

## WINSTON H. HSU

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### RESEARCH INTERESTS

- Analysis/search/mining of multimedia content including image, video, audio, and text
- Exploitation of large-scale and mobile multimedia computation
- Investigation of machine learning and information retrieval techniques
- Realizing advanced researches towards business deliverables

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### EDUCATION

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**Ph.D. in Electrical Engineering** **Nov. 2006**

*Department of Electrical Engineering, Columbia University, New York*

Dissertation: "An Information-theoretic Framework towards Large-Scale Video Structuring, Threading, and Retrieval"

Advisor: Prof. Shih-Fu Chang

**M.A. in Computer Science** **1995**

*Department of Computer Science and Information Engineering, National Taiwan University, Taiwan*

Thesis: "Performance Analysis of Multimedia Data over High Speed LANs"

GPA 4.0/4.0, Dean's List

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### AWARDS AND HONORS

- 2011 National Science Council (NSC) Ta-You Wu Memorial Award **Aug. 2011**  
National Young Researcher Award, Taiwan
- Best paper award for the 17th International Conference on Multimedia Modeling (MMM) 2011 **Jan. 2011**
- FIRST Prize for Mobile Application Award by Chunghwa Telecom, Taiwan **Nov. 2010**  
(flower recognition by mobile phones)
- Microsoft Research Award in Multimedia Search **Jan. 2009**
- Top-5 in Microsoft Taiwan Imagine Cup 2008 **May 2008**
- Best Paper Runner-Up Award, ACM Multimedia 2006 **Oct. 2006**  
the most prestigious conference in the multimedia area, and <1% of the submitted papers are selected for the award
- Watson Emerging Leaders in Multimedia Research 2006, IBM **Oct. 2006**  
organized by IBM Research and to recognize (8) top senior PhD students in multimedia research; to deliver research presentations and have interactive discussions with IBM researchers
- Taiwan Elite Award 2005 **2005**  
issued by Taiwan government for 12 essential research areas; 68 PhD students and post-docs are awarded from 2100+ applicants after screening and oral presentations (3.2% acceptance rate).

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### KEYNOTE/COLLOQUIUM SPEECHES (SELECTED)

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- Keynote speech for the 17th International Conference on Multimedia Modeling (MMM 2011)
  - Keynote speech for Global Software Service (GSS) TechEd, Taipei, August 2010
  - Keynote speech for Image Semantics and Applications Forum, Industrial Technology Research Institute, Taiwan, January 2010
  - Colloquium speech, "Harnessing Community-Sharing Photos and Videos: Opportunities and Challenges," Academia Sinica, Taipei, November 9, 2009.
  - Colloquium speech, "Exploiting Content and Context for Photo/Video Search at Query Time," Microsoft Research Asia - Tsinghua University Workshop on Internet Services and Cloud Computing, Beijing, China, November 2009.
  - Colloquium speech, "Large-Scale Visual Databases: What and How to Search for," Institute for Information Industry, Taiwan, December, 2007
  - Workshop speech, TRECVID Workshop 2003, "Discovery and Fusion of Salient Multimodal Features towards News Story Segmentation," Washington DC, November 2003. Host: NIST
  - Workshop speech, TRECVID Workshop 2004, "Adaptive Feature Discovery for TRECVID Broadcast News Video Story Segmentation," Washington DC, November 2004. Host: NIST
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#### PROFESSIONAL ACTIVITIES AND SERVICES (SELECTED)

