Edward Y. Chang
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Electrical & Computer Engineering
Computer Science (affiliated)
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Education

- Ph.D. Electrical Engineering, August 1999. Stanford University, Stanford, California. (**Advisor**: Hector Garcia-Molina).
- M.S. Computer Science, April 1994. Stanford University, Stanford, California.
- M.S. Industrial Engineering & Operations Research, August 1985. University of California, Berkeley.

Professional Employment

- July 2003 - Present: Associate Professor (with tenure). Electrical & Computer Engineering Department, University of California, Santa Barbara
- January 2001 – Present: Co-founder & CTO. VIMA Technologies Inc., Santa Barbara
- July 1999 – June 2003: Assistant Professor. Electrical & Computer Engineering Department, University of California, Santa Barbara
- 1998 - 2000: Visiting Scientist, NEC Research Center, San Jose, California
- 1995 - 1999: Research Assistant. Computer Science Department, Stanford University, Stanford, California
- 1998: Research Intern. Hewlett-Packard Laboratories, Palo Alto, California
- 1998: Teaching Fellow. Computer Science Department, Stanford University, Stanford, California
- 1994 – 1995: Staff Engineer. Sun Microsystems, Mountain View, California
- 1987 – 1994: Principal Software Engineering. Operating Systems, Transaction Processing, and Workflow, Digital Equipment Corp. (now Hewlett-Packard), Palo Alto, California
- 1985 – 1987: Senior Software Engineer. Consilium Inc., Mountain View, California

Honors and Awards

- CAREER Award, National Science Foundation (NSF), 2002
- IBM Faculty Partnership Award, 2000, 2001, 2002
- Digital Equipment Corporation Fellowship, 1993, 1994

Patents

1. Feature-space Adaptive Conformal Transformation, with UCSB, 2003 (Provisional).
2. Virtual IO: Pre-emptible Disk Access, with UCSB, 2002 (Provisional).
3. MEGA: The Maximizing Expected Generalization Algorithm, with VIMA, 2002 (Provisional).
4. Dynamic Partial Function in Measurement of Similarity of Objects, with VIMA, 2002 (Pending).
5. PBIR - A System that Learns Subjective Query Concepts, with VIMA, 2002 (Pending).
6. A Suite of Learning, Sampling, and Indexing Algorithms for Grasping Complex Query Concepts, with UCSB, 2001 (Pending).
7. Perception-based & Personalizable Image Retrieval, with UCSB, 2001 (Pending).
8. PiDTV: A Personalizable and Interactive DTV Architecture, with UCSB, 2000 (Pending).
9. Classification Considering Personalization, with NEC Research, 2002 (Granted).
10. Reliable Computing Services, with Digital Equipment Corporation, 1991 (Granted).

Program Committees and Reviewers

- Co-chair, First ACM International Workshop on Video Surveillance, Berkeley, November 2003.
- Panelist, National Science Foundation, 2002,2003.
- Associated Program Committee Chair of the ACM Multimedia Conf., 2002,2003,2004.
- Program Committee member of the ACM SIGMOD Conf., 2004.
- Program Committee member of the SIAM Data Mining Conf., 2004.
- Program Committee member of the Database Systems For Advanced Application Conf., 2004.
- Program Committee member of the ACM CIKM Conf., 2003.
- Program Committee member of the IEEE Multimedia Conf., 2002,2003,2004.
- Program Committee member of International Conference on Computer Vision (ICCV), 2003.
- Program Committee member of the Web Information System Engineering Conf. (WISE), 2002,2003.
- Program Committee member of the Web-age Information Management Conf. (WAIM), 2002,2003.
- Program Committee member of the IS&T/SPIE Storage and Retrieval for Databases, 2003,2004.
- Program Committee member of the IEEE Data Engineering Conf. (ICDE), 2002.
- Program Committee member of the IEEE Pacific-rim Knowledge Discovery Conf., 2002.
- Program Committee member of the IS&T/SPIE Imaging and Multimedia Technology, 2002.
- Program Committee member of the IEEE CBAIVL Workshop, 2000, 2001.
- Local Arrangement Chair of the ACM SIGMOD Conf., 2001.
- Referee for ACM Transactions on Database Systems, ACM Transactions on Multimedia Systems, ACM Transactions on Information Systems, IEEE Transaction on Multimedia, IEEE Transaction on Circuits and Systems for Video Technology, IEEE Transaction on Knowledge and Database Systems, Kluwer Academic Journals, ACM SIGMOD Conf., ACM PODS Conf., etc.

