

Lexing Xie

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EDUCATION

Columbia University, New York, NY (September 2000- August 2005).

Ph.D., Electrical Engineering (August 2005)

Thesis Title: "Unsupervised Pattern Discovery for Multimedia Sequences"

Thesis Advisor: Prof. Shih-Fu Chang

M. Phil., Electrical Engineering, May 2004.

M.S., Electrical Engineering, December 2001, GPA 4.15/4.00

Tsinghua University, Beijing, China (September 1996 - June 2000).

B.S. with Honors, Dept. of Electronic Engineering, June 2000.

RESEARCH AND TEACHING EXPERIENCES

IBM T. J. Watson Research Center, Hawthorne, NY.

Research Staff Member, January 2007 -

Josef Raviv Memorial Postdoctoral Fellow, October 2005 – December 2006

Multimedia Research group, Business Informatics Department

Research on multimedia content analysis and mining, resulted in multiple publications, patent applications and one best student paper award. Topics include:

- Multimedia search and retrieval
- Event detection and pattern mining in multimedia
- Social context for media annotation
- Systems and large-scale applications in multimedia indexing and recognition

Columbia University, New York, NY.

Adjunct Assistant Professor, Dept. of Electrical Engineering, January 2007-May 2008

- Co-teach graduate seminar EE 6882 Statistical Video Analysis and Indexing, with Shih-Fu Chang, Fall 2007.
- Co-teach graduate class EE 4830 Digital Image Processing, with Shahram Ebadollahi, Spring 2007 and 2008.

Columbia University, New York, NY.

*Graduate Research Assistant, Digital Video and Multimedia Lab, Dept. of Electrical Engineering
September 2000-August 2005 Advisor: Prof. Shih-Fu Chang*

Research Experience:

- Research on multimedia analysis, structure discovery and summarization, resulting in eleven publications, two patents and *three best student paper awards*.

Teaching Experience:

- Teaching assistant / course manager for three courses: EE6880 Statistical Methods for Video Indexing and Analysis (Fall 2003, graduate seminar), EE4830 Digital Image Processing (Spring 2001, Summer 2001 and 2002, senior undergraduate / graduate), EE3203 Signals and Systems II (Fall 2000, undergraduate). Resulted in *three excellent TA awards* from the School of Engineering and Applied Science, Columbia University.

Microsoft Research, Cambridge, UK.

Research Intern, June – August 2003. Manager: Dr. Patrick Pérez, Dr. Andrew Blake

- Tackled the problem of object class recognition from images, devised semi-supervised learning techniques for learning a part-based object appearance model.

Tsinghua University, Beijing, China.

Undergraduate Research Assistant, November 1997 – June 2000, Advisor: Prof. Yun He

- Research and implementations on video and image compression. Resulted in one university-wide undergrad research award.

AWARDS AND HONORS

- IBM Research 2005 Josef Raviv Memorial Postdoctoral Fellowship, Oct 2005- Dec 2006. One award is granted every year in Computer Science and Computer Engineering (from 36 applicants in 2005) in memory of Dr. Raviv, the founder and director of IBM Haifa Research Laboratory. This fellowship supports research at any IBM research group of the awardee's choice for up to two years. http://domino.watson.ibm.com/comm/research.nsf/pages/d.compsci.raviv_fellowship.2005.html
- Best Student Paper Award, ACM/IEEE Joint Conference on Digital Libraries (JCDL) 2007, June 2007
- Best Student Paper Award (first author), IEEE ICIP (International Conference on Image Processing) 2004, October 2004.
- Best Student Paper Award, ACM Multimedia 2005, Singapore, November 2005
- Best Student Paper Award, ACM Multimedia 2002, Juan Les Pins, France, December 2002
- IBM Research scholarship, IEEE ICIP (International Conference on Image Processing) 2003, among the 9 recipients evaluated by merit, September 2003.
- Excellent TA award (three times), the Fu Foundation School of Engineering and Applied Science, Columbia University. April 2001, December 2001 and April 2004.
- Undergraduate Research Award, 1st prize, Tsinghua University, December 1999
- Undergraduate scholarship in Tsinghua University every year, 1996-1999
- Ranked 1st out of 110,000 in the National College Entrance Exam, Guangdong, China, July 1996

PATENTS AND DISCLOSURES

L. Xie, M. Campbell, S. Ebadollahi, M. Hill, B. Landry, C.-S. Li, A. Natsev, M. Naphade, J. R. Smith, J. Tesic, "Method and Apparatus for Automatic Multimedia Narrative Enrichment", Patent Filed, August 2007

L. Xie, S.-F. Chang and A. Divakaran "Unsupervised Learning of Video Structures Using Hierarchical Statistical Models to Detect Events", US Patent No 7,313,269, filed 2003, granted December 2007.

