

Prof. Shih-Fu Chang

<http://www.ee.columbia.edu/~sfchang>

(Tel) 212-854-6894 (Email) sfchang@ee.columbia.edu

Summary:

Chang is an active researcher leading development of new theories, algorithms, and systems for content-based image video search, visual communication, multimedia analytics, as well as media forensics. He has made major contributions to the vibrant fields of content-based multimedia retrieval. In the 90's, he and his students developed several influential image/video search engines, such as *VisualSEEK*, *VideoQ*, and *WebSEEk*. He has also developed innovative systems that combine content analysis, adaptive streaming, and video summarization. Several research results were licensed to companies (e.g., Real Networks, BBN, NeuroMatters), for applications in consumer, sports, news, and Web. His group demonstrated the best performance in international video retrieval benchmarking forums such as TRECVID (2008 and 2010). The concept classifier library, ontology, and annotated video corpora released by his group have been used by more than 100 groups. In addition, Chang co-led the ADVENT university-industry research consortium with the participation of more than 25 industry sponsors. He has received ACM SIGMM Technical Achievement Award, the IEEE Kiyo Tomiyasu award, IBM Faculty award, NSF CAREER award, and ONR Young Investigator Award. He and his students have won many best paper awards, including the Most Cited Paper of the Decade Award from Journal of Visual Communication and Image Representation. He served as the general co-chair of ACM Multimedia conference in both 2000 and 2010, Editor-in-Chief of the IEEE Signal Processing Magazine (2006-8), Chairman of Columbia Electrical Engineering Department (2007-2010), and advisor for several international research institutes. He is an IEEE Fellow and an AAAS Fellow.

Honors and Awards:

- **ACM SIGMM Technical Achievement Award**, for pioneering research and inspiring contributions in multimedia analysis and retrieval, 2011.
- **AAAS Fellow**, the American Association for the Advancement of Science, for contributions to multimedia content analysis and search, 2010. (<http://news.columbia.edu/oncampus/2275>)
- **IEEE Kiyo Tomiyasu Award**, IEEE institution-level award, for pioneer contributions to image classification and search, 2009.
- **IEEE Fellow**, for contributions to digital video and multimedia technologies, 2004.
- **Publication Impact:**
h-index = 62, total # citations: 18,300 (based on Goggle Scholar citation index)
4 Best Papers, 3 Best Paper Finalists, and 7 Best Student Papers.
- **Faculty Award**, IBM, 1995-98, 1999-2002.
- **Recognition of Service Award**, Association for Computing Machinery (ACM), 2000.
- **Distinguished Lecturer**, IEEE Circuits and Systems Society, multimedia system and technology area, 2001-2002.
- **Young Investigator Award (YIA)**, Office of Naval Research (ONR), 1998-2001.
One of two ONR/YIA awards in the field of information, computer sciences & mathematics.
- **CAREER Award**, National Science Foundation, 1995-98.

- *Editor in Chief*, Signal Processing Magazine, IEEE Signal Processing Society, 2006-8. The flagship publication of IEEE Signal Processing Society disseminated to about 16,000 members. Ranked by ISI in 2009 as the top publication among all 245 IEEE journals with the highest citation impact factor 4.91.

Education:

Ph.D. in Electrical Engineering & Computer Sciences, U. of California at Berkeley, 1993.
 M.S. in Electrical Engineering & Computer Sciences, U. of California at Berkeley, 1991.
 B.S. in Electrical Engineering, National Taiwan University, 1985.

Professional Experience:

- Columbia University, Department of Electrical Engineering (joint appointment in Computer Science)

The Richard Dicker endowed chair professor, 2011; Chairman, 2007-10; Professor, 2002-date;
 Associate Professor, 1997-2002; Assistant Professor, 1993- 97.

Director, Digital Video and Multimedia (DVMM) Laboratory, <http://www.ee.columbia.edu/dvmm>

- Columbia University, Director (2000-2003), Co-PI (1993-1999), *the ADVENT University-Industry Research Consortium* (more than 25 sponsors in media and information technology areas)

Columbia's ADVENT consortium provides a forum for university and industry researchers to pursue joint work in the area of digital video and multimedia. In addition, the members make joint contributions to important international standards such as MPEG-7, MPEG-21, DAVID, etc. It has had more than 25 sponsors since inception.