Editorships

- *Editor, special issue on "Video Surveillance," ACM Multimedia System Journal, 2004.*

Invited Talks, Panels, and Tutorials

1. High-performance Pre-emptible and MEMS-based IOs, IBM Almaden Research Center, November 2003.
2. Research Toward a More Robust Big Brother, Invited Panelist, ACM Workshop on Video Surveillance, Berkeley, November 2003.
3. Statistical Learning for Emerging Bio and Surveillance Applications, ITRI, Taiwan U, and Tamkang U., Taiwan, September 2003.
4. Statistical Learning under Extreme Constraints, Mitsubishi Research Lab., Cambridge, August 2003.
5. Statistical Methods for Semantic Analysis of Multimedia Content (tutorial), M. Naphade, E. Chang, and J. R. Smith, IEEE International Conference on Multimedia (ICME), Baltimore, July 2003.
6. Project SFINX - Multi-sensor Fusion and Mining, IBM T.J. Watson Workshop on Multimedia, New York, June 2003.
7. Statistical Learning Methods for Emerging Database Applications (plenary tutorial), E. Chang, Database Systems for Advanced Applications (DASFAA), Kyoto, March 2003.
8. Multimedia Indexing: Promises and Problems, Invited Panelist, IEEE International Conference on Multimedia, Lausanne, August 2002.
9. Research Issues in Multimedia Databases, Research Seminar, UCLA, August 2002.
10. Statistical Learning under Extreme Constraints, ITRI (Industrial Technology Research Institute) Seminar, Taiwan, May 2002.
11. Learning and Measuring Perceptual Similarity, ICASSP Special Session in Statistical Learning Methods, Orlando, May 2002.
12. Interactive TV Infrastructures, SONY Research, San Jose, April 2002.
13. Dynamic Partial Function --- A Perceptual Distance Function for Measuring Similarity, Digital Library Seminar, Computer Science, UC Berkeley, Feb. 2002.

14. Multimedia Data Mining, HP Data Mining Lab., Palo Alto, January 2002.
15. Measuring and Learning Perceptual Similarity, HP Media Lab., Palo Alto, December 2001.
16. Characterizing, Indexing, and Retrieving Art Imagery, NSF Workshop, Harvard, November 2001.
17. Measuring and Learning Perceptual Similarity, CS Seminar, UCLA, October 2001
18. Measuring and Learning Perceptual Similarity, NSF Workshop, INRIA, September 2001.
19. Learning Query Concepts via Intelligent Sampling, IBM Almaden Research Center, September 2001.
20. Learning Query Concepts via Intelligent Sampling, IBM T.J. Watson Research Center, August 2001.
21. Perception-based Image Retrieval, SONY Music, San Francisco, June 2001.
22. Personalizable Interactive Digital VCR, SONY Research, April 2001.
23. On Managing Continuous Media Data, Compaq Western Research Lab., Palo Alto, September 2000.
24. Personalizable Interactive Digital VCR, IBM T.J. Watson, February 2000.

