

Matthew R. Boutell

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RESEARCH INTERESTS

Computer vision, machine learning, multimedia content understanding, image databases, pattern recognition.

EDUCATION

- **University of Rochester** (Rochester, NY), May, 2005
PhD in Computer Science
Dissertation: *Exploiting Context for Semantic Scene Classification*
Co-advisors: Prof. Christopher M. Brown and Dr. Jiebo Luo
- **University of Rochester** (Rochester, NY), May, 2002
M.S. in Computer Science
Area Paper: *State of the Art in Semantic Scene Classification*
- **University of Massachusetts** (Amherst, MA), August, 1994
M.Ed. in Mathematics Education
- **Worcester Polytechnic Institute** (Worcester, MA), May, 1993
B.S. in Mathematical Science with High Distinction

TEACHING EXPERIENCE

- **Rose-Hulman Institute of Technology** (Terre Haute, IN), 2005-present
Assistant Professor in the Department of Computer Science and Software Engineering. Taught *Fundamentals of Software Development I and III*. Developed and taught a special topics course in *Image Recognition*.
- **Norton High School** (Norton, MA), 1994-2000
Teacher of mathematics (*Honors Precalculus, Algebra II, College Geometry, Honors Geometry, Pre-Algebra, Basic Math*) and computer programming courses (*Advanced Placement C++, BASIC*), with 4300+ hours of classroom time. Developed curriculum for school's first AP C++ course (over 70% of students who took earned a '4' or '5'). Successfully incorporated *Geometer's Sketchpad* discovery software into all Geometry courses. Also advised numerous student groups (Math Team, Bible Club, Classes of 1998, 1999, and 2000).

- **Stonehill College** (Easton, MA), 1999-2000 (three semesters)
Adjunct Professor for *Computer Science I and II*, including C++ programming and introductory data structures. Stonehill was ranked #1 Comprehensive College in the North by *U.S. News and World Report*.
- **University of Rochester** (Rochester, NY), 2001-2002
Teaching Assistant for *Computer Models and Limitations* (Spring 2002; Prof. Lenhart Schubert), *Design and Analysis of Algorithms* (Fall 2001; Prof. Joel Seiferas), and *Visual Computing* (Spring 2001; Prof. Kyros Kutulakos). Held weekly recitations, and taught classes in instructors' absence. Led a team of assistants in grading assignments and answering student questions.

RESEARCH EXPERIENCE

- **Eastman Kodak Company** (Rochester, NY), 2001-2005
Research Intern/Consultant in the Image Understanding group. Worked on several image classification problems, including scene and orientation recognition. Responsible for data collection (multiple photo databases of over 2000 images), design, implementation, and testing of several feature extraction algorithms and full classification systems. Used temporal, spatial, and camera metadata cues to improve classification. Documented work in technical reports.
- **University of Rochester** (Rochester, NY), 2002-2005
Research assistant supported by grants from Eastman Kodak Company. Investigated use of several probabilistic graphical models (Markov random fields, Bayesian networks, and factor graphs) for classification problems. Implemented each model and analyzed performance. Advised three first-year PhD students each in class projects, leading to a conference paper currently under review and a journal publication.

HONORS

- Supported by a federal GAANN fellowship for first three years of PhD studies.
- Award for most papers published by a graduate student, URCS, 2004.
- Best Student Paper award, *2004 IEEE Western New York Image Processing Workshop*
- Included five times in *Who's Who Among American High School Teachers* (editions 5, 6, 8, 9, and 10, spanning 1998-2006)
- Inducted into *Pi Mu Epsilon* (math) and *Tau Beta Pi* (engineering) honor societies.
- Won *Worcester Polytechnic Institute Class of 1879 Prize for Outstanding Project in the Humanities* for original composition for brass quintet.
- *Randall Burton Scholarship* for graduate studies, Plumbers and Pipefitters' Union Local No. 4

REFEREED JOURNAL PAPERS

1. Matthew Boutell, Jiebo Luo, and Christopher Brown. Scene parsing using region-based generative models. *IEEE Transactions on Multimedia*. To appear.
2. Jiebo Luo, Matthew Boutell, and Christopher Brown. Pictures are not taken in a vacuum: An overview of exploiting context for semantic scene content understanding. *IEEE Signal Processing Magazine* 23(2), pp. 101-114, March 2006.

3. Matthew Boutell, Jiebo Luo, and Christopher Brown. A generalized temporal context model for classifying image collections. *ACM Multimedia Systems*, 11(1), pp. 82-92, November 2005.
4. Jiebo Luo and Matthew Boutell. Natural scene classification using overcomplete ICA. *Pattern Recognition*, 38(10), pp. 1507-1519, October 2005.
5. Jiebo Luo, Matthew Boutell, Robert T. Gray, and Christopher Brown. Image transform bootstrapping and its applications to semantic scene classification. *IEEE Transactions on Systems, Man, and Cybernetics, Part B*, 35(3), June 2005.
6. Matthew Boutell and Jiebo Luo. Beyond pixels: Exploiting camera metadata for photo classification. *Pattern Recognition*, Special Issue on Image Understanding for Digital Photos, 38(6), June 2005.
7. Jiebo Luo and Matthew Boutell. Automatic image orientation detection via confidence-based integration of low-level and semantic cues. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 27(5), pp. 715-726, May 2005.
8. Matthew Boutell, Xipeng Shen, Jiebo Luo, and Christopher Brown. Learning multi-label semantic scene classification. *Pattern Recognition*, 37(9), pp. 1757-1771, September 2004.
9. Jiebo Luo, David Crandall, Amit Singhal, Matthew Boutell, and Robert T. Gray. Psychophysical study of image orientation perception. *Spatial Vision*, 16(5), pp. 429-457, December 2003.

