

List of Publications

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Last modified: February 9, 2018

Current Hirsch-Index: 36 (google scholar)

Theses:

1. R. Schlüter: *Investigations on Discriminative Training Criteria*, Dissertation, Computer Science Department, RWTH Aachen University, http://publications.rwth-aachen.de/record/52111/files/Schlueter_Ralf.pdf, Aachen, Germany, September 2000.
2. R. Schlüter: *Monte-Carlo Simulation von Finite-Size-Effekten in Spinmodellen*, Diploma Thesis, Physics Department, RWTH Aachen University, Aachen, Germany, September 1995.

Patents:

1. R. Schlüter (Inventor): "Verfahren und Vorrichtung zur automatischen Spracherkennung," Patent DE10204325 B4, Feb. 2002.

Journals:

1. R. Schlüter, E. Beck, H. Ney: "Upper and Lower Tight Error Bounds for Feature Omission with an Extension to Context Reduction," accepted for publication in *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Dec. 2017.
2. P. Dötsch, M. Hannemann, R. Schlüter, H. Ney: "Inverted Alignments for End-to-End Automatic Speech Recognition," *IEEE Journal of Selected Topics in Signal Processing*, Vol. 11, No. 8, pp. 1265–1273, Dec. 2017.
3. M. Sundermeyer, H. Ney, and R. Schlüter: "From Feedforward to Recurrent LSTM Neural Networks for Language Modeling," in *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, Vol. 23, No. 3, pp. 517–529, March 2015.
4. G. Heigold, H. Ney, R. Schlüter: "Investigations on an EM-Style Optimization Algorithm for Discriminative Training of HMMs," in *IEEE Transactions on Audio, Speech, and Language Processing*, Vol. 21, No. 12, pp. 2616–2626, Dec. 2013.
5. D. Rybach, H. Ney, and R. Schlüter: "Lexical Prefix Tree and WFST: A Comparison of Two Dynamic Search Concepts for LVCSR," in *IEEE Transactions on Audio, Speech, and Language Processing*, Vol. 21, No. 6, pp. 1295–1307, June 2013.
6. G. Heigold, R. Schlüter, H. Ney, and S. Wiesler: "Discriminative Training for Automatic Speech Recognition: Modeling, Criteria, Optimization, Implementation, and Performance," in *IEEE Signal Processing Magazine*, Vol. 29, No. 6, pp. 58–69, Nov. 2012.
7. R. Schlüter, M. Nußbaum-Thom, and H. Ney: "Does the Cost Function Matter in Bayes Decision Rule?" *IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI)*, Vol. 34, No. 2, pp. 292–301, Feb. 2012.
- 7.a R. Schlüter, M. Nussbaum-Thom, and H. Ney: "Simulation of Fixed Length Word String Probability Distributions," Internal Report, Lehrstuhl für Informatik 6, RWTH Aachen University, Dec. 2010. (Supplement to 7.)
8. B. Hoffmeister, G. Heigold, D. Rybach, R. Schlüter, and H. Ney: "WFST Enabled Solutions to ASR Problems: Beyond HMM Decoding," *IEEE Transactions on Audio, Speech, and Language Processing*, Vol. 20, No. 2, pp. 551–564, February 2012.