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- Editorial Board for IEEE Multimedia Magazine
  - Editorial Board for Journal of Multimedia (JMM), Academy Publisher
  - Organizing Committee (Program Co-Chair) for ACM Multimedia 2012
  - Organizing Committee (Publicity Co-Chair) for ACM Multimedia 2010
  - Guest Editor for IEEE Multimedia Magazine Special Issue, "Knowledge Discovery over Community-Contributed Multimedia Data: Opportunities and Challenges," 2010
  - Organizing Committee (Publicity Co-Chair) for ICME 2009
  - Technical program committee for ACM Multimedia 2009, 2010, 2011 (content track)
  - Technical program committee for ACM WWW 2010 (rich media track)
  - Technical program committee for ACM SIGIR 2010
  - Co-organizer for MMM 2011 Special Session, "Large Scale Rich Media Data Management," with Prof. Jialie Shen and Prof. Shuicheng Yan
  - Co-organizer for IEEE ICME 2009 Special Session, "Knowledge Discovery over Community-Sharing Media – from Signal to Intelligence," with Tao Mei and Rong Yan
  - Technical program committee for CIVR 2009, 2010
  - Technical program committee for MIR 2010
  - Reviewer for the major journals:
    - Transaction on Multimedia, IEEE
    - Transactions on Circuits and Systems for Video Technology, IEEE
    - Transactions on Pattern Analysis and Machine Intelligence, IEEE
    - Transactions on Knowledge and Data Engineering, IEEE
    - Transactions on Image Processing, IEEE
    - Transactions on Information Forensics & Security, IEEE
    - Transactions on Multimedia Computing, Communications and Applications, ACM
    - Transactions on Intelligent Systems and Technology, ACM
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#### INDUSTRY EXPERIENCES

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*National Taiwan University*

#### **Technical Consultants/(co-) PIs**

**2007~present**

- For Taiwan-based industrial partners including MStar Semiconductor, Quanta Computer (cloud-based solutions), SEEnergy (surveillance), CyberLink Corp. (consumer image/video), Chunghwa

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Telecommunication (image retrieval), Institute for Information Industry (III) (smart TV), Industrial Technology Research Institute (ITRI) (surveillance), and a few technology start-ups.

- Identifying further mobile and cloud research opportunities and proposing sponsored projects with major industrial partners (i.e., Quanta, HTC, Trend Micro)

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*CyberLink Corp., Taiwan*

**Product Manager/Project Leader/Engineer**

**1997-1999**

- Founding engineer of the prominent multimedia software start-up, now public, profitable, and multinational.
- In charge of research and development of multimedia communication software (e.g., H.323, H.324, etc.).
- One of the incubated products, *VideoLive Mail*, received several international awards and occupied 75% OEM market share, as a project leader and then product manager.

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**RD Manager**

**1999-2001**

- Lead 13 engineers, 11 of whom have master degree, with direct report to CEO. Responsible for project coordination
- Architect of *StreamAuthor*, a product for managing and delivering streaming multimedia presentations in cooperates and institutions.
- Develop one-to-one Web tracking, personalization, and mining kernel technologies in Java and XML, for improving online user satisfaction, discovering real-time user profiles and behaviors.

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RESEARCH EXPERIENCES (SELECTED)

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*Communication and Multimedia Lab, National Taiwan University, Taiwan*

Assistant Professor

**2007~present**

**Founder for MiRA (Multimedia indexing, Retrieval, and Analysis) Research Group**

- Advising 7 PhD, 15+ master, 6+ undergraduate students, and one research assistant in the BEST CS department in Taiwan
- Research focus: (1) image/video analysis and detection; (2) searching one billion image/video collections
- Publishing in premier conferences and journals; 1000+ Google citations among the (co-) published papers in the past few years (as of Sept. 2010)
- Lecturing highly rated and very attended tutorials in premier conferences (e.g., ACM Multimedia 2008/2009, SIGIR 2008, and ICASSP 2009)

**Image Object Retrieval over Ultra-Large-Scale Image/Video Collections**

- Goal – effective and efficient example search for specific objects in large-scale visual collections
- Proposing effective hash-based (e.g., LSH) and inverted-file methods for large-scale (millions or billions) image/video object retrieval
- Achieving sub-second response time as retrieving a million-scale image collection by a novel object-level inverted indexing structure and efficient query evaluation
- Improving recall rate by mining semantically relevant auxiliary visual features through visual and textual clusters, formulated as optimization problems in an unsupervised and scalable manner
- Enabling technologies for promising applications such as mobile landmark recognition, product query, touch-based object query during video playback.
- Experimenting in Amazon EC2 platform and 30+ Hadoop-based clusters
- Receiving intensive reports from Taiwan-based news media

**Leveraging Cloud Computing for Large-Scale Image Graph Construction and Learning**

- Goal – leveraging distributed computation for ultra-large-scale image/video analysis and retrieval
- Devising effective multimodal graph construction and clustering methods over large-scale images, e.g., utilizing 30+ Hadoop servers and sparse features for graph construction, clustering, and