L. Xie, S.-F. Chang, A. Divakaran and H. Sun "Structural Analysis of Videos with Hidden Markov Models and Dynamic Programming", , US Patent No 6,865,226, filed December 2001, granted March 2005.

PUBLICATIONS

Citation counts obtained from Google Scholars (scholar.google.com) as of December 2007.

Electronic copies can be found at <http://www.ee.columbia.edu/~xlx/research/>

I. Multimedia Semantics, Events, and Social Annotation

1. L. Xie, H. Sundaram, M. Campbell, *Event Mining in Multimedia Streams*, invited paper for The Proceedings of IEEE, Special Issue on Advances in Multimedia Information Retrieval, to appear, April 2008
2. L. Xie, R. Yan, *Extracting Semantics from Multimedia Content: Challenges and Solutions*, invited book chapter in *Multimedia Content Analysis: Theory and Applications*, A. Divakaran Eds, Springer, to appear, 2008
3. A. Zunjarwad, H. Sundaram, L. Xie: *Contextual wisdom: social relations and correlations for multimedia event annotation*. Proc. ACM Multimedia 2007, pp 615-624 October 2007, Augsburg, Germany
4. B. Shevade, H. Sundaram, L. Xie . *Modeling Personal and Social Network Context for Event Annotation in Images*. Proc. ACM/IEEE Joint Conf. on Digital Libraries (JCDL) 2007, June 2007, Vancouver, Canada. (**Best Student Paper Award**)
5. L. Xie, D. Xu, S. Ebadollahi, K. Scheinberg, S.-F. Chang, J. R Smith. *Detecting Generic Visual Events with Visual Cues*. Proc. 40th Asilomar Conference on Signals, Computers and Communications (Asilomar 2006), Pacific Groves, Oct-Nov 2006
6. S. Ebadollahi, L. Xie, S.-F. Chang, J. R. Smith. *Visual Event Detection Using Multi-Dimensional Concept Dynamics*. Proc. IEEE International Conference on Multimedia and Expo (ICME 2006), Toronto, Canada, July 2006 (*7 citings*)

II. Multimedia Retrieval and Semantic Concept Detection

7. A. Natsev, A. Haubold, J. Tesic, L. Xie, R. Yan. *Semantic Concept-based Query Expansion and Re-ranking for Multimedia Retrieval*. ACM Multimedia 2007, pp 991-1000, October 2007, Augsburg, Germany
8. L. Xie, A. Natsev, J. Tesic. *Dynamic Multimodal Fusion in Video Search*. Proc. IEEE Intl. Conf. on Multimedia and Expo (ICME) 2007, July 2007, Beijing, China.
9. J. Tesic, A. Natsev, L. Xie, J. R. Smith. *Data Modeling Strategies for Imbalanced Learning in Visual Search*. Proc. IEEE Intl. Conf. on Multimedia and Expo (ICME) 2007, July 2007, Beijing, China.