- Co-Founder & Chief Scientist, MediaQuest Technology Inc., 1999-2000. A start-up company working on Internet Image/Video Search and Filtering applications.
- Advisory Board Member/Consultant, Eastman Kodak (1998), PictureTel (1998), iBeam (2000-2002), Sekani (2000), SOSi (2000-2002), Chonghwa Telecom Lab, Taiwan (2003-06), InspireWork (2003), Institute of Information Industry, Taiwan (2001-date), Motionbox (2007-2008).
- International Review Panel, the Swiss National Science Foundation (SNSF), "National Centres of Competence in Research" (NCCR), for the IM2 National Centre on multi-modal information interaction research, 2002-2011.
- Review Panel, National Centre for Science and Engineering Technology (CSET), CLARITY, Science Foundation Ireland, 2010-13.
- Review Panel, Academia Sinica, Division of Mathematics and Physical Sciences, 2009.
- International Advisory Board, European Union 7th Framework Project, Network of Excellence, PetaMedia, 2008-2011.
- Advisory Board, European Union Integrated Project Research Consortium (WeKnowIt), 2008-2011.
- Review Committee, University of Illinois at Urbana-Champaign, Beckman Institute, HCII, May 2010.
- Visiting Faculty, Microsoft Research, Beijing, China, 2006. Research on Web Search and Data Mining.

- Visiting Faculty, IBM T.J. Watson Research Center, Hawthorn NY, 2004 –2006. Research on intelligent information analysis.

Paper Awards:

1. **Most Cited Paper of the Decade Award**, the Journal of Visual Communication and Image Representation, 2010.

Yong Rui, Thomas Huang, and Shih-Fu Chang, “Image Retrieval: Current Techniques, Promising Directions, and Open Issues,” *Journal of Visual Communication and Image Representation* 10 (1999), 39–62.

2. **Best Paper Finalist**, Content Track, ACM Multimedia Conference, Oct. 2009.

W. Jiang, C. Cotton, S.-F. Chang, D. Ellis, and A. Loui, “Short-Term Audio-Visual Atoms for Generic Video Concept Classification,” *ACM Multimedia Conference, Beijing, Oct. 2009*.

This paper described a novel framework for extracting short-term temporal regions from the video track, and fusion with the atomic bases extracted from the audio signal. Such joint audio-video representations at the atomic level facilitates efficient discovery of multi-modal cues associated with events in videos and robust detection of high-level semantic categories.

3. **Best Paper Award**, ACM Conference on Image and Video Retrieval (CIVR), 2008.

E. Zavesky, S.-F. Chang, C.-C. Yang, “Visual Islands: Intuitive Browsing of Visual Search Results,” *ACM International Conference on Image and Video Retrieval, Niagara Falls, Canada, 2008*.

This paper described novel algorithms and interfaces to summarize large visual search results according to dynamically discovered dominant concepts contained in the search result sets.

4. **Best Paper Finalist**, Content Track, ACM Multimedia Conference, Oct. 2006.

Winston Hsu, Lyndon Kennedy, Shih-Fu Chang, “Video Search Reranking via Information Bottleneck Principle,” *In ACM Multimedia, Santa Barbara, CA, USA, 2006*.

This paper described a content-based information theoretic approach for reranking the noisy search results returned from existing text-based search applications.

5. **Best Student Paper Award**, ACM Multimedia Conference 2005.

Tian-Tsong Ng, Shih-Fu Chang, Jessie Hsu, Lexing Xie, Mao-Pei Tsui, “Physics-Motivated Features for Distinguishing Photographic Images and Computer Graphics,” *ACM Multimedia Conference 2005*.

6. **Best Student Paper Award**, IEEE ICIP 2004.

Lexing Xie, L. Kennedy, S.-F. Chang, A. Divakaran, H. Sun and C.-Y. Lin at, “Discovering Meaningful Multimedia Patterns with Audio-Visual Concepts and Associated Text,” *IEEE International Conference on Image Processing (ICIP) Oct. 2004, Singapore*.