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canonical image selection by the proposed Hadoop-based affinity propagation algorithm

- Demonstrating a first-ever query-time search result clustering
- Investigating graph-based semi-supervised learning methods for people and landmark annotation
- Devising random-forest-based (distributed) algorithms for effective large-scale semantic detection

#### **Investigating Effective Sensors for Automatic Mobile Landmark Annotation**

- Goal – enabling promising location-based mobile services by investigating effective mobile sensors (e.g., GPS, compass, camera, etc.) for automatic landmark annotation on mobile phones
- Enabling (real-time) image object retrieval framework in camera phones for annotation
- Proposing probabilistic based model to fuse multiple (noisy) sensors
- Discovering that image content matching can improve GPS-based methods up to (relatively) 40%

#### **Automatic/Interactive Inquiry for Object of Interest in Video Playback**

- Goal – interactively querying objects of interest (e.g., a bag or a location) during video playback on touch-based devices by exploiting external image/video collections (e.g., social media)
- Boosting answer quality by querying multiple image frames of the designated object of interest by improved video graph cut algorithm
- Achieving significant efficiency for segmenting objects of interest by augmenting prior 3D graph cut algorithms with compressed-domain motion features (90+ times speedup) as reducing graph complexity

#### **Attribute-Based People Search and Mining in User-Contributed Photos**

- Besides low-level features for face recognition, investigating the rich set of facial attributes (e.g., gender, race, age, hair style, smile, etc.) for user-contributed photos or videos
- Crowdsourcing explosively growing user-contributed photos for training data for facial attributes
- Enabling semantic-based people search in surveillance videos by (composite) facial attributes (e.g., a bearded man). For market
- Understanding users' preferences or investigating collective people profiles by analyzing the facial attributes in the (large-scale) photo collections (e.g., "most of Alice's friends are Asian girls with long hairs.")
- Investigating ensemble learning methods for aggregating multiple mid-level features and enabling distributed computation

#### **Attribute-Based Car Search in Consumer Photos and Surveillance Videos**

- Investigating new perspectives for cars, major objects of interest for surveillance videos and consumer photos.
- Beyond low-level representations, discovering more semantic descriptors (e.g., car types, intakes, wheels, lamps, etc.) for the unstructured images and videos
- Investigating 3D alignment methods for 2D car images for identifying essential car attributes
- Defining new applications for attribute-based search in surveillance videos

#### **People Annotation and Search in User-Contributed Videos and Camera Phones**

- Proposing unsupervised graph-based name propagation methods to boost people search in user-contributed videos where the user-provided names are generally sparse and erroneous
- Adopting hash-based methods for efficient face graph construction over 6000+ YouTube videos
- Enabling automatic name annotation in camera-phones by leveraging user contexts (e.g., address book, social network, and events)
- Investigating effective face features compliant with GPU implementation in Android phones

#### **Harnessing Social (User-contributed) Media for Annotation, Visualization, Learning, and Monetization**

- Growing practice of online media (video/photo) sharing (e.g., Flickr, YouTube)
- Aggregating people and knowledge factors essential for the social media and then boosting

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multimedia search

- Presenting multimedia search results in a quality and informative manner
- Leveraging context for automatic image/video annotation or recommendation by search
- Crowdsourcing user-contributed photos as auxiliary training data for image/video classification

#### **Internet Video Advertisement**

- Online image/video advertising, one of the problems for Internet Monetization – converting internet assets to cash or money
- Associating relevant ads in the (shared) videos and photos not restricted to text modality only
- Optimizing system revenues and contextual relevance and considering user context and profiles

#### **Keyword-based Visual Search by Large-Scale Concept Ontology**

- Motivations: (1) In light of the strong demands for semantic indexing and search over large-scale consumer photos which generally lack reliable user-provided annotations, (2) Investigating the feasibility and challenges entailed by the new paradigm, concept search – retrieving visual objects by large-scale automatic concept detectors.
- Focus: (1) Investigating effective concept mapping and selection methodologies over large-scale concept ontology. (2) Evaluating the quality and feasibility of the pre-trained concept detectors (e.g., LSCOM) applying on cross-domain consumer data (i.e., Flickr photos). (3) Investigating fusion strategies between automatic concept and low-quality user annotated data (tags).