Publications

Invited Papers

1. SFINX: A Multi-source Fusion and Mining System, Z. Dimitrijevic, G. Wu, and E. Chang, IEEE Pacific-Rim Conference on Multimedia, Singapore, December 2003.
2. Multimedia Web Services for Filtering, Searching, and Digital Rights Management, Y.-L. Wu, C.-W. Chang, W.-C. Lai, K.-T. Cheng, and E. Chang, IEEE Pacific-rim Conf. on Multimedia, Singapore, December 2003.
3. Statistical Learning for Effective Visual Information Retrieval, E. Chang, B. Li, G. Wu, and K.-S. Goh, IEEE International Conference on Image Processing (ICIP), Barcelona, September 2003.
4. On Learning Perceptual Distance Functions for Image Retrieval, E. Chang and B. Li, IEEE International Conference on Acoustics, Speech and Signal Processing, Orlando, May 2002.
5. Indexing Multimedia Data in High dimensional and Weighted Feature Spaces, K. Goh and E. Chang, The 6th Visual Database Conference, Australia, May 2002.
6. Learning and Measuring Perceptual Similarity, E. Chang, NSF/INRIA/Berkeley/IBM MMCBIR Workshop, INRIA - Rocquencourt, France, September 2001.

Refereed Journal Publications

1. Disk-aware Data Management for Interactive Media Services, R. Rangaswami, Z. Dimitrijevic, E. Chang, and S.-H. G. Chan, IEEE Transactions on Multimedia, December, 2003.
2. MEGA --- The Maximizing Expected Generalization Algorithm for Learning Complex Query Concepts, E. Chang and B. Li, ACM Transactions on Information Systems (TOIS), October 2003.
3. The Discovery of A Perceptual Distance Function for Measuring Image Similarity, B. Li, E. Chang, ACM Multimedia Journal Special Issue on Content-Based Image Retrieval, Volume 8, Number 6, pp. 512-522, April 2003 (12% accepted).
4. CBSA: Content-based Soft Annotation for Multimodal Image Retrieval Using Bayes Point Machines, E. Chang, K. Goh, G. Sychay, and G. Wu, IEEE Transactions on Circuits and Systems for Video Technology Special Issue on Conceptual and Dynamical Aspects of Multimedia Content Description, Volume 13, Number 1, pp.26-38, January 2003 (16% accepted).
5. Clindex: Approximate Similarity Queries in High-Dimensional Spaces, C. Li, E. Chang, Hector Garcia-Molina, and Gio Wiederhold, IEEE Transactions on Knowledge and Data Engineering (TKDE), Volume 14, Number 4, pp.792-808, July/August 2002.
6. Large-Scale Image Search on the Web, W.-C. Lai, E. Chang and K.-T. Cheng, A book chapter in Web Document Analysis: Challenges and Opportunities, World Scientific - Series in Machine Perception and Artificial Intelligence, 2002.
7. Answering Queries with Useful Bindings, C. Li and E. Chang, ACM Transactions on Databases (TODS), Volume 26, Number 3, pp. 313-343, September 2001.
8. Managing Parallel Disks for Continuous Media Data, E. Chang, C. Li and H. Garcia-Molina, A Book Chapter in Information Organization & Databases, p.107-120, Kluwer Publisher, 2000.

9. *Maximizing QoS for Interactive DTV Clients*, Edward Chang, The Computer Communications Journal (Special Issue), Elsevier, Volume 23, Number 3, February 2000.
10. *Classifying Web Documents Considering Personalization*, Quoc Vu, Wen-Syan Li and Edward Chang, Journal of Knowledge and Information Systems, (to appear).