7. **Outstanding Young Author Paper Award**, IEEE Circuits and Systems Society 2003.

Ching-Yung Lin and Shih-Fu Chang, “A Robust Image Authentication Method Distinguishing JPEG Compression from Malicious Manipulation,” *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 11, no. 2, pp. 153-168, February 2001,

One award given by the IEEE Circuits and Systems Society each year.

8. **Best Student Poster Award**, IBM Watson Workshop on Multimedia, June 2003.

For the paper authored by Ana Benitez on Multimedia Knowledge Network (1st prize).

- 9. Best Student Poster Award**, IBM Watson Workshop on Multimedia, June 2003.
For the paper authored by Echocardiogram Medical Video Indexing by Shahram Ebadollahi (2nd prize).
- 10. Best Student Paper Award**, ACM Multimedia Conference 2002.
Hari Sundaram, Lexing Xie and Shih-Fu Chang, "A Utility Framework for the Automatic Generation of Audio-Visual Skims", ACM Multimedia Conference, France, Oct. 2002.
- In this paper, we presented a unified theoretical framework based on film theories and user perception model for generating optimal summaries of video programs.
- 11. Best Paper Award (2nd prize)**, IEEE Sarnoff Symposium, March 2002.
Raj Kumar, Mihaela van der Schaar, and Shih-Fu Chang, "FGS+: Optimizing the Joint SNR-Temporal Video Quality in MPEG-4 Fine Grained Scalable Coding," IEEE Sarnoff Symposium, March 2002.
- 12. Best Paper Award**, IEEE Transactions on Circuits and Systems for Video Technology, 2000.
S.-F. Chang, W. Chen, H.J. Meng, H. Sundaram, and D. Zhong, "A Fully Automatic Content-Based Video Search Engine Supporting Multi-Object Spatio-Temporal Queries," IEEE Transactions on Circuits and Systems for Video Technology, Vol. 8, No. 5, pp. 602-615, Sept. 1998.
- This paper described one of the earliest video search engines that support multi-modality multi-feature searching of video content at the region level. One of the important features is searching of video object based on automatically indexed motion trajectory of video regions.
- 13. Best Paper Award**, SPIE International Symposium on Visual Communications and Image Processing, May 1995.
Shih-Fu Chang and John R. Smith, "Extracting Multi-Dimensional Signal Features for Content-Based Visual Query," SPIE Visual Communications and Image Processing, May 1995.
- This paper presents content-based image query methods based on multiple local spatio-visual features.
- 14. Best Student Paper Award**, the 1st ACM Multimedia Conference, Anaheim, CA, Aug. 1993.
S.-F. Chang and D. G. Messerschmitt, "Transform Coding of Arbitrarily-Shaped Image Segments," ACM 1st Multimedia Conference, Anaheim, CA, August 1993.
- This paper explores the key issues involved in object-based visual representation and presents an efficient solution for coding arbitrarily shaped image regions.

Keynote/Colloquium Speeches (recent):

(a list of recent invited talks can be found at <http://www.ee.columbia.edu/~sfchang/talks.html>)

- Keynote Speech, IBM Emerging Leader Workshop on Multimedia, IBM, Oct. 2010
- ECE Distinguished Lecture, Boston University, ECE Department, Boston, September 2010.
- Keynote Speech, IEEE International Conference on Semantic Computing, Pittsburg, Sept. 2010.
- Keynote Speech, IEEE International Conference on Multimedia and Exhibition (ICME), 2009 (joint conference sponsored by 4 IEEE societies)
- Eliahu I and Joyce Jury Lecture, University of Miami, Dec. 2009.
- Distinguished Lecture, College of Computing and Informatics, University of North Carolina - Charlotte, Nov. 2008.
- Keynote Speech, ACM International Conference on Multimedia Information Retrieval (MIR'08), Vancouver, Oct. 2008.