#### **Home Entertainment and Multimedia Management Systems**

- Industry-academy joint projects affiliated with senior faculties and the industry
- Realizing advanced video analysis technologies into business deliverables.
- Solving challenging problems arising from large-scale photo and video data sets of home users.

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*Digital Video and Multimedia Lab, Columbia University*

Graduate Research Assistant, Advisor: Prof. Shih-Fu Chang

**2002-2006**

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#### **Augmenting Video Search with Contextual Similarity (Context Reranking)**

- Improve text-based video search by utilizing video similarities across sources.
- Formulate the solution as a random-walk framework over stories (or web documents) with pairwise multimodal similarity consisting of visual duplicates, high-level concepts, and text.
- Requiring no query expansion, search examples, or specific pre-trained models, the average improvement from the text search baseline is up to 32% since recurrent patterns across diverse sources are commonly observed in large-scale video databases.
- First work to augment video search with contextual recurrences.

#### **Generic Image/Video Search Reranking through Recurrent Patterns**

- A novel and generic video/image reranking algorithm, which reorders images (videos) from text-based searches.
- Automatically discover salient visual patterns of relevant and irrelevant images from the approximate relevance provided by text results based on a rigorous Information Bottleneck (IB) principle.
- The method improves text-search baseline up to 23%, in average performance, requires no image search examples from the user, but is still competitive with other state-of-the-art example-based approaches and comparable with other sophisticated models.
- First work to improve image/video search by considering recurrent patterns
- Identified as one of the influential multimedia researches in the past 5 years (in ICME 2009)
- Nominated for Best Paper Award, ACM Multimedia Conference, October 2006.

#### **Topic Tracking for Cross-Domain Broadcast News Videos with Visual Duplicates and Semantic Concepts**

- Augment topic tracking with visual near-duplicates and high-level semantic concepts automatically
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detected from videos of distributed sources.

- Present information-theoretic analysis to assess the complexity of each semantic topic and determine the best subset of concepts for tracking each topic.
- A great compensation for international news, where text is mostly unreliable; improving text-based tracking approaches up to 25%; visual duplicates even outperform text-only approaches in certain topics.

### **Reconstructing and Mining of Semantic Threads across Multiple Video Broadcast News Sources Using Multi-Level Concept Modeling**

- Conduct researches for effective information exploitation (e.g., video retrieval, threading, automatic annotation, etc.) from hundreds of international broadcast news channels, which usually have poor ASR/MT transcripts.
- Funded by Advanced Research and Development Activity (ARDA), later Disruptive Technology Office (DTO), which encourages technology thrusts and sponsors high risk, high payoff researches designed for US intelligence community
- Extensive experiments through cross-site and cross-disciplinary projects affiliated with researchers in IBM T. J. Watson Research Center.
- Major working group for proposing cross-site projects in ARDA Phase II (since 2004) and III (since 2006)
- Contribute significant results in video structuring, cross-domain topic threading, and video search.

### **TRECVID: TREC Video Retrieval Evaluation**

- To promote progress in content-based video retrieval via open metric-based evaluation supported by National Institute of Standards and Technology (NIST).
- Evaluate proposed algorithms of video story boundary segmentation, high-level concept detection, and automatic multimodal search in TRECVID benchmark.
- The benchmark performances are consistently one of the best among the participants since 2003.
- Deliver invited talks in the post-benchmark workshops for the novelty and outstanding performance of proposed approaches; interact with worldwide cross-site leading researchers in image/video retrieval.

### **A Statistic Framework for Fusing Mid-Level Features for International Broadcast News Video Segmentation**

- Investigate statistical approaches to induce and fuse diverse features from multiple levels and modalities, including visual, audio, and text in international broadcast news videos
- Extend the Maximum Entropy statistical model and invent a novel feature wrapper
- Include various features such as motion, face, music/speech discrimination, speech rapidity, high-level text segmentation information, prosody, etc., and proposing some novel features such as Mandarin syllable cue terms and significant pauses.
- One of the best systems in TRECVID 2003 and 2004.