9. R. Schlüter, M. Nussbaum-Thom, and H. Ney: "On the Relationship between Bayes Risk and Word Error Rate in ASR," *IEEE Trans. on Audio, Speech, and Language Processing*, Vol. 19, No. 5, pp. 1103–1112, July 2011.
10. G. Heigold, H. Ney, P. Lehnen, T. Gass, and R. Schlüter: "Equivalence of Generative and Log-Linear Models," in *IEEE Transactions on Audio, Speech, and Language Processing*, Vol. 19, No. 5, July 2011.
11. G. Heigold, P. Dreuw, S. Hahn, R. Schlüter, and H. Ney: "Margin-Based Discriminative Training for String Recognition," *IEEE Journal of Selected Topics in Signal Processing - Statistical Learning Methods for Speech and Language Processing*, Vol. 4, No. 6, pp. 917–925, December 2010.
12. A. Zolnay, D. Kocharov, R. Schlüter, H. Ney: "Using Multiple Acoustic Feature Sets for Speech Recognition," in *Speech Communication*, Vol. 49, No. 6, pp. 514–525, June 2007.
13. R. Schlüter, W. Macherey, B. Müller, H. Ney: "Comparison of Discriminative Training Criteria and Optimization Methods for Speech Recognition," *Speech Communication*, Vol. 34, pp. 287–310, May 2001.
14. R. Schlüter, H. Ney: "Model Based MCE Bound to the True Bayes' Error," *IEEE Signal Processing Letters*, Vol. 8, No. 5, pp. 131–133, May 2001.
15. F. Wessel, R. Schlüter, K. Macherey, H. Ney: "Confidence Measures for Large Vocabulary Continuous Speech Recognition," *IEEE Transactions on Speech and Audio Processing*, Vol. 9, No. 3, pp. 288–298, March 2001.

Invited Talks:

1. "Neuronale Netze in der automatischen Spracherkennung - ein Paradigmenwechsel?" Plenary talk, DAGA 2018 - 44. Jahrestagung für Akustik, Munich, Germany, March 2018.
2. "Artificial Neural Networks for Automatic Speech Recognition: Feature Extraction and Use," DTU Electrical Engineering, Technical University of Denmark, Jan. 2018.
3. "Broadening the Perspective of Automatic Speech Recognition using Neural Networks," KITP Program: Physics of Hearing: From Neurobiology to Information Theory and Back, Kavli Institute for Theoretical Physics (KITP), University of California, Santa Barbara, CA, June 2017. <http://online.kitp.ucsb.edu/online/hearing17/>
4. "Automatic Speech Recognition: State-of-the-Art in Transition," KITP Program: Physics of Hearing: From Neurobiology to Information Theory and Back, Kavli Institute for Theoretical Physics (KITP), University of California, Santa Barbara, CA, June 2017. <http://online.kitp.ucsb.edu/online/hearing17/>
5. "On the Relation between Error Measures, Statistical Modeling, and Decision Rules," Speech Processing Group, Faculty of Information Technology, Brno University of Technology, Czech Republic, Aug. 2016.
6. "Automatic Speech Recognition based on Neural Networks," Keynote lecture at *Int. Conf. Speech and Computer (SPECOM)*, Budapest, Hungary, Aug. 2016.
7. "Automatic Speech Recognition using Neural Networks," Keynote lecture at *11. ITG Fachtagung Sprachkommunikation*, Erlangen, Germany, Sept. 2014.
8. "Error Measures, Training Criteria, and Decision Rules: Consistent?" IBM Thomas J. Watson Research Center, Yorktown Heights, NY, Jan. 2014.
9. "Matching Targets for Automatic Speech Recognition," M*Modal & Carnegie Mellon University, Pittsburgh, PA, Sept. 2012.
10. "Adaptive and Discriminative ASR at RWTH Aachen University," IDIAP Research Institute, Martigny, Switzerland, Mar. 2010.
11. "Log-Linear Approach to Discriminative Training," *NIPS 2008 Workshop "Speech and Language: Learning-based Methods and Systems"*, Whistler, BC, Canada, Dec. 2008.
12. "Speech Recognition and Statistical Machine Translation at RWTH Aachen University," NTT Communication Science Laboratories, Kyoto, Japan, Dec. 2007.