- Keynote Speech, IEEE Workshop on Semantic Learning Applications in Multimedia (SLAM'08), Anchorage, June 2008.
- Keynote Speech, 6th IEEE International Workshop on Content-Based Multimedia Indexing, London, June 2008.
- Keynote Speech, International Workshop on Image Analysis for Multimedia Interactive Services (WIAMIS), Greece, June 2007.
- Distinguished Lecture Series, Department of Computer Science and Engineering, University of Central Florida, Feb. 2007.
- Eastman Kodak Distinguished Lecture Series, Jan. 2007.
- Keynote Speech, International Computer Symposium (ICS), Taipei, Nov. 2006.
- Keynote Speech, International Conference on Computer Vision and Graphic Image Processing (CVGIP), Aug. 2005.
- Keynote Speech, International Conference on Image & Video Retrieval (CIVR), Dublin, Ireland, July 2004.

Professional Activities and Services:

Editorial Board (recent):

- Editor in Chief, IEEE Signal Processing Magazine, 2006-8.
(IEEE Signal Processing Magazine has been ranked first in ISI citation impact among 200+ journals and transactions in the electric and electronic area in 2004 and 2009)
- Associate Editor, Journal of Statistical Analysis and Data Mining, John Wiley & Sons, Inc., 2006-2009
- Associate Editor, IEEE Transactions on Multimedia (T-MM), 2000-2003.
- Associate Editor, EURASIP Journal on Applied Signal Processing, 2002-2003.
- Associate Editor, ACM Transactions on Multimedia Computing, Communications, and Applications, (TOMCAPP) 2004-2005.
- Associate Editor, Journal of Visual Communications & Image Representation (JVIS), Academic Press, 1999-2005.

Conference Organization and Technical Committee (recent):

- General Co-Chair, ACM Multimedia Conference, Florence, Italy, 2010. (the flagship conference of ACM SIG Multimedia Group, Collaboration with Prof. Alberto del Bimbo)
- Co-Chair, NSF Workshop on Hybrid Neuro-Computer Vision Systems, April 2010, New York, (<http://www.columbia.edu/cu/hybridvision/>)
- Chair, ARO/DARPA Workshop on Interactive Query Refinement, 2011.
- General Co-Chair, the 8th ACM International Multimedia Conference, Los Angeles, Nov. 2000.
- Special Session Chair, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Taipei, 2009.
- General Co-Chair, IEEE International Multimedia Conference and Exhibition, 2004. (joint conference between four IEEE Societies)
- Elected member, Information Forensics and Security (TIFS) TC, IEEE Society of Signal Processing, 2010-2013.

- Elected member, Image and Multidimensional Digital Signal Processing (IMDSP) TC, IEEE Society of Signal Processing, 2003-2008.

Others:

- Area Study Expert (for the area of Multimedia Information retrieval), Computer and Information Science and Engineering Directorate (CISE), National Science Foundation, ten-year perspective review, 2005.
- Program Review Panelist, National Science Foundation, 1996, 2000, 2001, 2003, 2005, 2008, 2009, 2010.
-

Publications:

Citation Impact: h-index = 62

total # of citations: 18,300

total # of papers: about 400

<http://scholar.google.com/> (search term “shih-fu chang”)

Subset of Frequently Cited Papers:

