Matthew Cooper, D.Sc.

FX Palo Alto Laboratory
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SUMMARY

Research Expertise

○ Extensive research experience in automatic analysis, mining, and retrieval of audio, text, music, image, video and multi-modal data resulting in over 70 professional publications, thirty U.S. patents, and more than 15 pending patent applications

○ Broad research interests including pattern recognition, probabilistic modeling and inference, machine learning, computer vision, information retrieval, and information theory

○ Distinguished Member of the ACM (2017), Senior Member of the IEEE, ACM (2010)

Skills

○ Extensive rapid research prototyping experience using Python, scikit-learn, pandas, numpy, C/C++, Octave/MATLAB

○ Experience developing systems for generic and scalable analysis and processing of multimedia and sensor data using Python, C/C++, and Java

○ Experience building and deploying analysis components within interactive systems for multimedia management and information retrieval

○ Experience with tensorflow, keras, hadoop, NLTK, Spark, R, node.js, mongoDB, MySQL, cython – committed to learning new tools, languages, environments as needed

○ Experience leading research projects, collaborating within teams, and mentoring researchers

EDUCATION

Washington University in St. Louis, St. Louis, MO

D.Sc. Dept. of Electrical Engineering, 12/1999

M.S. Dept. of Electrical Engineering, 12/1994

Research Advisor: Prof. Michael I. Miller

Boeing-McDonnell Foundation Fellowship, 1998 - 1999

Office of Naval Research AASERT Fellowship, 1996 - 1997

Washington University in St. Louis, St. Louis, MO

B.S. Major: Electrical Engineering, Minor: Computer Science, 05/1993

State of Missouri Bright Flight Scholarship, 1989 - 1993

Washington University School of Engineering and Applied Science Dean's Honorary Scholarship, 1989 - 1993

EXPERIENCE

Sr. Research Scientist & Group Lead, Integrative Analytics 2012 - Present

Sr. Research Scientist 2004 - 2012, *Research Scientist*, 2000 - 2004

FX Palo Alto Laboratory (FXPAL), Palo Alto, CA

FXPAL performs information technology research for Fuji-Xerox, Co., Ltd.

○ Research on content-based multimedia analysis to facilitate media management and information retrieval. Designed systems to process multimedia and multi-modal data. Provided applied machine learning design and development support lab-wide. Additional details available.

○ Core member of development team for Talkminer lecture video search system with over 60,000 web-distributed lecture videos (C/C++, Python)

○ Developed and validated systems for large-scale video analysis and interactive video search in conjunction with the TRECVID evaluation (C/C++, Python)

○ Member of Technical Assessment Panel for reviewing proposed inventions and helping determine patenting strategy

○ Supervised and co-supervised graduate student interns

EXPERIENCE

Software Engineer 1999 - 2000
NetCapita, Inc., Baltimore, MD
○ Research and development of low bandwidth internet videoconferencing software.
○ Technology is now under development at Animetrics, Inc., Jackson, NH. (C/C++, OpenGL)

Research Assistant 1998 - 1999
Center for Imaging Science, Johns Hopkins University, Baltimore, MD
Completed thesis research on information-theoretic analysis of generic object recognition. The research enables a quantitative characterization of the information content of a sensor observation (sensors included video cameras, infrared cameras, and radar systems) in terms of the pose parameters of observed objects. (MATLAB, C/C++, OpenGL)

Research Assistant 1996 - 1998, 1993-1994
Dept. of Electrical Engineering, Washington University, St. Louis, MO
Developed automated object recognition algorithms using infrared radar systems and an efficient representation of the radiant appearance of observed objects to achieve robustness to thermodynamic variability. (MATLAB, C/C++, OpenGL)

Programmer and Analyst 1994 - 1995
Washington University School of Medicine, Genome Sequencing Center
Developed and implemented image processing algorithms and software for four color electrophoretic DNA sequencing. Subsequent versions of the algorithms and software were used to sequence *C. elegans* and the human genome. (C programming)

PUBLICATIONS

Selected journal articles   complete list available

M. Cooper, J. Biehl, G. Filby, S. Kratz. LoCo: Boosting for indoor location classification combining Wi-Fi and BLE. *Personal and Ubiquitious Computing*, 2016.