Book Chapters:

1. G. Heigold, T. Deselaers, R. Schlüter, H. Ney, G. Saon, D. Povey: "Integration of large margin concept into standard discriminative training criteria," in J. Olive, C. Christianson, and J. McCary (Eds.): *Handbook of Natural Language processing and Machine Translation: DARPA Global Autonomous Language Exploitation (GALE)*, pp. 445–452, Springer, New York, USA, 2011.
2. C. Plahl, B. Hoffmeister, R. Schlüter, H. Ney: "Multiple Feature Speech Recognition," in J. Olive, C. Christianson, and J. McCary (Eds.): *Handbook of Natural Language processing and Machine Translation: DARPA Global Autonomous Language Exploitation (GALE)*, pp. 415–421, Springer, New York, USA, 2011.
3. D. Vergyri, A. Mandal, W. Wang, A. Stolcke, J. Zheng, M. Graciarena, D. Rybach, C. Gollan, R. Schlüter, K. Kirchhoff, A. Faria, N. Morgan: "Development of the SRI/Nightingale Arabic ASR System," in J. Olive, C. Christianson, and J. McCary (Eds.): *Handbook of Natural Language processing and Machine Translation: DARPA Global Autonomous Language Exploitation (GALE)*, pp. 561–569, Springer, New York, USA, 2011.
4. S. Kanthak, A. Sixtus, S. Molau, R. Schlüter, H. Ney: "Fast Search for Large Vocabulary Speech Recognition," in Wolfgang Wahlster, editor: *VerbMobil: Foundations of Speech-to-Speech Translation*, pp. 63–78, Springer Verlag: Berlin, Heidelberg, New York, 2000.

Tutorials:

1. R. Schlüter: "Does the Cost Function Matter in Bayes Decision Rule?" Tutorial, Summer Workshop, EU Project SCALE, Sheffield, UK, June 2012.
2. R. Schlüter, G. Heigold: "Introduction to Discriminative Training in Speech Recognition," Tutorial, Winter School, EU Project SCALE, Saarbrücken, Germany, Jan. 2010.

Conference Proceedings:

1. K. Irie, Z. Lei, R. Schlüter, H. Ney: "Prediction of LSTM-RNN Full Context States as a Subtask for N-Gram Feedforward Language Models," to be presented at *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, Calgary, AB, Canada, April 2018,
2. Z. Tüske, R. Schlüter, H. Ney: "Acoustic modeling of Speech Waveform based on Multi-Resolution, Neural Network Signal Processing," to be presented at *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, Calgary, AB, Canada, April 2018,
3. T. Menne, Z. Tüske, R. Schlüter, H. Ney: "Learning Acoustic Features from the Raw Waveform for Automatic Speech Recognition," to be presented at *DAGA 2018 - 44. Jahrestagung Akustik*, Munich, Germany, March 2018.
4. P. Golik, Z. Tüske, K. Irie, E. Beck, R. Schlüter, H. Ney: "The 2016 RWTH Keyword Search System for Low-Resource Languages," in *Int. Conf. Speech and Computer (SPECOM)*, A. Karpov, R. Potapova, I. Mporas (Eds.), *Lecture Notes in Computer Science, Subseries Lecture Notes in Artificial Intelligence*, Vol. LNAI 10458, pp. 719–730, Hatfield, UK, Sept. 2017.
5. Z. Tüske, W. Michel, R. Schlüter, H. Ney: "Parallel Neural Network Features for Improved Tandem Acoustic Modeling," in *Interspeech*, Stockholm, Sweden, August 2017.
6. A. Zeyer, E. Beck, R. Schlüter, H. Ney: "CTC in the Context of Generalized Full-Sum HMM Training," in *Interspeech*, Stockholm, Sweden, August 2017.
7. P. Dötsch, A. Zeyer, P. Voigtlaender, I. Kulikov, R. Schlüter, H. Ney: "RETURNN: The RWTH Extensible Training framework for Universal Recurrent Neural Networks," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 5345–5349, New Orleans, LA, March 2017, (arXiv preprint arXiv:1608.00895).
8. K. Irie, P. Golik, R. Schlüter, H. Ney: "Investigations on Byte-Level Convolutional Neural Networks for Language Modeling in Low Resource Speech Recognition," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 5740–5744, New Orleans, LA, March 2017.
9. A. Zeyer, P. Dötsch, P. Voigtlaender, R. Schlüter, H. Ney: "A Comprehensive Study of Deep Bidirectional LSTM RNNs for Acoustic Modeling in Speech Recognition," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 2462–2466, New Orleans, LA, March 2017, (arXiv preprint arXiv:1606.06871).