1. John R. Smith, Shih-Fu Chang, “VisualSEEK: A Fully Automated Content-Based Image Query System,” In *ACM Multimedia*, Boston, MA, November 1996. (**Citation Index: 1609**)
2. Yong Rui, Thomas Huang, and Shih-Fu Chang, "Image Retrieval: Current Techniques, Open Issues, and Promising Directions," *Journal of Visual Communication and Image Representation*, 1999. (**Citation Index: 1220**)
3. Shih-Fu Chang and David G. Messerschmitt, "Manipulation and Compositing of MC-DCT Compressed Video," *IEEE Journal of Selected Areas in Communications*, Special Issue on Intelligent Signal Processing, pp. 1-11, Jan. 1995. (**Citation Index: 390**)
4. Shih-Fu Chang, William Chen, Horace Jianhao Meng, Hari Sundaram, Di Zhong, “VideoQ: An Automatic Content-Based Video Search System Using Visual Cues,” In *ACM Multimedia*, Seattle, WA, November 1997. (**Citation Index: 365**)
5. John R. Smith and Shih-Fu Chang, "Searching for Images and Videos on the World-Wide Web," *IEEE Multimedia Magazine*, Vol. 4, No. 3, pp. 12-20, 1997. (**Citation Index: 358**)
6. Hari Sundaram, Shih-Fu Chang, “Determining Computable Scenes in Films and their Structures using Audio Visual Memory Models,” In *ACM Multimedia*, Los Angeles, CA, October 2000. (**Citation Index: 121**)
7. Winston Hsu, Lyndon Kennedy, Shih-Fu Chang, “Video Search Reranking via Information Bottleneck Principle,” In *ACM Multimedia*, Santa Barbara, CA, USA, 2006. (**Citation Index: 83**)
8. Milind Naphade, John R. Smith, Jelena Tesic, Shih-Fu Chang, Winston Hsu, Lyndon Kennedy, Alexander Hauptmann, Jon Curtis, “Large-Scale Concept Ontology for Multimedia,” *IEEE Multimedia Magazine*, 13(3), 2006. (**Citation Index: 269**)
9. Hualu Wang and Shih-Fu Chang, "A Highly Efficient System for Automatic Face Detection in MPEG Video Sequences," *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 7, No. 4, pp. 615-628. August 1997. (**Citation Index: 310**)
10. Lexing Xie, Shih-Fu Chang, Ajay Divakaran, Huifang Sun, “Structure Analysis of Soccer Video with Hidden Markov Models,” In *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP-2002)*, Orlando, FL, May 2002. (**Citation Index: 207**)
11. Ching-Yung Lin and Shih-Fu Chang, "A Robust Image Authentication Method Distinguishing JPEG Compression from Malicious Manipulation," *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 11, No. 2, pp.153-168, Feb. 2001. (**Citation Index: 341**)

12. Shih-Fu Chang, Anthony Vetro, "Video Adaptation: Concepts, Technologies, and Open Issues," Special Issue on Advances in Video Coding and Delivery, Proceedings of IEEE, 2005. (**Citation Index: 135**)
13. Akira Yanagawa, Shih-Fu Chang, Lyndon Kennedy, Winston Hsu, "Columbia University's Baseline Detectors for 374 LSCOM Semantic Visual Concepts," *ADVENT Technical Report #222-2006-8 Columbia University*, March 2007. (**Citation Index: 105**)
14. Tian-Tsong Ng, Shih-Fu Chang, Qibin Sun, "Blind Detection of Photomontage Using Higher Order Statistics," In *IEEE International Symposium on Circuits and Systems (ISCAS)*, Vancouver, Canada, May 2004. (**Citation Index: 112**)

Recent Papers:

Conferences:

1. Wei Jiang, Courtenay Cotton, Shih-Fu Chang, Dan Ellis, Alexander C. Loui. **Short-Term Audio-Visual Atoms for Generic Video Concept Classification.** In *Proceeding of ACM international conference on Multimedia (ACM MM)*, October 2009. (16% acceptance rate)
2. Jun Wang, Eric Pohlmeier, Barbara Hanna, Yu-Gang Jiang, Paul Sajda, Shih-Fu Chang. **Brain State Decoding for Rapid Image Retrieval.** In *Proceeding of the ACM international conference on Multimedia (ACM MM)*, October 2009.
3. Yu-Gang Jiang, Chong-Wah Ngo, Shih-Fu Chang. **Semantic Context Transfer across Heterogeneous Sources for Domain Adaptive Video Search.** In *Proceeding of ACM international conference on Multimedia (ACM MM)*, October 2009.
4. Junfeng He, Regunathan Radhakrishnan, Shih-Fu Chang, Claus Bauer. **Compact Hashing with Joint Optimization of Search Accuracy and Time.** In *IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2011. (oral, 3.5% acceptance rate)
5. Yu-Gang Jiang, Guangnan Ye, Shih-Fu Chang, Daniel Ellis, Alexander C. Loui. **Consumer Video Understanding: A Benchmark Database and an Evaluation of Human and Machine Performance.** In *Proceedings of ACM International Conference on Multimedia Retrieval (ICMR)*, 2011. (oral, 16.4% acceptance rate)
6. Wei Liu, Yu-Gang Jiang, Jiebo Luo, Shih-Fu Chang. **Noise Resistant Graph Ranking for Improved Web Image Search.** In *IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2011. (poster, 26% acceptance rate)
7. Junfeng He, Wei Liu, Shih-Fu Chang. **Scalable Similarity Search with Optimized Kernel Hashing.** In *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, Washington, DC, USA, July 2010. (oral, 17% acceptance rate)
8. Wei Liu, Junfeng He, Shih-Fu Chang. **Large Graph Construction for Scalable Semi-Supervised Learning.** In *the 27th International Conference on Machine Learning (ICML)*, June 2010. (25.6% acceptance rate)
9. Jun Wang, Sanjiv Kumar, Shih-Fu Chang. **Semi-Supervised Hashing for Scalable Image Retrieval.** In *IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, 2010.
10. Tony Jebara, Jun Wang, Shih-Fu Chang. **Graph Construction and b-Matching for Semi-Supervised Learning.** In *International Conference on Machine Learning (ICML)*, June 2009.