Refereed Conference Publications

1. Confidence-based Dynamic Ensemble for Image Annotation and Semantics Discovery, B. Li, K.-S. Goh, and E. Chang, ACM International Conference on Multimedia, Berkeley, November 2003 (17% accepted; **Best Student Paper Candidate**).
2. Multi-camera Spatio-temporal Fusion and Biased Sequence-data Learning for Security Surveillance, G. Wu, Y. Wu, L. Jiao, Y.-F. Wang, and E. Chang, ACM International Conference on Multimedia, Berkeley, November 2003 (17% accepted).
3. Adaptive Feature-Space Conformal Transformation for Imbalanced-Data Learning, G. Wu and E. Chang, International Conference on Machine Learning (ICML), pp.816-823, Washington DC, August 2003.
4. The Anatomy of A Multimodal Information Filter, Y.-L. Wu, K.-S. Goh, B. Li, H. You, E. Chang, ACM International Conference on Knowledge Discovery and Data Mining (KDD), pp.462-471, Washington DC, August 2003.
5. Invariant Feature Extraction and Biased Statistical Inference for Video Surveillance, Y. Wu, L. Jiao, G. Wu, E. Chang, and Y.-F. Wang, IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS), Miami, July 2003.
6. Enhancing DPF for Near-replica Image Recognition, Y. Meng, E. Chang, and B. Li, IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), pp.416-423, Madison, June 2003.
7. Design and Implementation of Semi-Preemptible IO, Z. Dimitrijevic, R. Rangaswami, and E. Chang, USENIX Conference on File and Storage Technologies (FAST), San Francisco, April 2003.
8. MEMS-based Disk Buffer for Streaming Media Servers, R. Rangaswami, Z. Dimitrijevic, E. Chang, and K. E. Schauser, IEEE International Conference on Data Engineering (ICDE), pp.619-630, Bangalore, March 2003 (13% accepted).
9. Image Copy Detection Using DPF, Y. Meng and E. Chang, IS&T/SPIE International Conference on Storage and Retrieval for Media Databases, pp.176-186, San Jose, January 2003.
10. A Framework for Detecting Hazardous Events, Y. Wu, G. Wu, and E. Chang, IS&T/SPIE International Conference on Storage and Retrieval for Media Databases, San Jose, January 2003.
11. DynDex: a Dynamic and Non-metric Space Indexer, K. Goh, B. Li, and E. Chang, ACM International Conference on Multimedia, pp.466-475, Juan Les Pin, France, December 2002 (14% accepted).
12. Virtual IO: Preemptible Disk Access (short paper), Z. Dimitrijevic, R. Rangaswami, and E. Chang, ACM International Conference on Multimedia, Juan Les Pin, December 2002 (20% accepted).
13. An Anatomy of a Large-scale Image Search Engine, W.-C. Lai, E. Chang and K.-T. Cheng, IEEE MSE, Irvine, December 2002.
14. Hybrid Learning Schemes for Multimedia Information Retrieval, W.-C. Lai, E. Chang, and K.-T. Cheng, IEEE Pacific-Rim Conference on Multimedia, Hsing-Chu, December 2002.
15. MORF: A Distributed Multimodal Information Filtering System, Y.-L. Wu, E. Chang, et. al., IEEE Pacific-Rim Conference on Multimedia, Hsing-Chu, December 2002.
16. An Architecture of a Web-based Collaborative Image Search Engine, W.-C. Lai, G. Sychay, and E. Chang, The 10th International Conf. on Cooperative Information Systems (CoopIS), Irvine, October 2002.
17. DPF --- A Perceptual Distance Function for Image Retrieval, B. Li, E. Chang, C.-T. Wu, IEEE International Conference on Image Processing (ICIP), Rochester, September 2002.
18. BPMs vs. SVMs for Image Classification, G. Wu, E. Chang, and C.-S. Li, IEEE International Conference on Multimedia, Switzerland, August 2002.
19. Video Shot Transition Detection, Y. Wu, E. Chang, and B. Li, IEEE International Conference on Multimedia, Switzerland, August 2002.
20. The xTream Multimedia System, Z. Dimitrijevic, R. Rangaswami, and E. Chang, IEEE International Conference on Multimedia, Switzerland, August 2002.