S. Carter, **M. Cooper**, L. Denoue, J. Doherty, V. Rugoobur. Supporting media bricoleurs. *ACM interactions*, 2014.

F. Chen, A. Girgensohn, **M. Cooper**, Y. Lu, and G. Filby. Genre identification for office document search and browsing. *International Journal of Document Analysis and Recognition* (IJDAR), **15**(3):167-182, 2012.

M. Cooper, T. Liu, and E. Rieffel. Video Segmentation via Temporal Pattern Classification. *IEEE Transactions on Multimedia*, **9**(3):610-618, 2007.

M. Cooper, J. Foote, E. Pampalk, and G. Tzanetakis. Audio Visualization for Music Information Retrieval. *Computer Music Journal*, **30**(2):42–62, 2006.

M. Cooper, J. Foote, A. Girgensohn, and L. Wilcox. Temporal Event Clustering for Digital Photograph Collections. *ACM Trans. on Multimedia Computing, Communications, and Applications*, **1** (3):269–288, 2005.

M. Cooper and M. Miller. Information Measures for Object Recognition Accommodating Signature Variability. *IEEE Trans. on Information Theory*, **46**(5):1896–1907, 2000.

C. elegans Sequencing Consortium. Genome Sequence of the Nematode *Caenorhabditis elegans*. A Platform for Investigating Biology. *Science*, **282**:2012–2018, 1998.

PUBLICATIONS   **Selected conference and workshop articles**

C. Bhatt, M. Cooper and J. Zhao. SeqSense: video recommendation using topic sequence mining. *Proc. Multimedia Modeling*, 2018.

L. Denoue, S. Carter, J. Marlow and M. Cooper. DocHandles: linking document fragments in messaging apps. Proc. Document Engineering, 2017.

Y.-Y. Chen, F. Chen, **M. Cooper** and D. Joshi. Using Business-Aware Latent Topics For Image Captioning In Social Media. *IEEE Intl. Conf. on Multimedia and Expo* (ICME) 2016.

L. Denoue, **M. Cooper**, and S. Carter. Searching Live Meetings: "Show me the Action". *Proc. of ACM Document Engineering* (DocEng) 2015.

J. Biehl, **M. Cooper**, G. Filby, A. Lee. You're where? Prove it! – Towards trusted indoor location estimation of mobile devices. *ACM UbiComp 2015*.

L. Denoue, S. Carter, and **M. Cooper**. Video Text Retouch: Retouching Text in Videos with Direct Manipulation. *ACM UIST 2014.*

L. Denoue, S. Carter, **M. Cooper**, and J. Adcock. Real-time Direct Manipulation of Screen-based Videos To appear *ACM Intl. Conf. on Intelligent User Interfaces*, 2013.

J. Pickens, **M. Cooper**, and G. Golovchinsky. Reverted Indexing for Feedback and Expansion. *Proc. ACM Conf. on Information and Knowledge Management (CIKM)*, p. 1049-1058, 2010.

J. Adcock, **M. Cooper**, L. Denoue, H. Pirsiavash, and L. A. Rowe. TalkMiner: A Lecture Webcast Search Engine. *Proc. ACM Multimedia 2010*, p. 241-250, 2010.

M. Cooper, Image Categorization Combining Neighborhood Methods and Boosting,*Proc. ACM Multimedia 2009*. Workshop on Large-Scale Multimedia Retrieval and Mining.

M. Cooper, Collective Media Annotation using Random Field Models. *IEEE Intl. Conf. on Semantic Computing*, p. 337-43, 2007.

M. Cooper and J. Foote. Discriminative Techniques for Keyframe Selection. *Proc. IEEE Intl. Conf. on Multimedia and Expo*, pp. 502-5, 2005.