11. Yu-Gang Jiang, Jun Wang, Shih-Fu Chang, Chong-Wah Ngo. **Domain Adaptive Semantic Diffusion for Large Scale Context-Based Video Annotation.** In *International Conference on Computer Vision (ICCV)*, Kyoto, Japan, September 2009.
12. Lyndon Kennedy, Shih-Fu Chang. **Internet image archaeology: automatically tracing the manipulation history of photographs on the web.** In *MM '08: Proceeding of the 16th ACM international conference on Multimedia*, October 2008.

Journals:

1. Steven C.H. Hoi, Wei Liu, Shih-Fu Chang. **Semi-Supervised Distance Metric Learning and Its Applications to Collaborative Image Retrieval and Clustering.** *ACM Transactions on Multimedia Computing, Communications and Applications*, 6(3):1-26, 2010.
2. Wei Jiang, Courtenay Cotton, Shih-Fu Chang, Dan Ellis, Alexander C. Loui. **Audio-Visual Atoms for Generic Video Concept Classification.** *ACM Transactions on Multimedia Computing, Communications and Applications*, 6(3):1-19, 2010.
3. Paul Sajda, Eric Pohlmeier, Jun Wang, Lucas C. Parra, Christoforou Christoforou, Jacek Dmochowski, Barbara Hanna, Claus Bahlmann, Maneesh K. Singh, Shih-Fu Chang. **In a Blink of an Eye and a Switch of a transistor: Cortically Coupled Computer Vision.** *Proceedings of the IEEE*, 98(3):462-478, 2010.
4. Tian-Tsong Ng, Shih-Fu Chang. **Identifying and Prefiltering Images.** *IEEE Signal Processing Magazine*, 26(2), 2009.
5. Jun Wang, Xiaobo Zhou, Fuhai Li, Shih-Fu Chang, Norbert Perrimon, Stephen T. C. Wong Pamela L. Bradley. **An Image Score Inference System for RNAi Genome-Wide Screening Based on Fuzzy Mixture Regression Modeling.** *Journal of Biomedical Informatics*, 42(1):32-40, 2009.
6. L. Kennedy, S.F. Chang, A. Natsev. **Query-Adaptive Fusion for Multimodal Search.** *Proceedings of the IEEE*, 96(4):567-588, 2008.
7. Dong Xu, Shih-Fu Chang. **Video Event Recognition Using Kernel Methods with Multilevel Temporal Alignment.** *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 30(11):1985-1997, November 2008.

Contributions to International Standards and Benchmarking Forums:

Through close collaboration with industrial partners (IBM, AT&T, Mitsubishi, SONY, Kodak, Philips, ETRI), we have actively participated in development of international standards: 21 MPEG-7 contributions (1998-2001), one MPEG-4 contribution (2002), and several MPEG-21 contributions (2002). Several of them have been accepted and become parts of the standards. Two members of our team have served as editors responsible for the multimedia description schemes of MPEG-7 and MPEG-21.

We actively participated in the large TRECVID video retrieval evaluation forum and demonstrated the best performing system in high-level feature detection in 2008 (among 160+ submissions), and multimedia media event detection in 2010.

