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## Personal Details

Date of Birth: 16 August 1978      Place of Birth: Shuangcheng, Heilongjiang, China  
Ethnicity/Nationality: Han Chinese      Languages: Chinese(native), English(fluent), Japanese, German

## Academic Qualifications

- **2001 - 2005:** PhD at Cambridge University Engineering Department. Thesis topic on “Discriminative Complexity Control and Linear Projections for Large Vocabulary Speech Recognition”. Supervisor: Dr. Mark Gales. Funded by the NIST Rich Transcription Evaluation and later DARPA’s EARS program.
- **2000 - 2001:** MPhil in Computer Speech and Language Processing at Cambridge University Engineering Department. Achieved very high standard in written exams. Thesis topic on “Linear Projection Schemes for Automatic Speech Recognition”. Supervisor: Dr. Mark Gales. Funded by the Cambridge Overseas Trust.
- **1996 - 2000:** BSc at Shanghai Jiao Tong University. Ranked top 0.6% in nation wide university entrance exams. Project: “Development of an On-line English Language Testing System”. Supervisor: Prof. Liang Yi Cui.

## Research and Teaching Experience

- **2006 - present:** Research Associate (with discretionary point) at Cambridge University Engineering Department. In charge of the development of the Cambridge GALE Chinese broadcast speech transcription system and its integration with translation systems. Research focus on discriminative model selection and estimation, language modeling and adaptation, sub-word level modeling, risk based decoding for machine translation, improving large vocabulary search and system combination methods.
- **2006 - present:** Elected by the Governing Body of Clare Hall as a Post-doctoral Associate, senior member and life member of the College.
- **2005 - present:** Heavily involved in the development of the HTK open source toolkit. Responsible for the first public release of the HTK large vocabulary decoder and associated lattice processing tools for multi-pass search and discriminative training in 2007 and 2009. Responsible for organizing HTK Users Meeting 2007 in Hawaii and 2009 in Taipei.
- **2001 - present:** Key member for the development of the Cambridge University large vocabulary speech recognition systems for the 2002 NIST Rich transcription, DARPA EARS and GALE speech recognition evaluations. The Cambridge system was ranked the best system on conversation telephone speech in 2002, on broadcast news in 2003, and broadcast Mandarin Chinese in 2006 and 2008.

- **2001 - present:** Supervising and demonstrating in practical sessions for the MPhil course in Computer Speech, Text and Internet Technology. Contributed to the restructuring of 2007 Lent term speech practical materials for the same course.
- **2006 - present:** Proposing and supervising thesis projects for the MPhil course in Computer Speech, Text and Internet Technology jointly run the Department of Engineering and Computer Laboratory at Cambridge University. Students and dissertation topics advised:
  - *2006 - 2007:* Lei Zhang, “Discriminative Language Model Interpolation”.
  - *2007 - 2008:* Xi Tan, “Context Aware Language Model Adaptation”.
- **Oct - Nov 2006:** Supervising and demonstrating in practical sessions for the Engineering tripos Part IB computing modules at the Cambridge University Engineering Department.

### Research Projects and Roles

- 2001 - 2002: NIST Rich Transcription evaluation: **student member** of the Cambridge LVCSR research team; research on heteroscedastic LDA; best system for conversational telephone speech in 2002.
- 2002 - 2004: DARPA EARS Rich Transcription evaluations: **student member** of the Cambridge EARS team; research on discriminative model complexity control and subspace projection; best broadcast news system in 2003
- 2005 - present: DARPA GALE speech translation evaluations: **key member** of the Cambridge GALE research team; research on discriminative and context dependent LM modeling, sub-word level modeling, risk based decoding for machine translation, improving large vocabulary search algorithms and system combination methods; best system for Chinese broadcast transcription in 2006 and 2008.
- 2005 - present: Open source Hidden Markov Model (HTK) toolkit: **key member** of Cambridge HTK research team; primarily responsible for the HTK large vocabulary decoder, lattice processing and discriminative training tools.
- 2009 - present: Speech Recognition in Complex Acoustic Environment, part of the Natural Science Foundation of China (NSFC) funded major research plan on Computational Models for Visual and Auditory Information Processing: CNY 500k, **joint grant applicant and external collaborator** with Dr. Lan Wang, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences.

### Professional Activities

- **2001 - present:** Member of IEEE and ISCA.
- reviewer for major technical journals in speech and language technology:
  - IEEE Transactions on Speech, Audio and Language Processing.
  - Speech Communication.
  - IEEE Pattern Recognition Letters.
  - IET Signal Processing.
  - Journal of Computer Science and Technology.