10. A. Zeyer, I. Kulikov, R. Schlüter, H. Ney: "Faster Sequence Training," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 5285–5289, New Orleans, LA, March 2017.
11. M. Nussbaum-Thom, R. Schlüter, V. Goel, H. Ney: "Noisy Objective Functions Based on the f -Divergence," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 2327–2331, New Orleans, LA, March 2017.
12. P. Dötsch, S. Hegselmann, R. Schlüter, H. Ney: "Inverted HMM - a Proof of Concept," in *Neural Information Processing Systems (NIPS) End-to-end Learning for Speech and Audio Processing Workshop*, Barcelona, Spain, December 2016.
13. W. Michel, Z. Tüske, M. A. B. Shaik, R. Schlüter, and H. Ney: "The RWTH Aachen LVCSR System for IWSLT-2016 German Skype Conversation Recognition Task," in *Int. Workshop on Spoken Language Translation (IWSLT)*, Seattle, WA, Dec. 2016.
14. M. Kitzka, A. Zeyer, R. Schlüter, J. Heymann, R. Häb-Umbach: "Robust Online Multi-Channel Speech Recognition," in *12th VDE ITG Symposium Speech Communication*, pp. 1–5, Oct. 2016.
15. T. Menne, J. Heymann, A. Alexandridis, K. Irie, A. Zeyer, M. Kitzka, P. Golik, I. Kulikov, L. Drude, R. Schlüter, H. Ney, R. Häb-Umbach, A. Mouchtaris: "The RWTH/UPB/FORTH System Combination for the 4th CHiME Challenge Evaluation," in *4th Int. Workshop on Speech Processing in Everyday Environments*, pp. 39–44, San Francisco, CA, Sept. 2016.
16. R. Schlüter, P. Dötsch, P. Golik, M. Kitzka, T. Menne, K. Irie, Z. Tüske, A. Zeyer: "Automatic Speech Recognition Based on Neural Networks," in *Int. Conf. Speech and Computer (SPECOM)*, A. Ronzhin, R. Potapova, G. Néméth (Eds.), *Lecture Notes in Computer Science, Subseries Lecture Notes in Artificial Intelligence*, Vol. LNAI 9811, pp. 3–17, Budapest, Hungary, Aug. 2016.
17. K. Irie, Z. Tüske, T. Alkhouli, R. Schlüter, H. Ney: "LSTM, GRU, Highway and a Bit of Attention: An Empirical Overview for Language Modeling in Speech Recognition," in *Interspeech*, pp. 3519–3523, San Francisco, CA, Sept. 2016.
18. A. Zeyer, R. Schlüter, H. Ney: "Towards Online-Recognition with Deep Bidirectional LSTM Acoustic Models," in *Interspeech*, pp. 3424–3428, San Francisco, CA, Sept. 2016.
19. Z. Tüske, K. Irie, R. Schlüter, and H. Ney: "Investigation on Log-Linear Interpolation of Multi-Domain Neural Network Language Models," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 6005–6009, Shanghai, China, March 2016.
20. Z. Tüske, P. Golik, R. Schlüter, H. Ney: "Speaker Adaptive Joint Training of Gaussian Mixture Models and Bottleneck Features," in *IEEE Automatic Speech Recognition and Understanding Workshop (ASRU)*, Scottsdale, AZ, Dec. 2015.
21. J. Cui, B. Kingsbury, B. Ramabhadran, A. Sethy, K. Audhkhasi, X. Cui, E. Kislal, L. Mangu, M. Nussbaum-Thom, M. Picheny, Z. Tüske, P. Golik, R. Schlüter, H. Ney, M.J.F. Gales, K.M. Knill, A. Ragni, H. Wang, P. Woodland "Multilingual Representations for Low Resource Speech Recognition and Keyword Search," *IEEE Automatic Speech Recognition and Understanding Workshop (ASRU)*, Scottsdale, AZ, Dec. 2015.
22. M.A.B. Shaik, Z. Tüske, M.A. Tahir, M. Nussbaum-Thom, R. Schlüter, H. Ney: "Improvements in RWTH LVCSR Evaluation Systems for Polish, Portuguese, English, Urdu, and Arabic," in *Proc. Interspeech*, pp. 3154–3157, Dresden, Germany, Sept. 2015.
23. P. Golik, Z. Tüske, R. Schlüter, H. Ney: "Convolutional Neural Networks for Acoustic Modeling of Raw Time Signal in LVCSR," in *Proc. Interspeech*, pp. 26–30, Dresden, Germany, Sept. 2015.
24. P. Golik, Z. Tüske, R. Schlüter, H. Ney: "Multilingual Features Based Keyword Search for Very Low-Resource Languages," in *Proc. Interspeech*, pp. 1260–1264, Dresden, Germany, Sept. 2015.
25. E. Beck, R. Schlüter, H. Ney: "Error Bounds for Context Reduction and Feature Omission," in *Proc. Interspeech*, pp. 1280–1284, Dresden, Germany, Sept. 2015.
26. K. Irie, R. Schlüter, H. Ney: "Bag-of-Words Input for Long History Representation in Neural Network-based Language Models for Speech Recognition," in *Proc. Interspeech*, pp. 2371–2375, Dresden, Germany, Sept. 2015.