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### **PUBLICATIONS (SELECTED)**

#### **Refereed Papers (1100+ Google citations):**

- Sheng-Yuan Wang, Wei-Shing Liao, Liang-Chi Hsieh, Yan-Ying Chen, Winston H. Hsu, *Learning by Expansion: Exploiting Social Media for Image Classification with Few Training Examples*, Neurocomputing, 2011.
  - Tao Mei, Winston Hsu, and Jiebo Luo, *Knowledge Discovery over Community-Contributed Multimedia Data: Opportunities and Challenges*, IEEE Multimedia Magazine 2010.
  - Kuan-Ting Chen, Kuan-Hung Lin, Yin-Hsi Kuo, Yi-Lun Wu, and Winston Hsu, *Boosting Image Object Retrieval and Indexing by Automatically Discovered Pseudo-Objects*, Journal of Visual Communication and Image Representation, 2010.
  - Yi-Hsuan Yang, Winston H. Hsu, and Homer H. Chen, *Online Reranking via Ordinal Informative Concepts for Context Fusion in Concept Detection and Video Search*, IEEE Transactions on Circuits
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and Systems for Video Technology (TCSVT), vol. 19, no. 12, pp. 1880–1890, Dec. 2009.

- Winston H. Hsu, Lyndon Kennedy, and Shih-Fu Chang, *Reranking Methods for Visual Search*, IEEE Multimedia Magazine, July-September, 2007. (Google Citation: **14**)
  - Milind Naphade, John R. Smith, Jelena Tesic, Shih-Fu Chang, Winston Hsu, Lyndon Kennedy, Alexander Hauptmann, and Jon Curtis, "Large-Scale Concept Ontology for Multimedia," IEEE Multimedia Magazine, Vol. 13, No.3, July-September, 2006. (**241 Google citations, 65 ISI citations, top 1% highly cited Comp. Sci. paper in year 2006**)
  - Yin-Hsi Kuo, Hsuan-Tien Lin, Wen-Huang Cheng, Yi-Hsuan Yang, Winston H. Hsu, *Unsupervised Auxiliary Visual Words Discovery for Large-Scale Image Object Retrieval*, CVPR 2011.
  - Wei-Lun Chao, Hsiao-Hang Su, Shao-Yi Chien, Winston H. Hsu, and Jian-Jiun Ding, *Coarse-to-Fine Temporal Optimization for Video Retargeting Based on Seam Carving*, ICME 2011.
  - Yan-Ying Chen, Winston H. Hsu, and Hong-Yuan Mark Liao, *Learning Facial Attributes by Crowdsourcing in Social Media*, WWW 2011 (poster). [**Google Fellowship for Women**]
  - Yu-Ming Hsu, Yen-Liang Lin, Winston H. Hsu, and Brian Wang, *Snap2Read: Automatic Magazine Capturing and Analysis for Adaptive Mobile Reading*, MMM 2011. (**Best Paper Award**)
  - Po-Nung Tseng, Yen-Liang Lin, and Winston Hsu, *Interactive Inquiry for Object of Interest in Video Playback by Motion-Augmented Graph Cut*, ACM Multimedia 2010 (short paper).
  - An-Jung Cheng, Fang-Erh Lin, and Winston Hsu, *GPS, Compass, or Camera?: Investigating Effective Mobile Sensors for Automatic Search-Based Image Annotation*, ACM Multimedia 2010 (short paper).
  - Yin-Hsi Kuo, Yi-Lun Wu, Kuan-Ting Chen, Yi-Hsuan Yang, Tzu-Hsuan Chiu, and Winston H. Hsu, *A Technical Demonstration of Large-Scale Image Object Retrieval by Efficient Query Evaluation and Effective Auxiliary Visual Feature Discovery*, ACM Multimedia 2010 (technical demo).
  - Liang-Chi Hsieh and Winston H. Hsu, "Search-Based Automatic Image Annotation Via Flickr Photos Using Tag Expansion," ICASSP 2010.
  - Yin-Hsi Kuo, Kuan-Ting Chen, Chien-Hsing Chiang, and Winston H. Hsu, *Query Expansion for Hash-based Image Object Retrieval*, ACM Multimedia 2009 (full paper).
  - Liang-Chi Hsieh, Kuan-Ting Chen, Chien-Hsing Chiang, Yi-Hsuan Yang, Guan-Long Wu, Chun-Sung Ferng, Hsiu-Wen Hsueh, Angela Charng-Rung Tsai, and Winston H. Hsu, *Canonical Image Selection and Efficient Image Graph Construction for Large-Scale Flickr Photos*, ACM Multimedia 2009 (Grand Challenge).
  - Kuan-Hung Lin, Kuan-Ting Chen, Winston Hsu, Chun-Jen Lee, and Tien-Hsu Li, *Boosting Object Retrieval By Estimating Pseudo-Objects*, ICIIP 2009.
  - Winston Hsu, Tao Mei, and Rong Yan, *Knowledge Discovery over Community-Sharing Media – from Signal to Intelligence*, Special Session, ICME 2009.
  - Lun-Yu Chang and Winston Hsu, *Foreground Segmentation For Static Video Via Multi-Core And Multi-Modal Graph Cut*, ICME 2009.
  - Yi-Hsuan Yang, Po-Tun Wu, Ching-Wei Lee, Kuan-Hung Lin, Winston H. Hsu, *ContextSeer: Context Search and Recommendation at Query Time for Shared Consumer Photos*, ACM Multimedia 2008 (full paper), Vancouver, Canada. (Google Citation: **14**)
  - Po-Tun Wu, Yi-Hsuan Yang, and Winston H. Hsu, *Keyword-Based Concept Search on Consumer Photos by Web-based Kernel Function*, ACM Multimedia 2008 (short paper), Vancouver, Canada.
  - Hong-Ming Chen, Chang Ming-Hsiu, Ping-Chieh Chang, Ming-Chun Tien, Winston H. Hsu, and Ja-Ling Wu, *SheepDog - Group and Tag Recommendation for Flickr Photos by Automatic Search-based Learning*, ACM Multimedia 2008 (short paper), Vancouver, Canada. (Google Citation: **12**)
  - Wei-Shing Liao, Kuan-Ting Chen, and Winston Hsu, *AdImage: Video Advertising by Image Matching and Ad Scheduling Optimization*, ACM SIGIR 2008 (short paper). (Google Citation: **6**)
  - Winston H. Hsu, Lyndon Kennedy, and Shih-Fu Chang, *Video Search Reranking through Random Walk over Document-Level Context Graph*, ACM Multimedia 2007 (full paper), Augsburg, Germany, September 23-29, 2007. (Google Citation: **46**)
  - Winston H. Hsu, Lyndon Kennedy, and Shih-Fu Chang, *Video Search Reranking via Information*
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*Bottleneck Principle*, ACM Multimedia (full paper), October 23-27 2006. (Nominated for Best Paper Award) (Google Citation: **72**)

