 9-16, Vigso, Denmark, June 1998.
- [107] K. Shinoda and C.-H. Lee, "Acoustic Model Adaptation Using Structural Bayes Approach," *Proc. ASJ Fall Meeting*, Yamagata, Japan, Sept. 1998.
- [108] C.-H. Lee, R. Carpenter, W. Chou, J. Chu-Carroll, W. Reichl, A. Saad and Q. Zhou, "A Study on Natural Language Call Routing," *Proc. IVTTA-98*, pp. 37-42, Torino, Italy, Sept. 1998.
- [109] P. Ramesh, C.-H. Lee, and B.-H. Juang, "Context Dependent Anti-Subword Modeling for Utterance Verification," *Proc. ICSLP-98*, Sydney, Australia, Nov. 1998.
- [110] A. Pargellis, Q. Zhou, A. Saad, and C.-H. Lee, "A Language for Creating Speech Applications," *Proc. ICSLP-98*, Sydney, Australia, Nov. 1998.

- [111]C. Garcia-Mateo, Q. Zhou, C.-H. Lee, and A. Pargellis, "A Voice User Interface Demonstration System for Mexican Spanish," *Proc. ICSLP-98*, Sydney, Australia, Nov. 1998.
- [112]T. Kawahara, K. Ishizuka, A. Doshita and C.-H. Lee, "Speaking-Style Dependent Lexicalized Filler Model for Key-Phrase Detection and Verification," *Proc. ICSLP-98*, Sydney, Australia, Nov. 1998.
- [113]A. Surendran and C.-H. Lee, "Predictive Adaptation and Compensation for Robust Speech Recognition," *Proc. ICSLP-98*, Sydney, Australia, Nov. 1998.
- [114]O. Siohan, C.-H. Lee, A. C. Surendran, and Q. Li, "Background Model Design for Flexible and Portable Speaker Verification Systems," *Proc. ICASSP-99*, pp. 825-828, Phoenix, AZ., March 1999.
- [115]C.-H. Lee and Q. Huo, "Adaptive Classification and Decision Strategies for Robust Speech Recognition," *Proc. Workshop on Robust Methods for Speech Recognition in Adverse Conditions*, pp. 45-52, Tampere, Finland, May 1999.
- [116]O. Siohan, C. Chesta and C.-H. Lee, "Hidden Markov Model Adaptation Using Maximum a Posteriori Linear Regression," *Proc. Workshop on Robust Methods for Speech Recognition in Adverse Conditions*, pp.147-150, Tampere, Finland, May 1999.
- [117]A. Surendran and C.-H. Lee, "Bayesian Predictive Approach to Adaptation of HMMs," *Proc. Workshop on Robust Methods for Speech Recognition in Adverse Conditions*, pp.155-158, Tampere, Finland, May 1999.
- [118]A. N. Pargellis, H.-K. Kuo and C.-H. Lee, "Automatic Application Generator Matches User Expectations to System Capabilities," *Proc. ETRW on Interactive Dialogue in Multi-Modal Systems*, pp.37-40, Kloster Irsee, Germany, June 1999.
- [119]S. Ortmanns, W. Reichl, W. Chou and C.-H. Lee, "An Efficient Decoding Approach to Dialogue Systems," *Proc. ETRW on Interactive Dialogue in Multi-Modal Systems*, pp. 73-76, Kloster Irsee, Germany, June 1999.
- [120]H.-K. Kuo, A. N. Pargellis and C.-H. Lee, "Information and Manager Customizes Dialogue-Based Applications," *Proc. ETRW on Interactive Dialogue in Multi-Modal Systems*, pp. 141-144, Kloster Irsee, Germany, June 1999.
- [121]A. Potamianos, H.-K. Kuo, C.-H. Lee, A. N. Pargellis, A. Saad and Q. Zhou, "Design Principles and Tools for Multimodal Dialog Systems," *Proc. ETRW on Interactive Dialogue in Multi-Modal Systems*, pp. 169-172, Kloster Irsee, Germany, June 1999.
- [122]C.-H. Lee, "Statistical Approaches to Speech and Speaker Recognition - From Theory to Practice, Learning from Surprises," invited paper in *Proc. ICSP-99*, pp. 27-38, Seoul, South Korea, Aug. 1999.
- [123]C. Chesta, O. Siohan and C.-H. Lee, "Maximum A Posteriori Linear Regression Hidden Markov Model Adaptation," *Proc. EuroSpeech-99*, pp. 211-214, Budapest, Hungary, Sept. 1999.
- [124]F. Korkmazskiy and C.-H. Lee, "Automatic Pronunciation Generation Applications," *Proc. EuroSpeech-99*, pp. 491-494, Budapest, Hungary, Sept. 1999.
- [125]A. N. Pargellis, H.-K. Kuo and C.-H. Lee, "Automatic Dialogue Generator Creates User Defined Applications," *Proc. EuroSpeech-99*, pp. 1175-1178, Budapest, Hungary, Sept. 1999.
- [126]O. Siohan, T. A. Myrvoll and C.-H. Lee, "Structural Maximum A Posteriori Linear Regression for Fast HMM Adaptation," *Proc. of ISCA Workshop on Automatic Speech Recognition*, pp. 120-127, Paris, France, May 2000.
- [127]O. Siohan, C. Chesta, and C.-H. Lee, "Joint Maximum A Posteriori Estimation of Transformation and Hidden Markov Model Parameters," *Proc. ICASSP-2000*, pp. 965-968, Istanbul, Turkey, June 2000.
- [128]Z. Lei, W. Chou, J. Zhong and C.-H. Lee, "Video Segmentation Using Spatial and Temporal Statistical Analysis Method," *Proc. ICME-2000*, pp. 1527-1530, New York, NY, Aug. 2000.
- [129]T. A. Myrvoll, O. Siohan, C.-H. Lee and W. Chou, "Structural Maximum A Posteriori Linear Regression for Unsupervised Speaker Adaptation," *Proc. ICSLP-2000*, Beijing, China, Oct. 2000.
- [130]A. C. Surendran and C.-H. Lee, "A Priori Threshold Selection for Fixed Vocabulary Speaker Verification Systems," *Proc. ICSLP-2000*, Beijing, China, Oct. 2000.
- [131]W. Chou, T. A. Myrvoll, O. Siohan and C.-H. Lee, "Extended Maximum A Posteriori Linear Regression for Speaker Adaptation," *Proc. ICSLP-2000*, Beijing, China, Oct. 2000.
- [132]H.-K. J. Kuo and C.-H. Lee, "Discriminative Training in Natural Language Call Routing," *Proc. ICSLP-2000*, Beijing, China, Oct. 2000.
- [133]C.-S. Huang, H.-C. Wang and C.-H. Lee, "An SNR-Incremental Stochastic Matching Algorithm for Noisy Speech Recognition," *Proc. ICSLP-2000*, Beijing, China, Oct. 2000.
- [134]C.-H. Lee, "Adaptation and Compensation for Speech Recognition -- Learning from Extra Data to Improve Robustness," *Proc. International Workshop on Hands-Free Speech Communication*, pp. 27-30, Kyoto, Japan, April 2001.

- [135] H. Jiang, F. K. Soong, and C.-H. Lee, "Hierarchical Feature Compensation and Its Applications to Hands-Free ASR," *Proc. International Workshop on Hands-Free Speech Communication*, pp. 111-114, Kyoto, Japan, April 2001.
- [136] Q. Li, J. Zheng, Q. Zhou and C.-H. Lee, "A Robust, Real-Time Endpoint Detection with Energy Normalization for ASR in Adverse Environments," *Proc. ICASSP-2001*, Salt Lake City, UT, May 2001.
- [137] J. H.-K. Kuo and C.-H. Lee, "Simplifying Design Specification for Automatic Training of Robust Natural Language Call Router," *Proc. ICASSP-2001*, Salt Lake City, UT, May 2001.
- [138] H. Jiang, F. K. Soong, and C.-H. Lee, "Hierarchical Stochastic Feature Matching for Robust Speech Recognition," *Proc. ICASSP-2001*, Salt Lake City, UT, May 2001.
- [139] H. Jiang, F. K. Soong, and C.-H. Lee, "A Data Selection Strategy for Utterance Verification in Continuous Speech Recognition," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [140] Q. Zhou, J. Zheng and C.-H. Lee, "TclBLASR: An Automatic Speech Recognition Extension for Tcl," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [141] P. Durston, M. Farrell, D. Attwater, J. Allen, H.-K. J. Kuo, M. Afify, E. Fosler-Lussier, and C.-H. Lee, "OASIS Natural Language Call Steering Trial," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [142] H.-K. J. Kuo and C.-H. Lee, "A Portability Study on Natural Language Call Steering," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [143] A. Tsai, A. N. Pargellis, C.-H. Lee, and J. P. Olive, "Dialogue Session Management Using VoiceXML," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [144] A. N. Pargellis, E. Fosler-Lussier, A. Potamianos, and C.-H. Lee, "Metrics for Measuring Domain Independence of Semantic Classes," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [145] O. Siohan, A. Ando, M. Afify, H. Jiang, C.-H. Lee, P. Q. Li, F. Liu, K. Onoe, and F. K. Soong, "A Real-Time Japanese Broadcasting News Closed-Captioning System," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [146] O. Siohan, M. Afify, and C.-H. Lee, "Minimax Classification with Parametric Neighborhoods for Noisy Speech Recognition," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [147] M. Afify, H. Jiang, F. Korkmazskiy, C.-H. Lee, Q. Li, O. Siohan, F. K. Soong, and A. C. Surendran, "Evaluating the Aurora Connected Digit Recognition Task: A Bell Labs Approach," *Proc. EuroSpeech-2001*, Aalborg, Denmark, Sept. 2001.
- [148] C.-H. Lee, "Statistical Confidence Measures and Their Applications," invited paper in *Proc. ICSP-2001*, pp. 1021-1028, Daejeon, South Korea, Aug. 2001.
- [149] A. N. Pargellis, E. Fosler-Lussier, A. Potamianos, and C.-H. Lee, "A Comparison of Four Metrics for Auto-Inducing Semantic Classes," *Proc. 2001 IEEE ASRU Workshop*, Italy, Dec. 2001.
- [150] I. Zitouni, H.-K. J. Kuo and C.-H. Lee, "Natural Language Call Routing: Towards Combination and Boosting of Classifiers," *Proc. 2001 IEEE ASRU Workshop*, Italy, Dec. 2001.
- [151] H. Jiang, F. K. Soong and C.-H. Lee, "A Dynamic In-Search Discriminative Training Approach for Large Vocabulary Speech Recognition," *Proc. ICASSP-2002*, Orlando, FL, April 2002.
- [152] I. Zitouni, H.-K. J. Kuo and C.-H. Lee, "Combination of Boosting and Discriminative Training for Natural Language Call Steering Systems," *Proc. ICASSP-2002*, Orlando, FL, April 2002.
- [153] H.-K. J. Kuo, E. Fosler-Lussier, H. Jiang and C.-H. Lee, "Discriminative Training of Language Models for Speech Recognition," *Proc. ICASSP-2002*, Orlando, FL, April 2002.
- [154] B. Launay, O. Siohan, A. C. Surendran and C.-H. Lee, "Towards Knowledge-Based Features for HMM-Based Large Vocabulary Automatic Speech Recognition," *Proc. ICASSP-2002*, Orlando, FL, April 2002.
- [155] L. Chaisorn, T.-S. Chua and C.-H. Lee, "The Segmentation of News Video into Story Units," *Proc. ICME-2002*, Lussane, Switzerland, August 2002.
- [156] H.-K. J. Kuo, I. Zitouni, E. Fosler-Lussier, E. Ammicht and C.-H. Lee, "Discriminative Training for Call Classification and Routing," *Proc. ICSLP-2002*, Denver, CO., September 2002.
- [157] I. Zitouni, O. Siohan, H.-K. J. Kuo and C.-H. Lee, "Backoff Hierarchical Class N-Gram Language Modeling for Automatic Speech Recognition Systems," *Proc. ICSLP-2002*, Denver, CO., September 2002.
- [158] H. Jiang and C.-H. Lee, "Utterance Verification Based on Neighborhood Information and Bayes Factors," *Proc. ICSLP-2002*, Denver, CO., September 2002.
- [159] S. Gao, J.-S. Zhang, S. Nakamura, C.-H. Lee and T.-S. Chua, "Weighted Graph Based Decision Tree Optimization for High Accuracy Acoustic Modeling," *Proc. ICSLP-2002*, Denver, CO., September 2002.
- [160] B. Ma, C. Guan, H. Li and C.-H. Lee, "Multilingual Speech Recognition with Language Identification," *Proc. ICSLP-2002*, Denver, CO., September 2002.
- [161] N. C. Maddage, C. Xu, C.-H. Lee and M. Kankanhalli, "Statistical Analysis of Musical Instruments," *Proc. PCM-2002*, pp. 581-588, Taipei, Taiwan, Dec. 2002.