27. Z. Tüske, M.A. Tahir, R. Schlüter, H. Ney: "Integrating Gaussian Mixture Models into Deep Neural Networks: Softmax Layer with Hidden Variable," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 4285–4289, Brisbane, Australia, April 2015.
28. M.A. Tahir, S. Wiesler, R. Schlüter, H. Ney: "Investigation of Mixture Splitting Concept for Training Linear Bottlenecks of Deep Neural Network Acoustic Models" in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 4614–4618, Brisbane, Australia, April 2015.
29. P. Voigtlaender, P. Dötsch, S. Wiesler, R. Schlüter, H. Ney: "Sequence-discriminative training of recurrent neural networks," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 2100–2104, Brisbane, Australia, April 2015.
30. S. Wiesler, P. Golik, R. Schlüter, H. Ney: "Investigations on Sequence Training of Neural Networks," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 4565–4569, Brisbane, Australia, April 2015.
31. J. Heymann, R. Hüb-Umbach, P. Golik, R. Schlüter: "Unsupervised Adaptation of a Denoising Autoencoder by Bayesian Feature Enhancement for Reverberant ASR under Mismatch Conditions," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 5053–5057, Brisbane, Australia, April 2015.
32. M.A.B. Shaik, A. Mousa, S. Hahn, R. Schlüter, H. Ney: "Improved Strategies for a Zero OOV Rate LVCSR System," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 5048–5052, Brisbane, Australia, April 2015.
33. D. Nolden, R. Schlüter, H. Ney: "Word Pair Approximation for More Efficient Decoding with High-Order Language Models," in *Proc. Interspeech*, pp. NN–NN, Singapore, Sept. 2014.
34. M.A. B. Shaik, Z. Tüske, M.A. Tahir, M. Nussbaum-Thom, R. Schlüter, H. Ney: "RWTH LVCSR Systems for Quaero and EU-Bridge: German, Polish, Spanish and Portuguese," in *Proc. Interspeech*, pp. 973–977, Singapore, Sept. 2014.
35. M. Sundermeyer, R. Schlüter, H. Ney: "rwthlm - The RWTH Aachen University Neural Network Language Modeling Toolkit," in *Proc. Interspeech*, pp. 2093–2097, Singapore, Sept. 2014.
36. M. Sundermeyer, Z. Tüske, R. Schlüter, H. Ney: "Lattice Decoding and Rescoring with Long-Span Neural Network Language Models," in *Proc. Interspeech*, pp. 661–665, Singapore, Sept. 2014.
37. Z. Tüske, P. Golik, D. Nolden, R. Schlüter, H. Ney: "Data Augmentation, Feature Combination, and Multilingual Neural Networks to Improve ASR and KWS Performance for Low-resource Languages," in *Proc. Interspeech*, pp. 1420–1424, Singapore, Sept. 2014.
38. Z. Tüske, P. Golik, R. Schlüter, H. Ney: "Acoustic Modeling with Deep Neural Networks Using Raw Time Signal for LVCSR," in *Proc. Interspeech*, pp. 890–894, Singapore, Sept. 2014. ISCA best student paper award Interspeech 2014.
39. M. Kozielski, M. Matysiak, P. Dötsch, R. Schlüter, H. Ney: "Open-lexicon Language Modeling Combining Word and Character Levels," in *Proc. Intern. Conf. on Frontiers in Handwriting Recognition (ICFHR)*, pp. 343–348, Crete, Greece, Sept. 2014.
40. Z. Tüske, D. Nolden, R. Schlüter, H. Ney: "Multilingual MRASTA Features for Low-Resource Keyword Search and Speech Recognition Systems" in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Florence, Italy, May 2014.
41. S. Wiesler, A. Richard, R. Schlüter, H. Ney: "Mean-Normalized Stochastic Gradient For Large-Scale Deep Learning" in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 180–184, Florence, Italy, May 2014.
42. S. Wiesler, A. Richard, P. Golik, R. Schlüter, H. Ney: "RASR/ANN: The RWTH Neural Network Toolkit for Speech Recognition" in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 3313–3317, Florence, Italy, May 2014.
43. S. Wiesler, C. Oberdörfer, K. Irie, R. Schlüter, H. Ney: "The RWTH Aachen University English Lecture Recognition System" in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pp. 3322–3326, Florence, Italy, May 2014.