21. Effective Image Annotation via Active Learning, G. Sychay, E. Chang, and K. Goh, IEEE International Conference on Multimedia, Switzerland, August 2002.
22. An Anatomy of a Large-scale Image Search Engine, W.-C. Lai, E. Chang, and K.-T. Cheng, WWW11, Hawaii, May 2002.
23. Supporting Subjective Image Queries without Seeding Requirements, E. Chang and K.-T. Cheng, IS&T/SPIE Internet Imaging III, pp.225-232, San Jose, January 2002.
24. Spin Discriminant Analysis: Using a One Dimensional Classifier for High-Dimensional Classification Problems, H. You and E. Chang, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp.968-975, Hawaii, December 2001.
25. Mining Image Features for Efficient Query Processing, B. Li, W.-C. Lai, E. Chang and K.-T. Cheng, IEEE Data Mining Conference, pp.353-360, San Jose, November 2001 (19% accepted).
26. SVM Binary Classifier Ensembles for Multi-Class Image Classification, K. Goh, E. Chang and K.-T. Cheng, ACM International Conference on Information and Knowledge Management (CIKM), pp.395-402, Atlanta, November 2001 (24% accepted).
27. Support Vector Machine Active Learning for Image Retrieval, S. Tong and E. Chang, ACM International Conference on Multimedia, pp.107-118, Ottawa, October 2001 (16% accepted).
28. Learning Image Query Concepts via Intelligent Sampling, B. Li, E. Chang, and C.-S. Li, IEEE International Conference on Multimedia, pp.1168-1171, Tokyo, August 2001.
29. NNEW - Nearest Neighbor Expansion by Weighting in Image Database Retrieval, H. You, E. Chang and B. Li, IEEE International Conference on Multimedia, pp.245-248, Tokyo, August 2001.
30. Data Placement for Multi-User Interactive Digital VCR, R. Rangaswami, E. Chang, C. Li and M. Chen, IEEE International Conference on Multimedia, pp. 1128-1131, Tokyo, August, 2001.
31. Providing Scalable On-Demand Interactive Video Services by Means of Multicasting and Client Buffering. S.-H. Chan and E. Chang, IEEE International Conf. on Communications, Helsinki, June, 2001.
32. On Answering Queries in the Presence of Limited Access Patterns, C. Li and E. Chang, International Conference on Database Theory (ICDT), London, January 2001.
33. Query Planning with Limited Source Capabilities, Chen Li and Edward Chang, IEEE International Conference on Data Engineering (ICDE), p. 401-412, San Diego, March 2000 (14% accepted).
34. PiDTV: A Client-Based Interactive DTV Architecture (short paper), Edward Chang, ACM International Conference on Multimedia, p.111-114, Orlando, November 1999.
35. Searching Near-Replicas of Images via Clustering, Edward Chang, Chen Li, James Z. Wang, Peter Mork, and Gio Wiederhold, IS&T/SPIE Symposium of Voice, Video, and Data Communications, p.281-92, Boston, September 1999.
36. MEDIC: A Memory & Disk Cache for Multimedia Clients, E. Chang and H. Garcia-Molina, IEEE International Conf. on Multimedia Computing and Systems, p.493-99, Florence, Italy, June 1999.
37. On Managing Continuous Media Data, Edward Chang (Advisor: Hector Garcia Molina), Stanford University Ph.D. Dissertation, August 1999.
38. On Constructing Personalized Navigation Trees for Web Documents, K. Vu, W. Li, E. Chang, WWW Conference (poster), Toronto, May 1999.
39. RIME: A Replicated Image Detector for the World-Wide Web, Edward Chang, James Z. Wang, Chen Li, and Gio Wiederhold, IS&T/SPIE Symposium of Voice, Video, and Data Communications, Boston, November 1998.
40. 2D BubbleUp - Managing Parallel Disks for Media Servers, Edward Chang, Hector Garcia-Molina, and Chen Li, International Conference on Foundations of Data Organization (FODO), p221-230, Kobe, Japan, November 1998.
41. BubbleUp: Low Latency Fast-Scan for Media Servers, Edward Chang and Hector Garcia-Molina, ACM International Conference on Multimedia, p.87-98, Seattle, November 1997.
42. Effective Memory Use in a Media Server, Edward Chang and Hector Garcia-Molina, The 23rd Very Large Data Base (VLDB) Conference, p.496-505, Athens, Greece, August 1997 (13% accepted).
43. Reducing Initial Latency in Media Servers, Edward Chang and Hector Garcia-Molina, IEEE Multimedia, vol.4, no.3, p.50-61, July 1997.
44. An Open and Extensible Event-Based Transaction Manager, E. Cheng, E. Chang and etc., USENIX Summer 1991, pp.49-58.