- [162] L. Chaisorn, T.-S. Chua and C.-H. Lee, "Extracting Story Units in News Video," *Proc. IWAIT-2002*, Nakasaki, Japan, Jan. 2003.
- [163] H.-K. J. Kuo, C.-H. Lee, I. Zitouni and E. Fosler-Lussier, "Minimum Verification Error Training for Topic Verification," *Proc. ICASSP-2003*, Hong Kong, China, April 2003.
- [164] I. Zitouni, O. Siohan and C.-H. Lee, "Hierarchical Class N-Gram Language Models: Towards Better Estimation of Unseen Events in Speech Recognition," *Proc. EuroSpeech 2003*, Geneva, Switzerland, Sept. 2003.
- [165] C.-S. Huang, C.-H. Lee, and H.C. Wang, "New Model-Based HMM Distances with Applications to Run-Time ASR Error Estimation and Model Tuning," *Proc. EuroSpeech 2003*, Geneva, Switzerland, Sept. 2003.
- [166] S. Gao and C.-H. Lee, "A Discriminative Decision Tree Learning Approach to Acoustic Modeling," *Proc. EuroSpeech 2003*, Geneva, Switzerland, Sept. 2003.
- [167] S. Gao, N. C. Maddage and C.H. Lee, "A Hidden Markov Model Based Approach to Music Segmentation and Identification," *Proc. ICICS-PCM 2003*, Singapore, Dec. 2003.
- [168] C.-H. Lee and B.-H. Juang, "A New Detection Paradigm for Collaborative Automatic Speech Recognition and Understanding," *Lectures by Masters in Speech Processing*, Maui, Hawaii, Jan. 2004.
- [169] S. Gao and C.-H. Lee, "An Adaptive Learning Approach to Music Tempo and Beat Analysis," *Proc. ICASSP-2004*, Montreal, Canada, April 2004.
- [170] S. Gao and C.-H. Lee, "An Unsupervised Learning Approach to Musical Event Detection," *Proc. International Conference on Multimedia Expo (ICME04)*, pp. 1307-1310, Taipei, Taiwan, June 2004.
- [171] L. Chaisorn, T.-S. Chua, C.-H. Lee and Q. Tian, "A Hierarchical Approach to Story Segmentation of Large Broadcast News Video Corpus," *Proc. International Conference on Multimedia Expo (ICME04)*, pp. 1095-1098, Taipei, Taiwan, June 2004.
- [172] S. Gao, C.-H. Lee and Q. Tian, "Indexing with Musical Events and Its Application to Content-Based Music Retrieval," *Proc. International Conference on Pattern Recognition (ICPR04)*, pp. 846-849, Cambridge, UK, July 2004.
- [173] R. Shi, H. Feng, C.-H. Lee and T.-S. Chua, "An Adaptive Image Content Representation and Segmentation Approach to Automatic Image Annotation," *Proc. International Conference on Video and Image Retrieval (CVIR2004)*, pp. 545-554, Dublin, Ireland, July 2004.
- [174] C.-H. Lee, "From Knowledge-Ignorant to Knowledge-Rich Modeling: A New Speech Research Paradigm for Next Generation Automatic Speech Recognition," *Proc. International Conference on Spoken Language Processing (ICSLP2004)*, Jeju, South Korea, Oct. 2004.
- [175] J. Li, Y. Tsao and C.-H. Lee, "A Study on Knowledge Source Integration for Candidate Rescoring in Automatic Speech Recognition," *Proc. ICASSP-2005*, Philadelphia, March 2005.
- [176] J. Li and C.-H. Lee, "On Designing and Evaluating Speech Event Detectors," *Proc. InterSpeech-2005*, Lisbon, Portugal, September 2005.
- [177] Y. Tsao, J. Li and C.-H. Lee, "A Study on Separation between Acoustic Models and Its Applications," *Proc. InterSpeech-2005*, Lisbon, Portugal, September 2005.
- [178] S. Gao, B. Ma, H. Li and C.-H. Lee, "A Text Categorization Approach to Automatic Language Identification," *Proc. InterSpeech-2005*, Lisbon, Portugal, September 2005.
- [179] B. Ma, H. Li and C.-H. Lee, "An Acoustic Segment Modeling Approach to Automatic Language Identification," *Proc. InterSpeech-2005*, Lisbon, Portugal, September 2005.
- [180] C. Ma and C.-H. Lee, "Speaker Verification Based on Combining Speaker Individuality Parameter Selection and Decisions," *Proc. 2005 IEEE ASRU Workshop*, Cancun, Mexico, December 2005.
- [181] S. Gao, D.-H. Wang and C.-H. Lee, "Automatic Image Annotation through Multi-Topic Text Categorization," *Proc. ICASSP-2006*, Toulouse, France, May 2006.
- [182] S. Yaman and C.-H. Lee, "An Iterative Constrained Optimization Approach to Classifier Design," *Proc. ICASSP-2006*, Toulouse, France, May 2006.
- [183] C.-H. Lee, "Media Processing and Data Mining for Education and Learning," *Proc. Workshop on Technology-integrated Science and Engineering Education*, Taipei, Taiwan, May 2006.
- [184] J. Li, S. Yaman, C.-H. Lee, B. Ma, R. Tong, D. Zhu and H. Li, "Language Recognition Based on Score Distribution Feature Vectors and Discriminative Classifier Fusion," *Proc. 2006 IEEE Odyssey Workshop*, San Juan, Puerto Rico, June 2006.
- [185] S. Gao and C.-H. Lee, "Exploiting Kernel Functions to Learn Rank Functions," Submitted to *ICML2006*, Pittsburgh, PA, June 2006.
- [186] R. Shi, T.-S. Chua, C.-H. Lee, and S. Gao, "Bayesian Learning of Hierarchical Multinomial Mixture Models of Concepts for Automatic Image Annotation," pp. 102-112, *CIVR2006*, Tempe, Arizona, July 2006.