### Awards and Scholarships

- **1996 - 2000:** Awarded Jiao Tong University Scholarships for academic merit.
- **August 1997:** Awarded best performing platoon of Jiao Tong University compulsory military training program, 11 out of more than 2700 participating.
- **April 2000:** Ranked 6th nation wide in all China (including Hong Kong) University Student Competition in English Language Skills.
- **2000 - 2001:** Awarded Cambridge Overseas Trust Bursary.
- **2001 - 2005:** Awarded Cambridge University Studentship.

### Research Interests

- Large vocabulary continuous speech recognition;
- Automatic model complexity control;
- Discriminative training;
- Language modeling and adaptation;
- Large vocabulary search and decoding;
- Finite state machines;
- Statistical Machine translation;
- Application of machine learning techniques.

### List of Selected Publications

#### Theses:

- X. Liu (2001). Linear Projection Schemes for Automatic Speech Recognition. MPhil thesis, Cambridge University.
- X. Liu (2005). Discriminative Complexity Control and Linear Projections for Large Vocabulary Speech Recognition, PhD thesis, Cambridge University.

#### Tutorial Books:

- S. J. Young, G. Evermann, M. J. F. Gales, T. Hain, D. Kershaw, X. Liu, G. Moore, J. Odell, D. Ollason, D. Povey, V. Valtchev and P. C. Woodland. The HTK Book Version 3.4.1, 2009.

#### Journal Papers:

- T. Hain, P. C. Woodland, G. Evermann, M. J. F. Gales, X. Liu, G.L. Moore, D. Povey and L. Wang (2004). Automatic Transcription of Conversational Telephone Speech, IEEE Transactions on Speech and Audio Processing, Vol. 13, Nov. 2005.
- X. Liu and M. J. F. Gales (2005). Automatic Model Complexity Control Using Marginalized Discriminative Growth Functions. IEEE Transactions on Speech Audio and Language Processing, Vol. 4, May 2007.

- X. Liu, M. J. F. Gales and P. C. Woodland. Use of Contexts in Discriminative Language Model Interpolation and Adaptation. (In preparation)
- X. Liu, M. J. F. Gales and P. C. Woodland. Large Scale Language Model Discriminative Training Using Constrained Confusion Networks. (In preparation)

#### Book Chapters:

- M. Tomalin, W. Byrne, A. de Gispert, M. Gales, X. Liu, P. Woodland et al. (2009). “Improving Speech Transcription for Machine Translation”, chapter of the GALE Book. (Submitted)
- S. Matsoukas, T. Ng , L. Nguyen , F. Diehl, M. J. F. Gales, X. Liu, P. C. Woodland, J-L Gauvain, L. Lamel, A. Messaoudi et al. (2009). “Optimizing Speech-To-Text System Combination for Machine Translation”, chapter of the GALE Book. (Submitted)

#### Conference Papers:

- X. Liu, M. J. F. Gales and P. C. Woodland (2003). Automatic Complexity Control for HLDA Systems. in Proc. IEEE ICASSP2003, Hong Kong. 2003.
- X. Liu and M. J. F. Gales (2003). Automatic Model Complexity Control Using Marginalized Discriminative Growth Functions, in Proc. IEEE ASRU2003, St. Thomas, U.S. Virgin Islands.
- X. Liu and M. J. F. Gales (2004). Model Complexity Control and Compression Using Discriminative Growth Functions. in Proc. IEEE ICASSP2004, Montreal.
- G. Evermann, H. Y. Chan, M. J. F. Gales, T. Hain, X. Liu, D. Mrva, L. Wang and P. C. Woodland (2004). Development of the 2003 CU-HTK Conversational Telephone Speech Transcription System. in Proc. IEEE ICASSP2004, Montreal.
- X. Liu, M. J. F. Gales, K. C. Sim and K. Yu (2005). Investigation of Acoustic Modeling Techniques for LVCSR Systems. in Proc. IEEE ICASSP2005, Philadelphia.
- M. J. F. Gales, B. Jia, X. Liu, K. C. Sim, P. C. Woodland and K. Yu (2005). Development of the CU-HTK 2004 Mandarin Conversational Telephone Speech Transcription System. in Proc. IEEE ICASSP2005, Philadelphia.
- R. Sinha, M. J. F. Gales, D. Y. Kim, X. Liu, K. C. Kim and P. C. Woodland (2006). The CU-HTK Mandarin Broadcast News Transcription System. in Proc. IEEE ICASSP2006, Toulouse.
- M. J. F. Gales , X. Liu , R. Sinha , P.C. Woodland , K. Yu, S. Matsoukas , T. Ng , K. Nguyen , L. Nguyen , J-L Gauvain , L. Lamel and A. Messaoudi (2007). Speech System Combination for Machine Translation. in Proc. IEEE ICASSP2007, Hawaii.
- M. Tomalin, M. J. F. Gales, X. Liu, K. C. Sim, R. Sinha, L. Wang, P.C. Woodland and K. Yu (2006). Improving Speech Transcription for Mandarin-English Translation. in Proc. IEEE ICASSP2007, Hawaii.
- X. Liu, W. J. Byrne, M. J. F. Gales, P. C. Woodland et al. (2007). Discriminative Language Model Adaptation for Mandarin Broadcast Speech Transcription and Translation, in Proc. IEEE ASRU2007, Kyoto.
- X. Liu, M. J. F. Gales and P. C. Woodland (2008). Context Dependent Language Model Adaptation, in Proc. ISCA Interspeech2008, Brisbane.
- X. Liu, M. J. F. Gales and P. C. Woodland (2009). Use of Contexts in Language Model Interpolation and Adaptation, in Proc. ISCA Interspeech2009.
- J. L. Hieronymus, X. Liu, M. J. F. Gales and P. C. Woodland (2009). Exploiting Chinese Character Models to Improve Speech Recognition Performance, in Proc. ISCA Interspeech2009.