- Winston H. Hsu and Shih-Fu Chang, *Topic Tracking across Broadcast News Videos with Visual Duplicates and Semantic Concepts*, ICIP 2006. (Google Citation: **27**)
- Winston Hsu and Shih-Fu Chang, *Visual Cue Cluster Construction via Information Bottleneck Principle and Kernel Density Estimation*, The 4th International Conference on Image and Video Retrieval (CIVR), Singapore, July 20-22, 2005. (15% acceptance rate) (Google Citation: **37**)
- Tat-Seng Chua, Shih-Fu Chang, Lekha Chaisorn, and Winston Hsu, *Story Boundary Detection in Large Broadcast News Video Archives - Techniques, Experiences, and Trends*, Brave New Topics in ACM Multimedia 2004. (Google Citation: **42**)
- Winston H. Hsu and Shih-Fu Chang, *Generative, Discriminative, and Ensemble Learning on Multi-modal Perceptual Fusion toward News Video Story Segmentation*, IEEE International Conference on Multimedia & Expo (ICME), Taipei, June 27-30, 2004. (Google Citation: **28**)
- Winston Hsu, Lyndon Kennedy, Chih-Wei Huang, Shih-Fu Chang, Ching-Yung Lin, Giridharan Iyengar, *News Video Story Segmentation using Fusion of Multi-Level Multi-modal Features in TRECVID 2003*, ICASSP, Montreal, Canada, May 17-21, 2004. (Google Citation: **35**)
- Winston Hsu, Shih-Fu Chang, Chih-Wei Huang, Lyndon Kennedy, Ching-Yung Lin, Giridharan Iyengar, *Discovery and Fusion of Salient Multi-modal Features towards News Story Segmentation*, IS&T/SPIE Symposium on Electronic Imaging: Science and Technology - SPIE Storage and Retrieval of Image/Video Database, 2004. (invited paper) (Google Citation: **40**)
- Winston Hsu and Shih-Fu Chang, *A Statistical Framework for Fusing Mid-level Perceptual Features in News Story Segmentation*, IEEE International Conference on Multimedia & Expo (ICME), Baltimore, MD, July 2003. (invited paper) (Google Citation: **30**)