- [187]R. Shi, T.-S. Chua, C.-H. Lee, and S. Gao, "Bayesian Learning of Hierarchical Multinomial Mixture Models for extended Automatic Image Annotation," *ACMMM2006*, Santa Barbara, CA, October 2006.
- [188]S. Gao and C.-H. Lee, "An Ensemble Classifier Learning Approach to ROC Optimization," *ICPR2006*, pp. 679-682, Hong Kong, China, August 2006.
- [189]J. Li, M. Yuan, and C.-H. Lee, "Soft Margin Estimation of Hidden Markov Model Parameters," *Proc. InterSpeech 2006*, Pittsburgh, PA, Sept. 2006.
- [190]S. M. Siniscalchi, J. Li, and C.-H. Lee, "A Study on Lattice Scoring with Knowledge Scores for Automatic Speech Recognition," *Proc. InterSpeech 2006*, pp. 517-520, Pittsburgh, PA, Sept. 2006.
- [191]Y. Tsao, J. Li and C.-H. Lee, "A Study on Environment Modeling for Robust Speech Recognition," *Proc. InterSpeech 2006*, Pittsburgh, PA, Sept. 2006.
- [192]C. Ma, Y. Taso, and C.-H. Lee, "A Study on Detection Based Automatic Speech Recognition," *Proc. InterSpeech 2006*, Pittsburgh, PA, Sept. 2006.
- [193]J. Reed and C.-H. Lee, "A Study on Music Genre Classification Based on Universal Acoustic Models," *Proc. ISMIR*, pp. 89-94, Victoria, BC, October 2006.
- [194]Y. Xiao, T.-S. Chua, C.-H. Lee, "Fusion of Region and Image-based Techniques for Automatic Image Annotation," *Proc. MMM*, pp. 247-258, Singapore, pp. 247-258, Springer Verlag LNCS 4351, Jan. 2007.
- [195]F. Vella and C.-H. Lee, "Information Fusion Techniques for Automatic Image Annotation," *Proc. VISAPP*, pp. 60-67, Barcelona, Spain, March 2007.
- [196]S. M. Siniscalchi, P. Schwarz and C.-H. Lee, "High-Accuracy Phone Recognition by Combining High-Performance Phone Lattice Generation and Knowledge Based Rescoring," *Proc. ICASSP*, pp. 869-872, Honolulu, Hawaii, April 2007.
- [197]J. Li, S. M. Siniscalchi and C.-H. Lee, "Approximate Test Risk Minimization through Soft Margin Estimation," *Proc. ICASSP*, pp. 653-656, Honolulu, Hawaii, April 2007.
- [198]Y. Xiao, T.-S. Chua, L. Chaisorn, and C.-H. Lee, "Use of Generalized Pattern Model for Video Annotation," *Proc. ICME*, pp. 819-822, Beijing, China, July 2007.
- [199]B. Byun, C.-H. Lee, S. Webb and C. Pu, "A Discriminative Classifier Learning Approach to Image Modeling and Spam Image Identification," *Proc. CEAS*, Mountain View, CA, August 2007.
- [200]S. Yaman and C.-H. Lee, "Iterative Constrained Optimization for Flexible Classifier Design with Multiple Competing Objectives," *Proc. MLSP*, Thessaloniki, Greece, August 2007.
- [201]C.-H. Lee, M. A. Clements, S. Dusan, E. Fosler-Lussier, K. Johnson, B.-H. Juang, and L. R. Rabiner, "An Overview on Automatic Speech Attribute Transcription (ASAT)," *Proc. Interspeech*, Antwerp, Belgium, August 2007.
- [202]J. Li and C.-H. Lee, "Soft Margin Feature Extraction for Automatic Speech Recognition," *Proc. Interspeech*, Antwerp, Belgium, August 2007.
- [203]S. Yaman, J.-T. Chien and C.-H. Lee, "Structural Bayesian Language Modeling and Adaptation," *Proc. Interspeech*, Antwerp, Belgium, August 2007.
- [204]Y. Tsao and C.-H. Lee, "An Ensemble Modeling to Joint Characterization of Speakers and Speaking Environments," *Proc. Interspeech*, Antwerp, Belgium, August 2007.
- [205]C. Ma and C.-H. Lee, "A Study on Word Detector Design and Knowledge-Based Pruning and Rescoring," *Proc. Interspeech*, Antwerp, Belgium, August 2007.
- [206]F. Vella and C.-H. Lee, "Boosting of Maximal Figure of Merit Classifiers For Automatic Image Annotation," *Proc. ICIP*, pp. 217-220, San Antonio, TX, Sept. 2007.
- [207]J. Reed and C.-H. Lee, "A Study on Attribute-Based Taxonomy for Music Information Retrieval," *Proc. ISMIR*, Vienna, Austria, Sept. 2007.
- [208]R. Shi, C.-H. Lee and T.-S. Chua, "Enhancing Image Annotation by Integrating Concept Ontology with Text-Based Bayesian Learning Model," *Proc. ACM Multimedia*, pp. 341-344, Augsburg, Germany, Sept. 2007.
- [209]C.-H. Lee, "Fundamentals and Technical Challenges in Automatic Speech Recognition," *Proc. SPECOM*, Moscow, Russia, Oct. 2007.
- [210]J. Li, Z.J. Yan, C.-H. Lee and R.-H. Wang, "A Study on Soft Margin Estimation for LVCSR," *Proc. ASRU*, Kyoto, Japan, Dec. 2007.
- [211]Y. Tsao and C.-H. Lee, "Two Extensions to Ensemble Speaker and Speaking Environment Modeling for Robust Automatic Speech Recognition," *Proc. ASRU*, Kyoto, Japan, Dec. 2007.
- [212]S. M. Siniscalchi, T. Svendsen and C.-H. Lee, "Towards Bottom-Up Continuous Phone Recognizer," *Proc. ASRU*, pp. 566-569, Kyoto, Japan, Dec. 2007.
- [213]Y. F. Liao, J.-J. Tu, S.-J. Chang and C.-H. Lee, "An Enhanced Minimum Classification Error Training to Balance Insertion, Deletion and Substitution Errors," *Proc. ASRU*, Kyoto, Japan, Dec. 2007.

- [214] S. M. Siniscalchi, T. Svendsen and C.-H. Lee, "Toward A Detector-Based Universal Phone Recognizer," *Proc. ICASSP*, pp. 566-569, Las Vegas, Nevada, March 2008.
- [215] C. Ma and C.-H. Lee, "Unsupervised Anchor Shot Detection Using Multi-Modal Spectral Clustering," *Proc. ICASSP*, Las Vegas, Nevada, March 2008.
- [216] D. Zhu, B. Ma, H. Li and C.-H. Lee, "Discriminative Learning for Optimizing Detector Performance in Spoken Language Recognition," *Proc. ICASSP*, Las Vegas, Nevada, March 2008.
- [217] D. Lyu, S. M. Siniscalchi, T.-Y. Kim and C.-H. Lee, "An Experimental Study on Continuous Phone Recognition with Little or No Language-Specific Training Data," *Proc. ITRW*, Aalborg, Denmark, June 2008.
- [218] J. Reed and C.-H. Lee, "A Reference Ranking Model Using a Discriminatively-Trained Classifier," *Proc. ISMIR*, Philadelphia, PA., Sept. 2008.
- [219] J. Li, Z. J. Yan, C.-H. Lee and R.-H. Wang, "Soft Margin Estimation with Various Separation Levels for LVCSR," *Proc. Interspeech*, Brisbane, Australia, Sept. 2008.
- [220] J. Li and C.-H. Lee, "On a Generalization of Margin-Based Discriminative Training to Robust Speech Recognition," *Proc. Interspeech*, Brisbane, Australia, Sept. 2008.
- [221] Y. Tsao, J. Li and C.-H. Lee, "Improving the Ensemble Speaker and Speaking Environment Modeling Approach by Enhancing the Online Estimation Process," *Proc. Interspeech*, Brisbane, Australia, Sept. 2008.
- [222] D. Lyu, S. M. Siniscalchi, T.-Y. Kim and C.-H. Lee, "Continuous Phone Recognition without Target Language Training Data," *Proc. Interspeech*, pp. 2687-2690, Brisbane, Australia, Sept. 2008.
- [223] S. M. Siniscalchi, T. Svendsen and C.-H. Lee, "A Penalized Logistic Regression Approach to Detection Based Phone Classification," *Proc. Interspeech*, pp. 2390-2393, Brisbane, Australia, Sept. 2008.
- [224] M. Cevik, F. Weng and C.-H. Lee, "Detection of Repetitions in Spontaneous Speech in Dialogue Sessions," *Proc. Interspeech*, Brisbane, Australia, Sept. 2008.
- [225] B. Byun, C. Ma and C.-H. Lee, "An Experimental Study on Discriminative Concept Classifier Combination for TRECVID High-Level Feature Extraction," *Proc. ICIP*, pp. 2532-2535, San Diego, CA, Oct. 2008.
- [226] C. Ma and C.-H. Lee, "An Efficient Gradient Computation Approach to Discriminative Fusion Optimization for Semantic Concept Detection," *Proc. ICPR*, pp. 1-4, Tampa, FL, Dec. 2008.
- [227] S. M. Siniscalchi, T. Svendsen, and C.-H. Lee, "A Phonetic Feature Based Lattice Rescoring Approach to LVCSR," *Proc. ICASSP*, pp. 3865-3868, Taipei, Taiwan, April 2009.
- [228] Y. Tsao, J. Li and C.-H. Lee, "Ensemble Speaker and Speaking Environment Modeling Approach with Advanced Online Process," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [229] H. Lin, L. Deng, D. Yu, Y. Gong, A. Acero and C.-H. Lee, "A Study on Multilingual Acoustic Modeling for Large Vocabulary ASR," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [230] I. Kim and C.-H. Lee, "A Hierarchical Grid Feature Representation Framework for Automatic Image Annotation," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [231] C. Ma, B. Byun, I. Kim and C.-H. Lee, "A Detection-Based Approach to Broadcasting News Video Story Segmentation," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [232] J. Reed and C.-H. Lee, "On the Importance of Modeling Temporal Information for Music Tag Annotation," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [233] S. Dimopoulos, A. Potamianos, E. Fosler-Lussier, and C.-H. Lee, "Multiple Time Resolution Analysis of Speech Signal Using MCE Training with Application to Speech Recognition," *Proc. ICASSP*, Taipei, Taiwan, April 2009.
- [234] B. Byun, C.-H. Lee, S. Webb, D. Irani, and C. Pu, "An Anti-spam Filter Combination Framework for Text and Image Emails," *Proc. CEAS*, Mountain View, CA, August 2009.
- [235] S. Matsuda, Y. Tsao, J. Li, S. Nakamura, and C. H. Lee, "A Study on Soft Margin Estimation of Linear Regression Parameters for Speaker Adaptation," *Proc. Interspeech*, Brighton, UK, September 2009.
- [236] S. M. Siniscalchi, J. Reed, T. Svendsen, and C.-H. Lee, "Exploring Universal Attribute Characterization of Spoken Languages for Spoken Language Recognition," *Proc. Interspeech*, pp. 168-171, Brighton, UK, September 2009.
- [237] J. Reed, Y. Ueda, S. M. Siniscalchi, U. Yuchi, S. Sagayama and C.-H. Lee, "Minimum Classification Error Training to Improve Isolated Chord Recognition," *Proc. ISMIR*, Kobe, Japan, Oct. 2009.
- [238] B. Byun and C.-H. Lee, "An Incremental Learning Framework Combining Sample Confidence and Discrimination with an Application to Automatic Image Annotation," *Proc. ICIP*, Cairo, Egypt, Nov. 2009.
- [239] N. Inoue, S. Hao, T. Saito, K. Shinoda, I. Kim, and C.-H. Lee, "TITGT at TRECVID 2009 Workshop," *Proc. TRECVID 2009 Workshop*, Rockville, MD, November 2009.
- [240] S. Yaman, S. M. Siniscalchi, and C.-H. Lee, "A Multi-Objective Programming Based Approach to Language Model Adaptation," *Proc. Workshop on Deep Learning for Speech Recognition and Related Applications (DLSRRA2009)* Whistler, BC, Canada, December 2009.