III. Multimedia Pattern Mining and recognition

10. L. Xie, S.-F. Chang. *Pattern Mining in Visual Concept Streams*. Proc. IEEE International Conference on Multimedia and Expo (ICME 2006), Toronto, Canada, July 2006 (**3 citings**)
11. L. Xie, L. Kennedy, S.-F. Chang, A. Divakaran, Huifang Sun and Ching-Yung Lin. *Layered Dynamic Mixture Model for Pattern Discovery in Asynchronous Multi-modal Streams*. Proc. IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP 2005), Philadelphia, PA, March 2005 (**6 citings**)
12. L. Xie, L. Kennedy, S.-F. Chang, A. Divakaran, Huifang Sun and Ching-Yung Lin. *Discovering Meaningful Multimedia Patterns with Audio-visual Concepts and Associated Text*. IEEE International Conference on Image Processing (ICIP-2004), Singapore, October 2004 (**Best Student Paper Award**)
13. A. Divakaran, Kadir A. Peker, S.-F. Chang, Regunathan Radhakrishnan and L. Xie. *Video Mining: Pattern Discovery versus Pattern Recognition*. IEEE International Conference on Image Processing (ICIP-2004), Singapore, October 2004
14. L. Xie, P. Xu, S.-F. Chang, A. Divakaran and H. Sun. *Structure Analysis of Soccer Video with Domain Knowledge and Hidden Markov Models*, Pattern Recognition Letters, Volume 25, Issue 7, Pages 767-775, May 2004. (**54 citings**)
15. L. Xie, S.-F. Chang, A. Divakaran and H. Sun. *Unsupervised Mining of Statistical Temporal Structures in Video*. Chap. 10, in Video Mining, Kluwer, June 2003. (**34 citings**)
16. L. Xie, S.-F. Chang, A. Divakaran and H. Sun. *Feature Selection and Order Identification for Unsupervised Discovery of Statistical Temporal Structures in Video*. Invited paper, special session on sports video analysis, IEEE International Conference on Image Processing (ICIP-2003), September 2003 (**3 citings**)
17. L. Xie, S.-F. Chang, A. Divakaran and H. Sun. *Unsupervised Discovery of Multilevel Statistical Video Structures Using Hierarchical Hidden Markov Models*. In Proc. IEEE International Conference on Multimedia and Expo (ICME-2003), December 2002 (**34 citings**)
18. L. Xie, S.-F. Chang, A. Divakaran and H. Sun. *Structure Analysis of Soccer Video with Hidden Markov Models*. Invited paper, in special session of Statistical Learning in Multimedia, In Proc. IEEE International Conference on Acoustic, Speech and Signal Processing, (ICASSP-2002), Orlando, FL, May 2002. (**127 citings**)
19. P. Xu, L. Xie, S.-F. Chang, A. Divakaran, Anthony Vetro and H. Sun. *Algorithms and Systems for Segmentation and Structure Analysis in Soccer Video*. In Proc. IEEE International Conference on Multimedia and Expo (ICME-2001), Tokyo, Japan, August 2001 (**122 citings**)

IV. Object Recognition and Semi-supervised Learning

20. L. Xie, P. Pérez, *Slightly Supervised Learning of Part-Based Appearance Models*, IEEE Workshop on Learning in Computer Vision and Pattern Recognition, in conjunction with CVPR 2004, Washington DC, June 2004 (**8 citings**)

V. Video Summarization

21. H. Sundaram, L. Xie and S.-F. Chang. *A Utility Framework for the Automatic Generation of Audio-Visual Skims*. In Proc. ACM Multimedia (ACM-MM 2002), Juan Les Pins, France,

December 2002. (**Best Student Paper Award**, 53 citations)

VI. Image Authentication

22. T.-T. Ng, S.-F. Chang, J. Hsu, L. Xie and M.-P. Tsui. *Are Photorealistic Computer Graphics Images Different from Natural Images - a Statistical Perspective*. ACM Multimedia 2005, Singapore. (**Best Student Paper Award**, 13 citations)

VII. Research Notebook Papers and Demos

23. M. Campbell, A. Haubold, M. Liu, A. Natsev, J.R. Smith, J. Tesic, and L Xie, R. Yan, J. Yang, *IBM Research TRECVID-2007 Video Retrieval System*. Notebook Paper. NIST TRECVID Workshop, Gaithersburg, MD, November 2007
24. A. Natsev, J. Tesic, L. Xie, R. Yan, J. R. Smith. *IBM multimedia search and retrieval system*. Proc. ACM Conf. Image and Video Retrieval (CIVR-2007, technical demo), July 2007, Amsterdam, The Netherlands.
25. M. Campbell, A. Haubold, S. Ebadollahi, M. R. Naphade, A. Natsev, J.R. Smith, J. Tesic, and L Xie, *IBM Research TRECVID-2006 Video Retrieval System*. Notebook Paper. NIST TRECVID Workshop, Gaithersburg, MD, November 2006. (26 citations)
26. S. Ebadollahi, L. Xie, A. Abreu, M. Podlasec, S.-F. Chang, J. R. Smith. *Visualizing Multi-Dimensional Concept Dynamics for Video Event Detection*. Proc. Intl. Conf. Image and Video Retrieval (CIVR 2006, technical demo), Phoenix, Arizona, July 2006
27. S.-F. Chang, W. Hsu, L. Kennedy, L. Xie, A. Yanagawa, E. Zavesky, D. Zhang, *Columbia University TRECVID-2005 Video Search and High-Level Feature Extraction*, Notebook Paper. NIST TRECVID Workshop, Gaithersburg, MD, November 2005