Refereed Workshop Publications

1. Class-boundary Alignment for Imbalanced Dataset Learning, G. Wu and E. Chang, International Conference on Machine Learning (ICML) Workshop on Learning from Imbalanced Datasets, pp.49-56, Washington DC, August 2003.
2. Support Vector Machine Pair-wise Classifiers with Error Reduction for Image Classification, K. Goh, E. Chang and K.-T. Cheng, ACM International Conf. on Multimedia (MIR Workshop), October 2001.
3. Towards Perception-Based Image Retrieval, Edward Chang, Beitao Li and Chen Li, IEEE Workshop on Content-based Access of Image and Video Libraries, p.101-105, South Carolina, June, 2000.
4. An Image Coding and Reconstruction Scheme for Mobile Computing, Edward Chang, The 5th IDMS (Springer-Verlag LNCS #1483), p.137-148, Oslo, Norway, September 1998.
5. Cost-Based Media Server Design, Edward Chang and Hector Garcia-Molina, The 8th Research Issues in Data Engineering, p.76-83, Orlando, February 1998.
6. Minimizing Initial Latency in a Multimedia Storage System, Edward Chang and Hector Garcia-Molina, International Workshop on Multimedia Database Systems, August 1996.

Demonstrations

1. A Multimodal Image Database System, E. Chang, B. Li, W.-C. Lai, C. Chang, K.-T. Cheng, and M. Crandell (with VIMA Technologies), IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), Madison, June 2003.
2. PBIR-MM: Multimodal Image Retrieval and Annotation, W.-C. Lai, C. Chang, E. Chang, K.-T. Cheng, and M. Crandell, ACM International Conf. on Multimedia, Juan Les Pin, December 2002.
3. PBIR: A System that Learns Subjective Image Query Concepts, E. Chang, K.-T. Cheng, W.-C. Lai, C. Wu, C. Chang and Y. Wu, ACM International Conference on Multimedia (Demo), pp.611-614, Ottawa, October 2001..
4. PBIR - Perception-Based Image Retrieval, E. Chang, K.-T. Cheng and L. Chang, ACM SIGMOD, Santa Barbara, May 2001.
5. PowerBookmarks: A System for Personalizable Web Information Organization, Sharing, and Management, Quoc Vu, Wen-Syan Li and Edward Chang, ACM SIGMOD (demonstration program), p.565-67, Philadelphia, June 1999.

Technical Reports

1. Kernel Boundary Alignment for Imbalanced Data Learning, G. Wu and E. Chang, UCSB Technical Report, September 2003 (submitted to SDM 2004).
2. Distributed Video Data Fusion and Mining, E. Chang and Y.-F. Wang,UCSB Technical Report, September 2003 (submitted to IS&T/SPIE Defense Symposium 2004).
3. Learning Image-Query Concepts and Measuring Perceptual Similarity in High Dimensional Spaces, Edward Chang and Beitao Li, August 2002 (submitted to ACM TODS).
4. SVMActive - Support Vector Machine Active Learning for Image Retrieval, E. Chang and S. Tong, UCSB Technical Report, November 2001 (submitted to IEEE Transaction on Multimedia).
5. User-Level SCSI Disk Feature Extraction, Z. Dimitrijevic, R. Rangaswami, E. Chang, D. Watson, A. Acharya, UCSB Technical Report, July 2001 (submitted to IEEE Transaction on Multimedia).
6. On Managing Continuous Media Data, Edward Chang (Advisor: Hector Garcia Molina), Stanford University Ph.D. Dissertation, August 1999.
7. Accounting for Memory Use, Cost, Throughput, and Latency in the Design of a Media Server, Edward Chang and Hector Garcia-Molina, Stanford Technical Report SIDL-WP-1998-0096, July 1999.

Ph.D. Thesis Advising

- **Active Ph.D. Advisees**: Zoran Dimitrijevic (CS), Kingshy Goh (ECE), Arun Hampapur (CS), Ankur Jain (CS), Navneet Panda (CS), Raju Rangaswami (CS), Gang Wu (ECE), Yi Wu (ECE).
- **Graduated Ph.D. Advisee:** Huaxin You (PhD Statistics, 2002; University of Central Florida), Beitao Li (PhD ECE, 2003; Ask Jeeves, New Jersey)