- [241]X. Xiao, J. Li, E. S. Chng, H. Li and C.-H. Lee, "A Study on Hidden Markov Model's Generalization Capability for Speech Recognition," *Proc. ASRU*, Merano, Italy, December 2009.
- [242]Y. Tsao, S. Matsuda, S. Nakamura and C.-H. Lee, "MAP Estimation of Online Mapping Parameters in Ensemble Speaker and Speaking Environment Modeling," *Proc. ASRU*, Merano, Italy, December 2009.
- [243]S. Dimopoulos, E. Fosler-Lussier, C.-H. Lee and A. Potamianos, "Transition Features for CRF-based Recognition and Boundary Detection," *Proc. ASRU*, Merano, Italy, December 2009.
- [244]Y. Tsao, H. Sun, H. Li and C.-H. Lee, "An Acoustic Segment Model Approach to Incorporating Temporal Information into Speaker Modeling for Text-independent Speaker Recognition," *Proc. ICASSP*, Dallas, TX, March 2010.
- [245]S. M. Siniscalchi, T. Svendsen, F. Sorbello and C.-H. Lee, "Experimental Studies on Continuous Speech Recognition Using Neural Architecture with "Adaptive" Hidden Activation Functions," *Proc. ICASSP*, pp. 4882-4885, Dallas, TX, March 2010.
- [246]C. Ma, H.-K. J. Kuo, H. Soltau, X. Cui, U. Chaudhari, L. Mangu and C.-H. Lee, "A Comparative Study on System Combination Schemes for LVCSR," *Proc. ICASSP*, Dallas, TX, March 2010.
- [247]S. M. Siniscalchi, J. Reed, T. Svendsen, and C.-H. Lee, "Exploiting Context-Dependency and Acoustic Resolution of Universal Speech Attribute Models in Spoken Language Recognition," *Proc. Interspeech*, pp. 2718-2721, Chiba, Japan, September 2010.
- [248]A. Mushtaq, Y. Tsao and C.-H. Lee, "A Particle Filter Feature Compensation Approach to Robust Speech Recognition," *Proc. Interspeech*, Chiba, Japan, September 2010.
- [249]J. Li, Y. Tsao and C.-H. Lee, "Shrinkage Model Adaptation in Automatic Speech Recognition," *Proc. Interspeech*, Chiba, Japan, September 2010.
- [250]Z. Chen, Y.-C. Cheng, F. Yin, and C.-H. Lee, "Bandwidth Expansion of Speech Based on Wavelet Transform Modulus Maxima Vector Mapping," *Proc. Interspeech*, Chiba, Japan, September 2010.
- [251]H.-C. Liao, J.-C. Chen, S.-C. Chang, Y.-H. Guan, C.-H. Lee, "Decision Tree Based Tone Modeling with Corrective Feedbacks for Automatic Mandarin Tone Assessment," *Proc. Interspeech*, Chiba, Japan, September 2010.
- [252]C.-H. Lee, "A Tutorial on Objective-Driven and Decision-Feedback Discriminative Training," *Proc. Interspeech*, Chiba, Japan, September 2010.
- [253]N. Inoue, T. Wada, Y. Kamishima, K. Shinoda, I. Kim, B. Byun, and C.-H. Lee, *TT+GT at TRECVID 2010 Workshop*, in *Proc. of TRECVID*, November 2010.
- [254]S. M. Siniscalchi, T. Svendsen, and C.-H. Lee, "A Survey on Recent Progress in the ASAT/SIRKUS Paradigm," *Proc. ISCSLP*, pp. 465-470, Tainan, Taiwan, November 2010.
- [255]B. Byun and C.-H. Lee, "A Kernalized Maximal Figure-of-Merit Learning Approach Based on Subspace Distance Minimization," *Proc. ICASSP*, Prague, Czech Republic, May 2011.
- [256]J. Li, M. Yuan and C.-H. Lee, "LASSO Model Adaptation in Automatic Speech Recognition," *Proc. Workshop on Learning Architectures, Representations, and Optimization for Speech and Visual Information Processing, International Conference on Machine Learning*, Bellevue, WA, July 2011.
- [257]S. M. Siniscalchi and C.-H. Lee, "A Bottom-Up Stepwise Knowledge-Integration Approach to Large Vocabulary Continuous Speech Recognition Using Weighted Finite Stat Machines," *Proc. Interspeech*, pp. 901-904, Florence, Italy, August 2011.
- [258]H.-C. Liao, Y.-F. Liao and C.-H. Lee, "Maximum Confidence Measure Based Interaural Phase Difference Estimation for Noise Masking in Dual-Microphone Robust Speech Recognition," *Proc. Interspeech*, Florence, Italy, August 2011.
- [259]M. Baxter, B. Byun, E. J. Coyle, T. Dang, T. Dwyer, I. Kim, C.-H. Lee, R. Llewallyn. And N. Sephus, "On Project-Based Learning through the Vertically-Integrated Projects Program," *Proc. Frontiers in Education*, Rapid City, S.D., October 12-15, 2011.
- [260]I. Kim and C.-H. Lee, "Optimization of Average Precision with Maximal Figure-of-Merit Learning," *Proc. MLSP2011*, Beijing, China, Sept. 18-21, 2011.
- [261]A. G. A. Perera, *et al*, "GENIE TRECVID 2011 Multimedia Event Detection: Late-Fusion Approaches to Combining Multiple Audio-Visual Features," *TRECVID Workshop Notebook Paper*, Gaithersburg, MD., December, 2011.
- [262]C. Zhang, Y. Liu and C.-H. Lee, "Detection-Based Accented Speech Recognition Using Articulatory Features," *Proc. Automatic Speech Recognition and Understanding Workshop*, Hawaii, Dec. 11-15, 2011.
- [263]D. Yu, S. M. Siniscalchi, L. Deng, and C.-H. Lee, "Boosting Attribute and Phone Estimation Accuracies Using Deep Neural Networks for Detection-Based Speech Recognition," *Proc. ICASSP2012*, pp. 4169-4172, Kyoto, Japan, March 25-30, 2012.

- [264] C. Zhang, Y. Liu, Y. Xia, and C.-H. Lee, "Discriminative Gaussian Mixture Selection with Enhanced Robustness and Performance for Multi-Accent Speech Recognition," *Proc. ICASSP2012*, Kyoto, Japan, March 25-30, 2012.
- [265] Y.-C. Cheng, Z. Feng, F. Weng, and C.-H. Lee, "Enhancing Model-Based Skin Color Detection: From Low-Level RGB Features to High-Level Discriminative Binary-Class Features," *Proc. ICASSP2012*, Kyoto, Japan, March 25-30, 2012.
- [266] A. Mushtaq and C.-H. Lee, "An Integrated Approach to Feature Compensation Combining Particle Filters and Hidden Markov Models for Robust Speech Recognition," *Proc. ICASSP*, Kyoto, Japan, March 25-30, 2012.
- [267] Z. Shen and C.-H. Lee, "A LASSO-Based Ensemble Empirical Mode Decomposition Approach to Designing Adaptive Clutter Suppression Filters," *Proc. ICASSP2012*, Kyoto, Japan, March 25-30, 2012.
- [268] I. Kim and S. Oh, A. G. A. Perera, and C.-H. Lee, "Per-Exemplar Fusion Learning for Video Retrieval and Recounting," *Proc. ICME*, Melbourne, Australia, July 9-13, 2012.
- [269] C.-H. Lee, "An Information-Extraction Approach to Speech Analysis and Processing," *Proc. Interspeech*, Portland, Oregon, Sept. 10-12, 2012.
- [270] S. M. Siniscalchi, J. Li, and C.-H. Lee, "Hermitian based Hidden Activation Functions for Adaptation of Hybrid HMM/ANN Models," *Proc. Interspeech*, Portland, Oregon, Sept. 10-14, 2012.
- [271] I.-F. Chen, and C.-H. Lee, "A Study on Using Word-Level HMMs to Improve ASR Performance over State-of-the-Art Phone-Level Acoustic Modeling for LVCSR," *Proc. Interspeech*, Portland, Oregon, Sept. 2012.
- [272] B. Byun, I. Kim, S. M. Siniscalchi, and C.-H. Lee, "Consumer-level multimedia event detection through unsupervised audio signal modeling," *Proc. Interspeech*, Portland, Oregon, Sept. 10-14, 2012.
- [273] I. Kim, S. Oh, B. Byun, A. Perera, and C.-H. Lee, "Explicit Performance Metric Optimization for Fusion-Based Video Retrieval," *Proc. ECCV Workshop*, Florence, Italy, Oct. 7, 2012.
- [274] A. Mushtaq and C.-H. Lee, "Joint Tracking of Clean Speech and Noise Using HMMs and Particle Filters for Robust Speech Recognition," *Proc. Asiloma Conference on Signals, Systems and Computers*, Pacific Grove, CA., Nov. 3-6, 2012.
- [275] A. G. A. Perera, *et al*, "TRECVID 2012 GENIE: Multimedia Event Detection and Recounting," TRECVID Workshop Notebook Paper, Gaithersburg, MD., Nov. 26-28, 2012.
- [276] C.-Y. Chiang, S. M. Siniscalchi, Y.-R. Wang, S.-H. Chen, and C.-H. Lee, "A Study on Cross-Language Knowledge Integration for Mandarin LVCSR," *Proc. 8th ISCSLP*, pp. 315-319, Hong Kong, China, Dec. 5-8, 2012.
- [277] S. J. Leow, T. S. Lau, A. Goh, H. M. Peh, T. K. Ng, S. M. Siniscalchi, and C.-H. Lee, "A New Confidence Measure Combining Hidden Markov Models and Artificial Neural Network of Phonemes for Effective Keyword Spotting," *Proc. 8th ISCSLP*, pp. 112-116, Hong Kong, China, Dec. 5-8, 2012.
- [278] A. Mushtaq and C.-H. Lee, "An MCMC Approach to Joint Estimation of Clean Speech and Noise for Robust Speech Recognition," *Proc. ICASSP*, Vancouver, BC, Canada, May 2013.
- [279] Y.-C. Cheng, K. Li, Z. Feng, F. Weng, and C.-H. Lee, "Online Whole-Word and Stroke-Based Hand-Written Letter Recognition for In-Car Environments," *Proc. ICASSP*, Vancouver, BC, Canada, May 2013.
- [280] Z. Huang, Y.-C. Cheng, K. Li, V. Hautamaki, and C.-H. Lee, "A Blind Segmentation Approach to Acoustic Event Detection Based on I-Vector," *Proc. Interspeech*, Lyon, France, August 2013.
- [281] V. Hautamaki, Y.-C. Cheng, P. Rajan, and C.-H. Lee, "Minimax ivector extractor for short duration speaker verification," *Proc. Interspeech*, Lyon, France, August 2013.
- [282] I.-F. Chen and C.-H. Lee, "A Hybrid HMM/DNN Approach to Keyword Spotting of Short Words," *Proc. Interspeech*, Lyon, France, August 2013.
- [283] I.-F. Chen and C.-H. Lee, "A Resource-Dependent Approach to Word Modeling for Keyword Spotting," *Proc. Interspeech*, Lyon, France, August 2013.
- [284] C.-Y. Chiang, S. M. Siniscalchi, S.-H. Chen, and C.-H. Lee, "Knowledge Integration for Improving Performance in LVCSR," *Proc. Interspeech*, Lyon, France, August 2013.
- [285] I.-F. Chen, S. M. Siniscalchi, S. Y. Moon, D. J. Shin, M.-Y. Koo and C.-H. Lee, "An Experimental Study on Structural-MAP Approaches to Implementing Very Large Vocabulary Speech Recognition Systems for Real-World Tasks," *Proc. APSIPA ASC*, Kaohsiung, Taiwan, October 2013.
- [286] D. H. Nguyen, A. Mushtaq, X. Xiao, E. S. Chng, H. Li and C.-H. Lee, "A Particle Filter Compensation Approach to Robust LVCSR," *Proc. APSIPA ASC*, Kaohsiung, Taiwan, October 2013.
- [287] S. Oh, *et al*, "TRECVID 2013 GENIE: Multimedia Event Detection and Recounting," TRECVID Workshop Notebook Paper, Gaithersburg, MD., Nov. 20-22, 2013.
- [288] Z. Shen, N. Feng, Y. Shen, and C.-H. Lee, "A Forward-Backward Subsequence Smoothing Eigen-based Approach to Designing Clutter Rejection Filter in Color Flow Imaging," *Proc. ICBME*, Singapore, Dec. 2013.