44. M. Nussbaum-Thom, X. Cui, R. Schlüter, H. Ney, V. Goel: "A Family of Discriminative Training Criteria Based on the F-Divergence for Deep Neural Networks" in *Proc. IEEE Int. Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Florence, Italy, May 2014.
45. M.A.B. Shaik, Z. Tüske, S. Wiesler, M. Nussbaum-Thom, S. Peitz, R. Schlüter, and H. Ney: "The RWTH Aachen German and English LVCSR systems for IWSLT-2013," in *Proc. Int. Workshop on Spoken Language Translation (IWSLT)*, Heidelberg, Germany, Dec. 2013.
46. D. Nolden, R. Schlüter, H. Ney: "Efficient Nearly Error-Less LVCSR Decoding Based on Incremental Forward and Backward Passes," in *Proc. IEEE Automatic Speech Recognition and Understanding (ASRU) Workshop*, Olomouc, Czech Republic, Dec. 2013.
47. P. Golik, Z. Tüske, R. Schlüter, H. Ney: "Development of the RWTH Transcription System for Slovenian," in *Proc. Interspeech*, pp. 3107–3111, Lyon, France, Aug. 2013.
48. S. Hahn, P. Lehnen, S. Wiesler, R. Schlüter, H. Ney: "Improving LVCSR with Hidden Conditional Random Fields for Grapheme-to-Phoneme Conversion," in *Proc. Interspeech*, pp. 495–499, Lyon, France, Aug. 2013.
49. A. Mousa, M.A.B. Shaik, R. Schlüter, H. Ney: "Morpheme Level Hierarchical Pitman-Yor Class-based Language Models for LVCSR of Morphologically Rich Languages," in *Proc. Interspeech*, pp. 3409–3413, Lyon, France, Aug. 2013.
50. M. Nussbaum-Thom, E. Beck, T. Alkhoul, R. Schlüter, H. Ney: "Relative Error Bounds for Statistical Classifiers based on the f-Divergence," in *Proc. Interspeech*, pp. 2197–2201, Lyon, France, Aug. 2013.
51. M.A.B. Shaik, A. Mousa, R. Schlüter, H. Ney: "Feature-rich Sub-lexical Language Models using a Maximum Entropy Approach for German LVCSR," in *Proc. Interspeech*, pp. 3404–3408, Lyon, France, Aug. 2013.
52. M.A. Tahir, H. Huang, R. Schlüter, H. Ney, L. ten Bosch, B. Cranen, L. Boves: "Training Log-Linear Acoustic Models in Higher-Order Polynomial Feature Space for Speech Recognition," in *Proc. Interspeech*, pp. 3352–3356, Lyon, France, Aug. 2013.
53. Z. Tüske, R. Schlüter, H. Ney: "Multilingual hierarchical MRASTA features for ASR," in *Proc. Interspeech*, pp. 2222–2226, Lyon, France, Aug. 2013.
54. R. Schlüter, M. Nußbaum-Thom, E. Beck, T. Alkhoul, H. Ney: "Novel Tight Classification Error Bounds under Mismatch Conditions based on f-Divergence," in *IEEE Information Theory Workshop*, pp. 432–436, Sevilla, Spain, Sept. 2013.