J. Adcock, **M. Cooper**, A. Girgensohn, and L. Wilcox. Interactive Video Search Using Multi-level Indexing. *Proc. Intl. Conf. on Image and Video Retrieval (CIVR)*, 2005.

M. Cooper and J. Foote. Summarizing Popular Music via Structural Similarity Analysis. *Proc. IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2003.

M. Cooper and J. Foote. Summarizing Video using Non-Negative Similarity Matrix Factorization. *Proc. IEEE Workshop on Multimedia Signal Processing*, pp. 25–28, 2002.

J. Foote, **M. Cooper**, and A. Girgensohn. Creating Music Videos using Automatic Media Analysis. *Proc ACM Conf. on Multimedia*, pp. 550–560, 2002.

J. Foote, **M. Cooper**, and U. Nam. Audio Retrieval by Rhythmic Similarity. *Proc. Intl. Symposium on Music Information Retrieval*, pp. 265-6, 2002.

INVITED TALKS LoCo: A Ready-to-deploy Framework for Indoor Location-driven Experiences. SWARM Lab, Dept. of EECS, University of California, Berkeley, 04/2014

Guest Lecturer: Information Retrieval. Introduction to Artificial Intelligence, Dept of Computer Science, University of San Francisco, 10/2013, 04/2014.

Searching and Archiving Presentations. Dept. of Computer Science Special Lecture Series, University of San Francisco, San Francisco, CA, 03/2011.

Media Analysis and Visualization at FXPAL. Kodak Research Labs Distinguished Lecture Series. Rochester, NY, 03/2008.

Visualizing Multimedia Structure. Center for Imaging Science Weekly Seminar Series. Rochester Institute of Technology. Rochester, NY, 03/2008

Visualizing Multimedia Structure. Graduate Seminar Series. Dept. of Computer Science, San Francisco State Univeristy. San Francisco, CA, 10/2007.

Similarity Analysis of Audio. CCRMA Hearing Seminar, Stanford University, Palo Alto, CA, 02/2003.

PROFESSIONAL SERVICE **Associate Editor**: *Journal of Multimedia* 2011 - Present
Associate Editor: *Multimedia Systems Journal* 2015 - Present

Steering Committee Member: TRECVID, 2015-Present

Area Chair: ACM Multimedia 2018: Multimedia for Collaboration in Education & Distributed Environments
Area Chair: ACM Multimedia 2016: Multimedia for Collaboration in Education & Distributed Environments
Area Chair: ACM Multimedia 2015: Multimedia for Collaboration
Area Chair: IEEE Intl. Conf. on Multimedia & Expo: 2014, 2015, 2016
Area Chair: IEEE Intl. Symposium. on Multimedia: 2015
Area Chair: ACM Multimedia 2013: Multimedia Analysis

Program Committee Member: Multimedia Modeling 2009-2015; IEEE Intl. Conf. on Multimedia & Expo 2009-2017; ACM Conf. on Multimedia 2006-2017; IEEE Intl. Conf. on Image Processing 2014, 2016; ACM Intl. Conf. on Multimedia Retrieval 2013, 2015-8; ACM/IEEE Joint Conf. on Digital Libraries 2008-2010; IEEE Intl. Conf. on Semantic Computing 2008-2017; Intl. Conf. on Semantic and Digital Media Technologies 2008-2010; World Wide Web 2009

External Journal Reviewer: *ACM Trans. on Multimedia Computing, Communications, & Applications*; *IEEE Trans. on Pattern Analaysis & Machine Intelligence*; *IEEE Trans. on Multimedia*; *IEEE Trans. on Audio, Speech, and Language Processing*; *IEEE Signal Processing Letters*; *IEEE Trans. on Information Theory*; *IEEE Trans. on Circuits and Systems for Video Technology*; *Machine Vision and Applications*; *Multimedia Systems Journal*

REFERENCES Available upon request.