- [289] I.-F. Chen, S. M. Siniscalchi and C.-H. Lee, "Attribute Based Lattice Rescoring in Spontaneous Speech Recognition," *Proc. ICASSP2014*, pp. 3325-3329, Florence, Italy, May 2014.
- [290] Y.-C. Cheng, V. Hautamaki, Z. Huang, K. Li and C.-H. Lee, "An I-Vector Based Descriptor for Alphabetical Gesture Recognition," *Proc. ICASSP2014*, pp. 6593-6597, Florence, Italy, May 2014.
- [291] Z. Huang, C. Weng, K. Li, Y.-C. Cheng and C.-H. Lee, "Deep Learning Vector Quantization for Acoustic Information Retrieval," *Proc. ICASSP2014*, pp. 1050-1354, Florence, Italy, May 2014.
- [292] K. Li, Z. Huang, Y.-C. Cheng and C.-H. Lee, "A Maximal Figure-of-Merit Approach to Maximizing Average Precision with Deep Neural Network Based Classifiers," *Proc. ICASSP2014*, pp. 4503-4507, Florence, Italy, May 2014.
- [293] H. Behravan, V. Hautamaki, S. M. Siniscalchi, T. Kinnunen and C.-H. Lee, "Knowledge-Based Features in Foreign Accent Recognition," *Proc. ICASSP2014*, pp. 5332-5336, Florence, Italy, May 2014.
- [294] Y. Xu, J. Du, L.-R. Dai and C.-H. Lee, "Global Variance Equalization for improving Deep Neural Network Based Speech Enhancement," *Proc. ChinaSIP2014*, pp. 71-74, Xi'an, China, July 2014.
- [295] S. Shakil, M. Magnuson, S. D. Keilholz and C.-H. Lee, "Cluster-Based Analysis for Characterizing Dynamic Functional Connectivity," *Proc. EMBC*, Chicago, Il., July 2014.
- [296] Y. Wang, J. Du, L.-R. Dai and C.-H. Lee, "A Fusion Approach to Spoken Language Identification Based on Combining Multiple Phone Recognizers and Speech Attribute Detectors," *Proc. ISCSLP*, Singapore, 2014.
- [297] I.-F. Chen, C. Ni, B. P. Lim, N. F. Chen and C.-H. Lee, "A Novel Keyword+LVCSR-Filler Based Grammar Network Representation for Resource-Limited Keyword Spotting," *Proc. ISCSLP*, pp. 192-196, Singapore, Sept. 2014.
- [298] Y.-H. Tu, J. Du, Y. Xu, L.-R. Dai and C.-H. Lee, "Speech Separation Based on Improved Deep Neural Networks with Dual Outputs of Speech Feature for Both Target and Interfering Speakers," *Proc. ISCSLP*, pp. 250-254, Singapore, Sept. 2014.
- [299] Y. Xu, J. Du, L.-R. Dai and C.-H. Lee, "Transfer Learning between Mandarin and English for Deep Neural Networks Based Speech Enhancement" *Proc. ISCSLP*, pp. 336-340, Singapore, Sept. 2014.
- [300] Z. Huang, J. Li, C. Weng and C.-H. Lee, "Beyond Cross-entropy: Towards Better Frame-level Objective Functions for Deep Neural Network Training in Automatic Speech Recognition," *Proc. Interspeech*, pp. 1214-1218, Singapore, Sept. 2014.
- [301] Z. Huang, J. Li, S. M. Siniscalchi, I.-F. Chen, C. Weng and C.-H. Lee, "Feature Space Maximum a Posteriori Linear Regression for Adaptation of Deep Neural Networks," *Proc. Interspeech*, pp. 2992-2996, Singapore, Sept. 2014.
- [302] I.-F. Chen, N. F. Chen and C.-H. Lee, "A Keyword-Boosted sMBR Criterion to Enhance Keyword Search Performance in Deep Neural Network Based Acoustic Modeling," *Proc. Sept. Interspeech*, pp. 2779-2783, Singapore, 2014.
- [303] Y. Xu, J. Du, L.-R. Dai and C.-H. Lee, "Dynamic Noise Aware Training for Speech Enhancement Based on Deep Neural Networks," *Proc. Interspeech*, pp. 2679-2674, Singapore, Sept. 2014.
- [304] J. Du, Q. Wang, T. Gao, Y. Xu, L.-R. Dai and C.-H. Lee, "Robust Speech Recognition with Speech Enhanced Deep Neural Networks," *Proc. Interspeech*, pp. 616-620, Singapore, Sept. 2014.
- [305] H. Behravan, V. Hautamaki, S. M. Siniscalchi, E. Khoury, T. Kurki, T. Kinnunen and C.-H. Lee, "Dialect Levelling in Finnish: A Universal Speech Attribute Approach," *Proc. Interspeech, Singapore*, Sept. 2014.
- [306] J. Du, Y.-H. Tu, Y. Xu, L.-R. Dai and C.-H. Lee, "Speech Separation of a Target Speaker Based on Deep Neural Networks," *Proc. ICSP, Hangzhou, China*, Oct. 2014.
- [307] J. Du, Y.-H. Tu, Y. Xu, L.-R. Dai and C.-H. Lee, "Robust Speech Recognition of a Target Speaker with Speech Separation Based on Deep Neural Networks," *Proc. ICSP, Hangzhou, China*, Oct. 2014.
- [308] I.-F. Chen, C. Ni, B. P. Lim, N. F. Chen and C.-H. Lee, "A Keyword-Aware Grammar Framework for LVCSR-Based Keyword Search," *Proc. IEEE ICASSP*, pp. 5196-5200, Brisbane, Australia, April 2015.
- [309] K. Li and C.-H. Lee, "A Deep Neural Network Approach to Speech Bandwidth Expansion," *Proc. IEEE ICASSP*, pp. 4395-4399, Brisbane, Australia, April 2015.
- [310] S. J. Leow, E. S. Chng, and C.-H. Lee, "Language-Resource Independent Speech Segmentation Using Cues From A Spectrogram Image," *Proc. IEEE ICASSP*, pp. 5813-5817, Brisbane, Australia, April 2015.
- [311] T. Gao, J. Du, L.-R. Dai and C.-H. Lee, "Joint Training of Front-End and Back-End Deep Neural Networks for Robust Speech Recognition," *Proc. IEEE ICASSP*, pp. 4375-4379, Brisbane, Australia, April 2015.
- [312] Y. Tu, J. Du, L.-R. Dai and C.-H. Lee, "Speech Separation Based on Signal-Noise-Dependent Deep Neural Networks For Robust Speech Recognition," *Proc. IEEE ICASSP*, pp. 61-65, Brisbane, Australia, April 2015.