INVITED TALKS

Title: *"Mining Events and Patterns from Multimedia Repositories"*

- Polytechnic University, Brooklyn, NY, Nov. 2007, Host: Prof. Yao Wang
- Dept. of Computer Science, Tsinghua University, Beijing, China, July 2007, Host: Prof. Jianmin Li

Title: *"Temporal analysis and pattern discovery in multimedia sequences"*

- Hong Kong University of Science and Technology, Hong Kong SAR, China, Dec. 2006, Host: Prof. Jie Yuan
- Shanghai Jiao Tong University, Shanghai, China, Dec. 2006, Host: Prof. Xiaokang Yang
- NEC Labs America, Cupertino, CA, Nov. 2006, Host: Dr. Xiaodan Song
- Dept. of Electrical Engineering, University of California, Los Angeles, Oct. 2006, Host: Prof. Mihaela van der Schaar

Title: *"Unsupervised Pattern Discovery for Multimedia Sequences"*

- "Emerging Leaders in Multimedia" seminar series, IBM T. J. Watson Research Center, Hawthorne, NY, July 2005, Host: Dr. Deepak Turaga
- Dept. of Computing, Oxford Brookes University, Oxford, UK, April 2005, Host: Prof. Phil Torr
- Dept. of Electrical Engineering, Ryerson University, Toronto, Canada, April 2005, Host: Prof. Xiao-Ping Zhang
- School of Computing, National University of Singapore, Oct. 2004, Host: Prof. Ye Wang
- MERL (Mitsubishi Electric Research Labs), Cambridge, MA, July 2004. Host: Dr. Ajay Divakaran
- CLSP 2004 Workshop, Johns Hopkins University, Baltimore, MD, July 2004, Host: Dr. Giridharan Iyengar

PROFESSIONAL ACTIVITIES

- Guest Editor, Special Issue on Communities and Media Computing, IEEE Transaction of Multimedia, to appear, 2009
- Special Sessions Chair, ACM Conference on Image and Video Retrieval (CIVR) 2008, July 2008, Niagara Falls, Ontario, Canada
- Organizer of Brave New Topics session, ACM Multimedia 2007, October 2007, Augsburg, Germany
- Special Session organizer, “*Temporal analysis and mining in multimedia*”, the 40th Asilomar Conference on Signals, Computers and Communications (Asilomar), Oct-Nov 2006, Pacific Groves, CA
- Program committee, ACM Multimedia 2007, Augsburg, Germany
- Program committee, International Conference on Multimedia Modeling (MMM) 2007, Singapore
- Program committee, the 5th International Conference on Image and Video Retrieval (CIVR) 2006, Phoenix, AZ

- Refereed papers for a diverse set of journals and conferences:

Journals:

IEEE Trans. on Multimedia, IEEE Trans. Image Processing, International Journal on Computer Vision (IJCV), ACM Transaction on Multimedia Computing, Communications and Applications (TOMCCAP), Journal of Visual Communication and Image Representation (JVIS), Computer Vision and Image Understanding Journal (CVIU), ACM Multimedia Systems Journal, ACM Multimedia Tools and Applications (MTAP), SPIE Journal of Electronic Imaging (JEI), EURASIP Journal on Applied Signal Processing (EURASIP-JASP)

Conferences and referred workshops:

ACM Conf. on Multimedia (ACM-MM), 2001-2007; IEEE Intl. Conf. on Computer Vision (ICCV) 2003, 2005; IEEE Intl. Conf. on Acoustic, Speech and Signal Processing (ICASSP) 2002, 2004, 2005; IEEE Intl. Conf. on Image Processing (ICIP) 2003-2004; IEEE Intl. Symposium on Circuits and Systems (ISCAS) 2001; IEEE Intl. Conf. on Multimedia and Expo (ICME) 2002-2004, 2006; IEEE Workshop on Multimedia Signal Processing (MMSP) 2001-2002; Intl. Conf. on Patter Recognition (ICPR) 2002; Intl. Conf. On Image and Video Retrieval (CIVR) 2003, 2004, 2006; ACM Intl. Workshop on Multimedia Information Retrieval (MIR) 2003-2004; Intl. World Wide Web Conf. (WWW-11) 2002; Intl. Packet Video Workshop (PV) 2002.

- IBM Research Services Research Seminar coordinator, 2007-08

REFERENCE

Available upon request.