#### **Workshop Papers**

- Shih-Fu Chang, Winston Hsu, Wei Jiang, Lyndon Kennedy, Akira Yanagawa, Dong Xu, and Eric Zavesky, *Columbia University TRECVID-2006 Video Search and High-Level Feature Extraction*, TRECVID Workshop, November 2006, Washington DC. (Google Citation: **56**)
- Shih-Fu Chang, Winston Hsu, Lyndon Kennedy, Lexing Xie, Akira Yanagawa, Eric Zavesky, Dong-Qing Zhang, *Columbia University TRECVID-2005 Video Search and High-Level Feature Extraction*, TRECVID Workshop, November 2005, Washington DC. (Google Citation: **73**)
- Arnon Amir, Janne O Argillander, Marco Berg, Shih-Fu Chang, Martin Franz, Winston Hsu, Giridharan Iyengar, John R Kender, Lyndon Kennedy, Ching-Yung Lin, Milind Naphade, Apostol Natsev, John R. Smith, Jelena Tesic, Gang Wu, Rong Yan, Donqing Zhang, *IBM Research TRECVID-2004 Video Retrieval System*, TRECVID Workshop, Nov. 2004. (Google Citation: **24**)
- Arnon Amir, Marco Berg, Shih-Fu Chang, Giridharan Iyengar, Ching-Yung Lin, Apostol (Paul) Natsev, Chalapathy Neti, Harriet Nock, Milind Naphade, Winston Hsu, John R. Smith, Belle Tseng, Yi Wu, Donqing Zhang, *IBM Research TRECVID-2003 Video Retrieval System*, TRECVID Workshop, Nov. 2003, Washington DC. (Google Citation: **120**)

#### **Technical Reports**

- Yanagawa Shih-Fu Chang, Lyndon Kennedy, Winston Hsu. *Columbia University's Baseline Detectors for 374 LSCOM Semantic Visual Concepts*, Columbia University Technical Report, March 2007. (Google Citation: **89**)
- Winston Hsu, Lyndon Kennedy, Shih-Fu Chang, Martin Franz, John Smith, *Columbia-IBM News Video Story Segmentation In TRECVID 2004*, Columbia ADVENT Technical Report 209-2005-3
- Chih-Wei Huang, Winston Hsu, Shih-Fu Chang, *Automatic Closed Caption Alignment Based on Speech Recognition Transcripts*, Columbia ADVENT Technical Report 005, 2003. (Google Citation: **8**)

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#### TUTORIALS AND SHORT COURSES

- Tutorial, "Content-based and Concept-based Retrieval for Large-Scale Image/Video Collections," in ICASSP 2011, with Rong Yan
- Short Course, "Cloud Computing and its Applications," National Center for High-performance Computing (NCHC), Taiwan, August 2010

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- Tutorial, "Content-based and Concept-based Retrieval for Large-Scale Image/Video Collections," in ACM Multimedia 2009, with Rong Yan (the most attended tutorial)
  - Tutorial, "Content-based and Semantic-based Image/Video Retrieval" in ICASSP 2009, with Rong Yan
  - Tutorial, "Recent Developments in Content-based and Concept-based Image/Video Retrieval" in ACM Multimedia 2008, with Rong Yan (the most attended tutorial)
  - Tutorial, "Content-based and Semantic-based Image/Video Retrieval" in SIGIR 2008, with Rong Yan (evaluated significantly positive by the registered attendees)
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#### LECTURED COURSES

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- Multimedia Analysis and Indexing (MMAI), Fall Semester, 2007 – 2010
  - Advanced Topics in Multimedia Analysis and Indexing (aMMAI), Spring Semester, 2008 – 2010
  - Database Management System, Fall Semester, 2007 – 2010
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#### REFERENCES

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