- [313]N. Chen, C. Ni, I.-F. Chen, S. Sivasdas, V. T. Pham, H. Xu, X. Xiao, T. S. Lau, S. Leow, B. P. Lim, C.-C. Leung, L. Wang, C.-H. Lee, A. Goh, E. S. Chng, B. Ma, H. Li, “Low-Resource Keyword Search Strategies for Tamil,” *Proc. IEEE ICASSP*, pp. 5366-5370, Brisbane, Australia, April 2015.
- [314]T. Gao, J. Du, L. Xu, C. Liu, L.-R. Dai and C.-H. Lee, “A Unified Speaker-Dependent Speech Separation and Enhancement System Based on Deep Neural Networks,” *Proc. ChinaSIP*, pp. 687-691, Chengdu, China, July 2015.
- [315]K. Xu, Y. Xia and C.-H. Lee, “Tweet Normalization with Syllables,” *Proc. ACL*, pp. 920-928, Beijing, China, July 2015.
- [316]T. Gao, J. Du, Y. Xu, C. Liu, L.-R. Dai and C.-H. Lee, “Improving Deep Neural Network Based Speech Enhancement in Low SNR Environments,” *Proc. LVA/ICA*, pp. 75-82, Liberec, Czech, August 2015.
- [317]J. Wu, M. Li and C.-H. Lee, “An Entropy Minimization Framework for Goal-Driven Dialog Management,” *Proc. Interspeech*, pp. 2207-2211, Dresden, Germany, September 2015.
- [318]Z. Huang, S. M. Siniscalchi, I.-F. Chen, J. Li, J. Wu, and C.-H. Lee, “Maximum a Posteriori Adaptation of Network Parameters in Deep Models,” *Proc. Interspeech*, pp. 1076-1080, Dresden, Germany, Sept. 2015.
- [319]Z. Huang, J. Li, S. M. Siniscalchi, I.-F. Chen, J. Wu, and C.-H. Lee, “Rapid Adaptation for Deep Neural Networks through Multi-Task Learning,” *Proc. Interspeech*, pp. 3625-3629, Dresden, Germany, Sept. 2015.
- [320]K. Li, Z. Huang, Y. Xu and C.-H. Lee, “DNN-Based Speech Bandwidth Expansion and Its Application to Adding High-Frequency Missing Features for Automatic Speech Recognition of Narrowband Speech,” *Proc. Interspeech*, pp. 2578-2582, Dresden, Germany, September 2015.
- [321]T. S. Lau, I.-F. Chen and C.-H. Lee, “Tunable Keyword-Aware Language Modeling and Context Dependent Fillers for LVCSR-based Spoken Keyword Search,” *Proc. Interspeech*, pp. 3655-3659, Dresden, Germany, September 2015.
- [322]Y. Xu, J. Du, Z. Huang, L.-R. Dai and C.-H. Lee, “Multi-Objective Optimization and Mask-Based Post-Processing for Deep Neural Network Based Speech Enhancement,” *Proc. Interspeech*, pp. 1508-1512, Dresden, Germany, September 2015.
- [323]Q. Wang, J. Du, X. Bao, Z.-R. Wang, L.-R. Dai and C.-H. Lee, “A Universal VAD Based on Jointly Trained Deep Neural Networks,” *Proc. Interspeech*, pp. 2282-2286, Dresden, Germany, September 2015.
- [324]Y. Wang, J. Du, L.-R. Dai and C.-H. Lee, “High-Resolution Acoustic Modeling and Compact Language Modeling of Language-Universal Speech Attributes for Spoken Language Identification,” *Proc. Interspeech*, pp. 992-996, Dresden, Germany, September 2015.
- [325]S. Shakil, S. D. Keilholz and C.-H. Lee, “On Frequency Dependencies of Sliding Window Correlation,” *Proc. IEEE BIBM*, pp. 363-368, Washington DC, Nov. 2015.
- [326]J. Du, Q. Wang, Y.-H. Tu, X. Bao, L.-R. Dai and C.-H. Lee, “An Information Fusion Approach to Recognizing Microphone Array Speech in The CHIME-3 Challenge Based on A Deep Learning Framework,” *Proc. IEEE ASRU*, pp. 430-435, Scottsdale, AZ, Dec. 2015.
- [327]W. Li, S. M. Siniscalchi, N. F. Chen and C.-H. Lee, “Improving Mispronunciation Detection and Enriching Diagnostic Feedback with DNN-Based Speech Attribute Modeling,” *Proc. ICASSP*, pp. 6135-6139, Shanghai, China, March 2016.
- [328]J. Zhang, Y. Gao, S. Feng, Y. Yuan and C.-H. Lee, “Automatic Image Region Annotation through Segmentation Based Visual Semantic Analysis and Discriminative Classification,” *Proc. ICASSP*, pp. 1956-1960, Shanghai, China, March 2016.
- [329]N. Chen, V. T. Pham, H. Xu, X. Xiao, V. H. Do, C. Ni, I.-F. Chen, S. Sivasdas, C.-H. Lee, E. S. Chng, B. Ma, H. Li, “Exemplar-Inspired Strategies for Low-Resource Spoken Keyword Search in Swahili,” *Proc. ICASSP*, pp. 6040-6044, Shanghai, China, March 2016.
- [330]J. Gao, J. Du, C. Kong, H. Lu, E. Chen and C.-H. Lee, “An Experimental Study on Joint Modeling of Mixed-Bandwidth Data via Deep Neural Networks for Robust Speech Recognition,” *Proc. IJCNN*, pp. 588-594, Vancouver, Canada, July 2016.
- [331]S. Shakil, S. D. Keilholz and C.-H. Lee, “Adaptive Change Point Detection of Dynamic Functional Connectivity networks,” *Proc EMBC*, pp. 1135-1138, Orlando, FL., August 2016.
- [332]K. Li, B. Wu, and C.-H. Lee, “An Iterative Phase Recovery Framework with Phase Mask for Spectral Mapping with An Application to Speech Enhancement,” *Proc. Interspeech*, San Francisco, CA., Sept 2016.
- [333]W. Li, K. Li, S. M. Siniscalchi, N. F. Chen, and C.-H. Lee, “Detecting Mispronunciations by L2 Learners and Proving Corrective Feedbacks Using Knowledge-guided and Data-driven Based Decision Trees,” *Proc. Interspeech*, San Francisco, CA., September 2016.
- [334]T. Gao, J. Du, L.-R. Dai and C.-H. Lee, “SNR-progressive Learning for Speech Enhancement Based on Deep Neural Networks,” *Proc. Interspeech*, San Francisco, CA., September 2016.

- [335]Z. Wen, K. Li, Z. Huang, J. Tao, and C.-H. Lee, "Learning Auxiliary Categorical information for Speech Synthesis Based on Deep and Recurrent Neural Networks," *Proc. ISCSLP*, Tianjin, China, Oct. 2016.
- [336]Y. Tu, J. Du, L.-R. Dai and C.-H. Lee, "A Speaker-Dependent Deep Learning Approach to Joint Speech Separation and Acoustic Modeling for Multi-Talker Automatic Speech Recognition," *Proc. ISCSLP*, Tianjin, China, Oct. 2016.
- [337]W. Li, S. M. Siniscalchi, N. F. Chen, and C.-H. Lee, "Using Tone-based Extended Recognition Network to Detect Non-native Mandarin Tone Mispronunciations," *Proc. APSIPA, Jeju, South Korea*, December 2016.
- [338]Y. Wang, J. Du, L.-R. Dai and C.-H. Lee, "Single-Channel Unsupervised Speech Separation via Deep Neural Networks," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [339]B. Wu, K. Li, M. Yang and C.-H. Lee, "A Study on Target Feature Activation and Normalization: Their Impact on the Performance of DNN Based Speech Dereverberation Systems," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [340]B. Wu, K. Li, M. Yang and C.-H. Lee, "A Study on Sampling in Time and Frequency Domains of STFT Modifications for DNN-Based Speech Dereverberation," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [341]Z. Huang, J. Li, S. M. Siniscalchi, I.-F. Chen, J. Wu, and C.-H. Lee, "Towards a Direct Bayesian Adaptation Framework for Deep Models," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [342]S. J. Leow, E. S. Chng and C.-H. Lee, "Zero-Resource Anti-Spoofing Detection for Unit Selection Based Synthetic Speech Using Spectrogram Artifacts," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [343]Z. Wen, K. Li, J. Tao, and C.-H. Lee, "A Deep Neural Network Approach to Voice Conversion with An Enlarged and Synthesized Parallel Corpus," *Proc. APSIPA, Jeju, South Korea*, Dec. 2016.
- [344]B. Wu, K. Li, Z. Huang, S. M. Siniscalchi, M. Yang and C.-H. Lee, "A Unified Deep Modeling Approach to Simultaneous Speech Dereverberation and Recognition for the REVERB Challenge," *Proc. HSCMA Workshop, San Francisco*, March 2017.
- [345]L. Sun, J. Du, L.-R. Dai and C.-H. Lee, "Multiple-Stage Deep Learning for LSTM-RNN Based Speech Enhancement," *Proc. HSCMA Workshop, San Francisco*, March 2017.
- [346]Q. Wang, J. Du, L.-R. Dai and C.-H. Lee, "Joint Noise and Mask Aware Training for DNN-based Speech Enhancement with Sub-band Features," *Proc. HSCMA Workshop, San Francisco*, March 2017.
- [347]S. Wang, K. Li, Z. Huang, S. M. Siniscalchi, and C.-H. Lee, "A Transfer Learning and Progressive Stacking Approach to Reducing Deep Model Sized with An Application to Speech Enhancement," *Proc. ICASSP, New Orleans*, March 2017.
- [348]W. Li, N. F. Chen, S. M. Siniscalchi, and C.-H. Lee, "Improving Mispronunciation Detection for Non-Native Learners with Multisource Information and LSTM-Based Deep Models," *Proc. Interspeech*, Stockholm, August 2017.
- [349]F. Ge, K. Li, B. Wu, Y. Yaan, S. M. Siniscalchi, and C.-H. Lee, "Joint Training of Multi-channel-condition Dereverberation and Acoustic Modeling of Microphone Array Speech for Robust Distant Speech Recognition," *Proc. Interspeech*, Stockholm, August 2017.
- [350]Y. Wang, J. Du, L. Dai and C.-H. Lee, "A Maximum Likelihood Approach to Deep Neural Network Based Nonlinear Spectral Mapping for Single-Channel Speech Separation," *Proc. Interspeech*, Stockholm, August 2017.
- [351]S. Wen, J. Du, and C.-H. Lee, "On Generating Mixing Noise Signals with Noise Basis Functions for Simulating Noisy Speech and Learning DNN-Based Speech Enhancement Models," *Proc. Interspeech*, Stockholm, August 2017.
- [352]W. Li, N. F. Chen, S. M. Siniscalchi and C.-H. Lee, "Improving Madarin Tone Mispronunciation Detection for Non-Native Learner with Soft-Target Tone Labels and BLSTM-Based Deep Models," *submitted to ICASSP*, Calgary, April 2018.
- [353]Y. Tu, I. Tashev, S. Zarav and C.-H. Lee, "Combining Conventional and Deep Learning Techniques for Speech Enhancement and Recognition," *submitted to ICASSP*, Calgary, April 2018.
- [354]Q. Wang, J. Du, L.-R. Dai and C.-H. Lee, "A Compact Design for Deep Neural Network Based Speech Enhancement," *submitted to ICASSP*, Calgary, April 2018.
- [355]L. Sun, J. Du, T. Gao, Y.-D. Lu, Y. Tsao, C.-H. Lee and N Ryant, "A Novel LSTM-Based Speech Preprocessor for Speaker Diarization in Realistic Mismatch Conditions," *submitted to ICASSP*, Calgary, April 2018.

D. PRESENTATIONS

- [1] C.-H. Lee, "Some techniques for creating robust stochastic models speech recognition," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 82, S36, Fall 1987.