Software Release and Data Sets:

Research prototypes, open source tools, and large video corpora developed in our group have been widely used in the research community. A list of our publicly released software and data sets may be found at <http://www.ee.columbia.edu/dvmm/newDownloads.htm>. The LSCOM multimedia lexicon and the associated annotated video corpus have been distributed to a large number of groups worldwide. An extensive library of classifiers for detecting 374 semantic concepts has also been downloaded by more than 450 times to more than 100 research groups. In addition, we have developed and released benchmark data sets for various research problems, such as image splicing detection, image near-duplicate detection, and story boundary detection for news videos.

Patents and Technology Transfer:

Our research has resulted in about 15 patents issued and several pending in the areas of digital video search, manipulation, watermarking, MPEG-7, and MPEG-21. More than ten video technologies developed in our research have been licensed to companies, including BBN, Real Networks, Inspired Works, III, NeuroMatters, and Digital Genesis. Through the ADVENT consortium, we have conducted collaborative research sponsored by more than 25 companies. Several results of our group are being used in a few multi-year large-scale government funded projects, in collaboration with industry partners, such as Kitware, NeuroMatters, IBM, and BBN.

Ph.D. Students and Postdocs:

(PhD completed)

1. John R. Smith (IBM T.J. Watson Research Lab, Senior Manager), 1997.
2. Gustavo Reyes (AT&T, Executive Director Technology), 1999.
3. Paul Bocheck (24-7), 1999.
4. Seungyup Paek (Jubilant Technology Inc.), 2000.
5. Ching-Yung Lin (IBM T.J. Watson Research Lab), 2000.
6. Di Zhong (Citibank), 2001.
7. Hari Sundaram (Arizona State U., Associate Professor, co-director of Media-Art Center), 2002.
8. Alejandro Jaimes (Yahoo! Research), 2003.
9. Ana Benitez (Google), 2004.
10. Shahram Ebadollahi (IBM T.J. Watson Research) 2005.
11. Yong Wang (Dolby Research), 2005.
12. Lexing Xie (Australian National University, Assistant Professor), 2005.
IBM Research Josef Raviv Memorial Postdoctoral Fellow.
13. Dong-Qing Zhang (Huawei Research), 2005.
14. Winston Hsu (National Taiwan University, Assistant Professor), 2006.
15. Tian-Tsong Ng (Institute for Information Research, Project Lead), 2007.
16. Lyndon Kennedy (Yahoo! Research), 2008.
17. Jessie Hsu (Industrial Technology Research Institute), 2009.
18. Eric Zavesky (AT&T Research), 2010.

19. Wei Jiang (Kodak Research Lab), 2010.
20. Jun Wang (IBM T.J. Watson Research), 2011.

Current PhD (8):

Junfeng He, Wei Liu (Facebook Fellowship), Mandis Beigi, Anna Choromanska (SEAS Presidential Fellow), Guangnan Ye, Yan Wang, Felix X. Yu, Xiaoming Wu

Current Postdoc Researchers (4):

Dr. Yu-Gang Jiang
Dr. Zhenguo Li
Dr. Rong-Rong Ji
Dr. Dong Liu

Other Honors Received by PhD advisees:

IBM Awards for Emerging Research Leaders in Multimedia, given to students in my group. Winston Hsu (2007), Lyndon Kennedy (2008), Jun Wang (2009), Yu-Gang Jiang (2009).

Kodak Fellowship (2007-09), Wei Jiang.

Goggle Global Intern Scholarship (2009), Jun Wang.

Facebook Fellowship (2011), Wei Liu.

Jury Award for Best Thesis in Communications, Signal Processing and Systems, "Integrated Spatial and Feature Image Systems: Retrieval, Compression and Analysis," Ph.D. student: John R. Smith, Department of Electrical Engineering, Columbia University, 1997;

Jury Award for Best Thesis in Communications, Signal Processing and Systems, "Segmentation, Index and Summarization of Digital Video Content," Ph.D. student: Di Zhong, Department of Electrical Engineering, Columbia University, 2000;

Jury Award for Best Thesis in Communications, Signal Processing and Systems, "Segmentation, Structure Detection and Summarization of Multimedia Sequences," Ph.D. student: Hari Sundaram, Department of Electrical Engineering, Columbia University, 2002.