55. J. Mamou, J. Cui, X. Cui, M.J.F. Gales, B. Kingsbury, K. Knill, L. Mangu, D. Nolden, M. Picheny, B. Ramabhadran, M. Saraclar, R. Schlüter, A. Sethy, P.C. Woodland: "Developing Keyword Search under the IARPA Babel Program," in *Proc. AFEKA Speech Processing Conference*, Tel Aviv, Israel, Jul. 2013.
56. M. Kozielski, D. Rybach, S. Hahn, R. Schlüter, H. Ney: "Open Vocabulary Handwriting Recognition using Combined Word-Level and Character-Level Language Models," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 8257–8261, Vancouver, Canada, May 2013. (IBM Research Spoken Language Processing Student Travel Grant Award)
57. D. Nolden, R. Schlüter, H. Ney: "Advanced Search Space Pruning with Acoustic Look-Ahead for WFST-based LVCSR," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 6734–6738, Vancouver, Canada, May 2013.
58. C. Plahl, M. Kozielski, R. Schlüter, H. Ney: "Feature Combination and Stacking of Recurrent and Non-recurrent Neural Networks for LVCSR," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 6714–6718, Vancouver, Canada, May 2013.
59. M. Sundermeyer, I. Oparin, J.-L. Gauvain, B. Freiberg, R. Schlüter, H. Ney: "Comparison of Feedforward and Recurrent Neural Network Language Models," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 8430–8434, Vancouver, Canada, May 2013.
60. Z. Tüske, R. Schlüter, H. Ney: "Deep hierarchical bottleneck MRASTA features for LVCSR," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 6970–6974, Vancouver, Canada, May 2013.
61. Z. Tüske, J. Pinto, D. Willett, R. Schlüter: "Investigation on cross- and multilingual MLP features under matched and mismatched acoustical conditions," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 7349–7353, Vancouver, Canada, May 2013.

62. S. Wiesler, A. Richard, R. Schlüter, H. Ney: "A Critical Evaluation of Stochastic Algorithms for Convex Optimization," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 6955–6959, Vancouver, Canada, May 2013.
63. J. Mamou, J. Cui, X. Cui, M.J.F. Gales, B. Kingsbury, K. Knill, L. Mangu, D. Nolden, M. Picheny, B. Ramabhadran, R. Schlüter, A. Sethy, P.C. Woodland: "System Combination and Score Normalization for Spoken Term Detection," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 8272–8276, Vancouver, Canada, May 2013.
64. B. Kingsbury, J. Cui, X. Cui, M.J.F. Gales, K. Knill, J. Mamou, L. Mangu, D. Nolden, M. Picheny, B. Ramabhadran, R. Schlüter, A. Sethy, P.C. Woodland: "A High-Performance Cantonese Keyword Search System," in *Proc. IEEE Intern. Conf. on Acoustics, Speech, and Signal Processing*, pp. 8277–8281, Vancouver, Canada, May 2013.
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