- [2] R. W. Bossemeyer, J. G. Wilpon, C.-H. Lee and L. R. Rabiner, "Automatic speech recognition of small vocabularies within the context of unconstrained input," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 84, S212, Fall 1988.
- [3] L. R. Rabiner, C.-H. Lee, B.-H. Juang, D. B. Roe and J. G. Wilpon, "Improved training procedures for hidden Markov models," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 84, S61, Fall 1988.
- [4] S. Euler, C.-H. Lee, B.-H. Juang and F. K. Soong, "Speaker Independent Isolated Word Recognition Based on Acoustic Segmentation," *Proc. Int. Symposium on Signals, Systems & Electronics*, A.4.6, Sept. 1989.
- [5] C.-H. Lee, L. R. Rabiner, R. Pieraccini and J. G. Wilpon, "Speaker-Independent Recognition of the DARPA Naval Resource Management Task," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 86, S77, Fall 1989.
- [6] S. Katagiri and C.-H. Lee "A New HMM/LVQ Hybrid Algorithm for Speech Recognition," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 88, Fall 1990.
- [7] J. G. Wilpon, P. Ramesh, M. A. McGee, D. B. Roe, L. R. Rabiner and C.-H. Lee, "Automatic recognition of connected digit strings in a credit card authorization task," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 88, Fall 1990.
- [8] S. Gokcen, R. Grubbe and C.-H. Lee, "Technology Transfer of Speech Recognition Algorithms," *Proc. AT&T Symposium on Technology Transfer*, Murray Hill, NJ., Dec. 1990.
- [9] C.-H. Lee, W. Chou, B.-H. Juang, L. R. Rabiner and J. G. Wilpon, "Context-Dependent Acoustic Subword Modeling for Connected Digit Recognition," *J. Acoust. Soc. Am. Suppl. 1*, Vol. 94, Fall 1993.
- [10] C.-H. Lee, "Stochastic Matching for Robust Speech Recognition," invited talk at *CAIP Summer Workshop on Spoken Language Technologies*, Rutgers University, August 1995.
- [11] C.-H. Lee, "An Overview on Spoken Language Processing," *Proc. ROCLING IX Tutorial Notes*, Tainan, Taiwan, August 1996.
- [12] C.-H. Lee, "Feature and Model Compensation for Robust Speech Recognition", invited paper in *J. Acoust. Soc. Am. Suppl. 1*, Vol. 91, S36, Dec. 1996.
- [13] C.-H. Lee, "Fundamentals of Speaker and Utterance Verification," *ICASSP-97 Tutorial Notes*, Munich, Germany, April 1997.
- [14] C.-H. Lee, "An Overview of Speech Processing Research at Bell Labs," invited talk at Columbia University, New York, NY., June 1997.
- [15] C.-H. Lee, "Key-Phrase Detection and Verification for Flexible Speech Understanding," invited talk at *MIT Spoken Language Processing Group*, Cambridge, MA., Nov. 1997.
- [16] C.-H. Lee, "A Detection Approach to Flexible Speech Recognition and Understanding," *invited talk at 1998 Johns Hopkins University Summer Research Workshop*, Baltimore, MD., July, 1998.
- [17] C.-H. Lee, "A Unified Testing Hypothesis Approach to Speaker and Utterance Verification, " invited talk at *Peiking University Information Technology Forum*, Beijing, China, July 1998.
- [18] C.-H. Lee, "Robust Speech Recognition: An Adaptation and Compensation Perspective," invited talk at *Tsinghua University Information Technology Forum*, Beijing, China, July 1998.
- [19] C.-H. Lee, "A Detection Approach to Flexible Speech Recognition and Understanding: Perspectives for Spoken Dialogue Processing, " *Chinese Academy of Sciences Speech Technology Forum*, Beijing, China, July 1998.
- [20] C.-H. Lee, "Spoken Dialogue Processing towards Telecommunication Applications" invited talk at *1998 ISSD Workshop*, Sydney, Australia, Dec. 1998.
- [21] C.-H. Lee, "Robust speech recognition -- overview of statistical pattern recognition approach and the implied robustness problems and solutions," *TMH Special Speech Seminar* at KTH, Stockholm, Sweden, April 1999.
- [22] C.-H. Lee, "Speaker and speech verification -- overview of statistical pattern verification approach and applications to speaker and speech verification," *TMH Special Speech Seminar* at KTH, Stockholm, Sweden, April 1999.
- [23] C.-H. Lee, "A detection approach to speech recognition and understanding -- a paradigm to combine feature-based detection and state-of-the-art recognition to open up new possibilities," *TMH Special Speech Seminar* at KTH, Stockholm, Sweden, April 1999.
- [24] C.-H. Lee, "Voice User Interface (VUI) to Multimedia Services over Networks," *Multimedia and Internet Technologies Summer School Lecture Notes*, Taipei, Taiwan, August 2000.
- [25] C.-H. Lee, "Voice User Interface (VUI): Technology Dimensions and Applications," Plenary Talk at *International Conference on Signal Processing Plenary Talk*, Beijing, China, August 2000.
- [26] C.-H. Lee, "Parameter Adaptation and Compensation in Designing Maximum A Posteriori Decision Rules for Automatic Speech Recognition," *IMA Workshop on Mathematical Foundations on Speech Processing and Recognition*, Minneapolis, MN., Nov. 2000.
- [27] C.-H. Lee, "Voice User Interface (VUI) for New Services over Internet and Wireless Communication," *Korea Telecom International Symposium - Cyber World's Technologies for the New Millennium*, Seoul, South Korea, Oct. 2000.

- [28] C.-H. Lee, "Adaptation and Compensation for Automatic Speech Recognition," invited lecture at *ETRI*, Dajon, South Korea, August 2001.
- [29] C.-H. Lee, "Voice User Interface Technologies and Applications," invited keynote at *NCSEC-2001*, Chiang Mai, Thailand, Nov. 2001.
- [30] C.-H. Lee, "Fundamentals of Speech and Audio Coding," invited lecture at *Tamkang University International Lecture Series on Signal Processing*, Taipei Taiwan, April 2002.
- [31] C.-H. Lee, "Fundamentals of Speech and Speaker Recognition," invited lecture at *Tamkang University International Lecture Series on Signal Processing*, Taipei Taiwan, April 2002.
- [32] C.-H. Lee, "Voice User Interface Technologies and Their Applications," invited lecture at *Tamkang University International Lecture Series on Signal Processing*, Taipei Taiwan, April 2002.
- [33] C.-H. Lee, "Advances in Speech and Audio Technologies," invited lecture at *2002 IDA Distinguished Professor Symposium*, Singapore, May 2002.
- [34] C.-H. Lee, "Future of Speech and Media Technologies," invited lecture at *2002 IDA Distinguished Professor Symposium*, Singapore, May 2002.
- [35] C.-H. Lee, "Back to Speech Science: A Bottom-Up Approach to Automatic Speech Recognition," invited lecture at *2002 NATO-ASI Series on Speech Production*, Il Ciocco, Italy, July 2002.
- [36] C.-H. Lee, "A Machine Learning Approach to Generalized Call Routing," presented at *Microsoft Research*, Redmond, WA., Nov. 2002.
- [37] C.-H. Lee, "Infocomm Research at Georgia Tech," presented at *A*Star and Georgia Tech Joint Seminar*, Singapore, Dec. 2002.
- [38] C.-H. Lee, "Knowledge-Based Features for Automatic Speech Recognition," presented at *Rutgers University CAIP Colloquium*, New Brunswick, NJ., May 2003.
- [39] C.-H. Lee, "Novel Approaches to ASR: How Far can we Push?," presented at *DARPA EARS PI Meeting*, Boston, MA., May 2003.
- [40] C.-H. Lee, "Human and Media Communication at the Dawn of the 21st Century," invited lecture at Department of Information Science and Engineering, *Nagoya University*, Nagoya, Japan, June 2003.
- [41] C.-H. Lee, "Human Language Engineering: Research and Challenges?," invited talk at *IEEE Kansai Section Meeting*, Kyoto, Japan., June 2003.
- [42] C.-H. Lee, "A Neural-Perception Approach to Automatic Speech Recognition" invited talk at *SMA Lecture Series*, National University of Singapore, September 2003.
- [43] C.-H. Lee and B.-H. Juang, "A New Detection Paradigm for Collaborative Automatic Speech Recognition and Understanding," *Lectures by Masters in Speech Processing*, Maui, Hawaii, January 2004.
- [44] C.-H. Lee, "Advances in Voice User Interface Technologies," Acer Research Forum at Acer Aspire Park, Longtan, Taiwan, March 2004.
- [45] C.-H. Lee, "From Knowledge-Ignorant to Knowledge-Rich Modeling: A New Speech Research Paradigm for Next Generation Automatic Speech Recognition," *International Conference on Spoken Language Processing (ICSLP2004)*, Jeju, South Korea, Oct. 2004.
- [46] C.-H. Lee, "Discovering Knowledge in and Extracting Information from Multimedia Patterns," *International Symposium on Intelligent Multimedia, Video and Speech Processing (ISIMP2004)*, Hong Kong., Oct. 2004.
- [47] C.-H. Lee, "A Decision-Feedback Approach to Text Categorization," *Microsoft Faculty Summit*, July 2005.
- [48] C.-H. Lee, "Speech Recognition Based on Attribute Detection and Knowledge Integration," *2005 Symposium on Next Generation Automatic Speech Recognition*, Academia Sinica, Taipei, Taiwan, September 2005.

E. OTHER SCHOLARLY ACCOMPLISHMENTS (PATENTS)

- [1] C.-H. Lee and D. Y. Wong, U. S. Patent No. 4,689,760, "Digital Tone Decoder and Method of Decoding Tones Using Linear Predictive Coding," August 25, 1987.
- [2] J.W. Klovstad, K. Ganesan and C.-H. Lee, U. S. Patent No. 4,713,777, "Speech Recognition Method Having Noise Immunity," Dec. 15, 1987.
- [3] J. K. Baker, J.W. Klovstad, K. Ganesan and C.-H. Lee, U. S. Patent No. 4,718,088, "Speech Recognition Training Method," Jan. 5, 1988.
- [4] C.-H. Lee, L. R. Rabiner and J. G. Wilpon, U. S. Patent No. 5,509,104, "Application of Hidden Markov Models for Recognition of a Limited Set of Words in Unconstrained Speech - Word Spotting," April 16, 1996.
- [5] W. Chou, B.-H. Juang and C.-H. Lee, U. S. Patent No. 5,579,436, "Recognition Unit Model Training Based on Competing Words and Word String Models," Nov. 26, 1996.
- [6] W. Chou, B.-H. Juang and C.-H. Lee, U. S. Patent No. 5,606,644, "Minimum Error Rate Training of Combined String Models," Feb. 25, 1997.