**Technical Reports:**

- T. Hain, P. C. Woodland, G. Evermann, M. J. F. Gales, X. Liu, G. L. Moore, D. Povey and L. Wang (2003) Automatic Transcription of Conversational Telephone Speech. Development of the CU-HTK 2002 System. Cambridge University Engineering Department Technical Report, CUED/F-INFENG/TR-465. December 2003.
- X. Liu and M. J. F. Gales (2004) Discriminative Training of Multiple Subspace Projections for Large Vocabulary Speech Recognition. Cambridge University Engineering Department Technical Report, CUED/F-INFENG/TR-489. August 2004.
- X. Liu and M. J. F. Gales (2004) Automatic Model Complexity Control Using Marginalized Discriminative Growth Functions. Cambridge University Engineering Department Technical Report, CUED/F-INFENG/TR-490. August 2004.
- X. Liu, W. J. Byrne, M. J. F. Gales and P. C. Woodland (2007). Discriminative Language Model Adaptation for Mandarin Broadcast Speech Transcription and Translation. Cambridge University Engineering Department Technical Report, CUED/F-INFENG/TR-586. September 2007.
- X. Liu, M. J. F. Gales and P. C. Woodland (2009). Use of Contexts in Language Model Interpolation and Adaptation. Cambridge University Engineering Department Technical Report, CUED/F-INFENG/TR-630. February 2009.

**Selected Presentations and Talks:**

- X. Liu and M. J. F. Gales (2003) Automatic Model Complexity Control Using Marginalized Discriminative Growth Functions. DARPA EARS STT technical meeting, Martigny, Switzerland, September, 2003.
- X. Liu and M. J. F. Gales (2004) Discriminative Model Complexity Control. Presentation to DARPA and GCHQ EARS Site Visit, August, 2004.
- M. J. F. Gales, X. Liu, K. C. Sim and K. Yu (2004). Investigation of Acoustic Modeling Techniques for LVCSR Systems. DARPA EARS Rich Transcription Workshop, 2004.
- X. Liu, M. J. F. Gales and P. C. Woodland (2007). HTK Large Vocabulary Decoder and Discriminative Training Tools. Part of presentation on new features of HTK version 3.4, the HTK Meeting, Hawaii, 2007.
- X. Liu, W. J. Byrne, M. J. F. Gales, P. C. Woodland (2007). Investigation of System Combination, Improved Minimum Bayes Risk Decoding, Discriminative Language Model Interpolation and Adaptation for Machine Translation. Part of joint AGILE team presentation to DARPA's GALE Site Visit, August, 2007.
- P. C. Woodland, X. Liu, M. J. F. Gales, K. Yu, T. Ng and L. Nguyen (2008). Development of AGILE Chinese STT Systems. AGILE team presentation to DARPA's GALE Principal Invigilator Meeting, April, 2008.
- X. Liu, M. J. F. Gales and P. C. Woodland (2008). Context Dependent Language Model Interpolation and Adaptation. Presentation at ISCA Interspeech2008 and invited talk at the Chinese University of Hong Kong, September, 2008.
- X. Liu, F. Diehl, M. Tomalin M. J. F. Gales and P. C. Woodland (2009). AGILE Speech to Text (STT) Research, part of AGILE team presentation to DARPA's GALE Principal Invigilator Meeting, May, 2009.