- [7] C.-H. Lee, L. R. Rabiner and J. G. Wilpon, U. S. Patent No. 5,649,057, "Speech Recognition Employing Key Word Modeling and Non-Key Word Modeling," July 17, 1997.
- [8] C.-H. Lee, L. R. Rabiner and J. G. Wilpon, EP Patent 0,398,574, "Speech Recognition Employing Key Word Modeling and Non-Key Word Modeling," 1998.
- [9] B.-H. Juang, C.-H. Lee, A.E. Rosenberg, F.K. Soong, U.S. Patent No. 5,675,704, "Speaker Verification with Cohort Normalized Scoring," Oct. 7, 1997.
- [10] C.-H. Lee and R. Sukkar, U.S. Patent No. 5,675,706, "Vocabulary Independent Discriminative Utterance Verification for Non-Keyword Rejection in Subword Based Speech Recognition," Oct. 7, 1997.
- [11] B.-H. Juang, C.-H. Lee and R. Rose, U.S. Patent No. 5,710,864, "Systems, Methods And Articles Of Manufacture For Improving Recognition Confidence," Jan. 20, 1998.
- [12] C.-H. Lee and A. Sankar, U.S. Patent No., 5,724,124, "Method Of And Apparatus For Signal Recognition That Compensates For Mismatch," March 10, 1998.
- [13] W. Chou, B.-H. Juang, C.-H. Lee and M. Rahim, U.S. Patent No. 5,737,489, "Discriminative Utterance Verification for Connected Digit Recognition," April 7, 1998.
- [14] W. Chou, B.-H. Juang, C.-H. Lee and M. Rahim, EP Patent 0,763,816, "Discriminative Utterance Verification for Connected Digit Recognition," 2002.
- [15] W. Chou, B.-H. Juang, T. Kawahara, and C.-H. Lee, U.S. Patent No. 5,797,123, "Method of Key-Phrase Detection and Verification for Flexible Speech Understanding," August 18, 1998.
- [16] W. Chou, B.-H. Juang, T. Kawahara, and C.-H. Lee, EP Patent 0,834,862, "Method of Key-Phrase Detection and Verification for Flexible Speech Understanding," 1998.
- [17] W. Chou, B.-H. Juang, C.-H. Lee, and T. Matsuoka, U.S. Patent No. 5,805,772, "Systems, Methods, and Articles of Manufacture for Performing High Resolution N-Best String Hypothesization," Sept. 8, 1998.
- [18] C.-H. Lee and K. Shinoda, U.S. Patent No. 6151574, "Techniques for Adaptation of Hidden Markov Models for Speech Recognition," Nov. 21, 2000.
- [19] H.-K. Kuo, C.-H. Lee and A. Pargellis, . EP Patent 1,061,459,, "System and Method for Generating Dynamic Interface," 2000.
- [20] H.-K. Kuo, C.-H. Lee and A. Pargellis, U.S. Patent No. 6418440, "System and Method for Performing Automated Dynamic Dialogue Generation," July 7, 2002.
- [21] C.-H. Lee, P. Q. Li, O. Siohan and A. C. Surendran, U.S. Patent No. 6519563, "Background Model Design for Flexible and Portable Speaker Verification," Feb. 11, 2003.
- [22] C.-H. Lee, P. Q. Li, J. Zheng and Q. Zhou, U.S. Patent No. 6782363, "Method and Apparatus for Performing Real-Time Endpoint Detection in Automatic Speech Recognition," August 24, 2004.
- [23] H.-K. Kuo and C.-H. Lee, U.S. Patent No. 6925432, "Methods and Apparatus Using Discriminative Training in Natural Language Call Routing and Document Retrieval," August 2, 2005.
- [24] B.-H. Juang, C.-H. Lee, P. Q. Li and Q. Zhou, "Method and Apparatus for Providing Speaker Authentication by Verbal Information Verification," filed July 1997.
- [25] B.-H. Juang, C.-H. Lee, P. Q. Li and Q. Zhou, "Method and Apparatus for Providing Speaker Authentication by Verbal Information Verification Using Forced Decoding," EP Patent 0,892,387, 1999.
- [26] C.-H. Lee and P. Ramesh, "Voice Message Filtering for Classification of Voice Messages According to Caller," filed June 1999. EP Patent 1,058,445, 2000.
- [27] C.-H. Lee and P. Ramesh, "Key Segment Spotting in Voice Messages," filed June 1999. EP Patent 1,058,446, 2000.
- [28] C.-H. Lee, P. Q. Li, J. Zheng and Q. Zhou, "A Robust, Real-Time Endpoint Detector with Energy Normalization for ASR in Adverse Environment," filed September 2000.
- [29] E. Fosler-Lussier, C.-H. Lee, A. Pargellis, and A. Potamianos, "Automatic Derivation and Extraction of Semantic Classes across Domains," filed June 2001.

V. SERVICE

A. PROFESSIONAL CONTRIBUTIONS

A1. Memberships

- Member, ARPA Spoken Language Coordination Committee (1991-95)
- Member, IEEE Signal Processing Society Speech Technical Committee (1994-96)
- Member, SPS Multimedia Signal Processing Technical Committee (1996-2004)
- Member, Advisory Board, Telecommunication Labs, Taiwan (1992-present)
- Member, Advisory Council, International Speech Communication Association (2004-present)

- Member, Advisory Board, European Union FP7 ACORNS project (2007-2009)

A2. Editorial/Review Activities

- Associate Editor, IEEE Transactions on Signal Processing (1991-93)
- Associate Editor, IEEE Transactions on Speech and Audio Processing (1993-95)
- Editor, Inter Journal of Computational Linguistics and Chinese Language Processing (1997-Present)
- International Editorial Board, Communications of COLIPS (1998-Present)
- Editorial Board, European Journal on Applied Signal Processing (2001-2007)
- Editorial Board, IEEE Signal Processing Magazine (2009-2011)
- Paper Reviewers for many journals, conferences and workshops of IEEE, ISCA and ACM
- Proposal Reviewers for many funding agencies from US, Canada, Europe, and Asia

A3. Conference Leadership Positions

- Steering Committee Chair, International Symposium on Chinese Spoken Language Processing
- Member, Scientific Review Committee, HLT-NAACL'03, May 2003.
- Member, Scientific Review Committee, EuroSpeech 2003, Geneva, Switzerland, Sept. 2003.
- Special Session Chair, 2004 International Conference on Image Processing, Dec. 2004
- Member, Scientific Committee, 2003 International Conference on WWW, Budapest, Hungary
- Member, Scientific Committee, 2004 IEEE Workshop on Automatic Speech Recognition and Understanding, St. Thomas, Virgin Islands, Dec. 2003.
- Organizer and Lecturer, 2000 Multimedia and Internet Technology Summer School, Taipei, Taiwan
- Program Chair, 1996 International Symposium on Multi-Technology Information Processing
- General Chair, 1997 International Symposium on Multi-Technology Information Processing
- General Chair, 1998 International Symposium on Chinese Spoken Language Processing, Singapore
- General Co-Chair, 1999 IEEE Workshop on Automatic Speech Recognition and Understanding
- General Co-Chair, 1999 International Workshop on Spoken Dialogue Processing
- General Co-Chair, 2002 International Symposium on Chinese Spoken Language Processing, Taiwan
- Technical Co-Chair, 2003 International Conference on Multimedia Modeling, Taipei, Taiwan

A4. Invited Speakers/Lecturers

- Keynote Speaker, 1995 International Symposium on Multi-Technology Information Processing
- Keynote Speaker, 1996 International Conf. of Computational Linguistics & Chinese Language Proc.
- Plenary Speaker, 1999 International Conference of Speech Processing
- Keynote Speaker, 2000 International Symposium on Chinese Spoken Language Processing
- Plenary Speaker, 2000 Korean Telecom International Symposium,
- Plenary Speaker, 2000 World Congress on Computers
- Keynote Speaker, 2000 IEEE Pacific Rim Conference on Multimedia
- Keynote Speaker, 2001 Turkish Signal Processing and Applications Conference
- Keynote Speaker, 2004 International Conference on Spoken Language Processing
- Keynote Speaker, 2004 International Symposium on Intelligent Multimedia Processing
- Keynote Speaker, 2007 National Conference on Man-Machine Speech Communication
- Invited Speaker, 2007 European Science Foundation Workshop
- Keynote Speaker, 2007 International Conference on Speech and Computer
- Keynote Speaker, 2008 Chinese Conference on Pattern Recognition
- Plenary Speaker, 2008 International Conference on Signal Processing
- Keynote Speaker, 2009 NTNU Advanced Learning Workshop
- Keynote Speaker, 2009 ROCLING
- Invited Lecturer, NATO Advanced Study Institute (1990, 1993, 2002)
- Invited Speaker at many international societies, workshops and universities

A5. Professional Society Leadership

- Chairman, IEEE Signal Processing Society Speech Technical Committee (1996-98)
- Founding Chair, International Symposium on Chinese Spoken Language Processing (1998)
- Member, Advisory Committee, HK PolyTechnic University Area of Strategic Development in

Multimedia (2001- Present)

- Member, Academic Advisory Board, Institute of Information Science, Academia Sinica (1998-2004)
- Member, Academic Advisory Board, Center for Chinese Language Learning, National Taiwan Normal University (2011-Present)

B. CAMPUS CONTRIBUTIONS

- Establish the Joint Laboratory program between School of Computing at National University of Singapore and Institute of Infocomm Research at A*Star in Singapore, 2001-2002
- Organize the IDA Symposium on Advanced Speech and Media Technologies and Applications, National University of Singapore, 2002.
- Organize the 2002 Summer School of Media and Information Processing, Singapore
- Member, SIG-GT Steering Committee, Tech's Singapore outreach possibilities
- Champion, Feasibility Study on Georgia Tech Singapore Institute

VI. HONORS AND AWARDS

- 1994 IEEE Signal Processing Society Senior Award
- 1995 AT&T Bell Laboratories Distinguished Member of Technical Staff
- 1997 IEEE Fellow
- 1997 Bell Labs President's Gold Award
- 1997 Lucent Network System TSVS (Toll Switching, Voice & Signaling) Award
- 1997 IEEE Signal Processing Society Best Paper Award
- 1999 IEEE Signal Processing Society Best Paper Award
- 2000 IEEE Signal Processing Society Distinguished Lecturer
- 2002 Top Teacher Award, National University of Singapore, School of Computing
- 2002 Singapore IDA Distinguished Visiting Professor Award
- 2006 IEEE Signal Processing Society Technical Achievement Award for “exceptional contributions to the field of automatic speech recognition”
- 2007-2008 International Speech Communication Association (ISCA) Distinguished Lecturer
- 2012 ICASSP Plenary Speaker
- 2012 ISCA Medal for “pioneering and seminal contributions to the principles and practice of automatic speech and speaker recognition, including fundamental innovations in adaptive learning, discriminative training and utterance verification”
- 2012 ISCA Fellow