REFEREED CONFERENCE AND WORKSHOP PAPERS

10. Matthew Boutell, Jiebo Luo, and Christopher Brown. Factor-graphs for region-based whole-scene classification. *International Workshop on Semantic Learning Applications in Multimedia* (in conjunction with CVPR2006), New York, NY, June 2006.
11. Matthew Boutell, Anustup Choudhury, Jiebo Luo, and Christopher Brown. Using semantic features for scene classification: How good do they need to be? *IEEE International Conference on Multimedia and Expo*, Toronto, July 2006.
12. Matthew Boutell and Jiebo Luo. Overcomplete ICA for manmade scene classification. *IEEE International Conference on Multimedia and Expo*, Amsterdam, NL, July 2005.
13. Matthew Boutell, Jiebo Luo, and Christopher Brown. Improved semantic region labeling based on scene context. *IEEE International Conference on Multimedia and Expo*, Amsterdam, NL, July 2005.
14. Jiebo Luo, Alexander Loui, Matthew Boutell, and Phoury Lei. RhythmPix: Photo-centric multimedia authoring based on automatic scene classification. *Visual Communications and Image Processing*, Beijing, China, July, 2005 (invited paper).
15. Matthew Boutell and Jiebo Luo. Photo classification by integrating image content and camera metadata. *International Conference on Pattern Recognition*, Cambridge, UK, August 2004.

16. Matthew Boutell and Jiebo Luo. Incorporating temporal context with content for classifying image collections. *International Conference on Pattern Recognition*, Cambridge, UK, August 2004.
17. Matthew Boutell, Jiebo Luo, and Christopher Brown. Learning spatial configuration models using modified Dirichlet priors. *Workshop on Statistical Relational Learning (in conjunction with ICML2004)*, Banff, Alberta, July 2004.
18. Matthew Boutell and Jiebo Luo. Bayesian fusion of camera metadata cues in semantic scene classification. *IEEE Conference on Computer Vision and Pattern Recognition*, Washington, DC, June 2004.
19. Matthew Boutell and Jiebo Luo. A generalized temporal context model for semantic scene classification. *IEEE Workshop on Learning in Computer Vision and Pattern Recognition (in conjunction with CVPR2004)*, Washington, DC, June 2004.
20. Jiebo Luo and Matthew Boutell. A probabilistic approach to image orientation detection via confidence-based integration of low-level and semantic cues. *4th International Workshop on Multimedia Data and Document Engineering (in conjunction with CVPR2004)*, Washington, DC, July 2004.
21. Xipeng Shen, Matthew Boutell, Jiebo Luo, and Christopher Brown. Multi-label machine learning and its application to semantic scene classification. *International Symposium on Electronic Imaging*, San Jose, CA, January, 2004.
22. Jiebo Luo, Matthew Boutell, Robert T. Gray, and Christopher Brown. Using image transform-based bootstrapping to improve scene classification. *2004 International Symposium on Electronic Imaging*, San Jose, CA, January 2004.
23. Matthew Boutell, Jiebo Luo, and Robert T. Gray. Sunset scene classification using simulated image recomposition. *IEEE International Conference on Multimedia and Expo*, Baltimore, MD, July 2003.

TECHNICAL REPORTS NOT DETAILING EXTERNALLY PUBLISHED WORK

Matthew Boutell and Jiebo Luo. Indoor-outdoor scene classification: Re-implementation. Eastman Kodak Company Technical Memorandum, June 9, 2003.

Matthew Boutell, Jiebo Luo, Amit Singhal, and Christopher Brown. Survey on the state of the art in semantic scene classification. Eastman Kodak Company Technical Report, June 19, 2002 and Technical Report 799, University of Rochester, Rochester, NY, December 2002.

Matthew Boutell and Jiebo Luo. Single-frame orientation using low-level features. Eastman Kodak Company Technical Report and Technical Report 758, University of Rochester, Rochester, NY, September 2001.

PATENTS

1. Jiebo Luo, Matthew Boutell, "Method of using temporal context for image classification", filed to USPTO by Eastman Kodak Company, 2003.

2. Jiebo Luo, Matthew Boutell, Robert T. Gray, "Method for semantic scene classification using camera metadata and content-based cues", filed to USPTO by Eastman Kodak Company, 2003.
3. Jiebo Luo, Matthew Boutell, Robert T. Gray, "Method for using effective spatio-temporal image recomposition to improve scene classification", filed to USPTO by Eastman Kodak Company, 2002.

PRESENTATIONS AND TALKS

“Factor-graphs for region-based whole-scene classification”, *International Workshop on Semantic Learning Applications in Multimedia (in conjunction with CVPR2006)*, New York, NY, June 18, 2006.

“Expanding your vision: Using context for photograph classification” presented to Rose-Hulman Institute of Technology Department of Computer Science, Terre Haute, IN; Rochester Institute of Technology Department of Computer Science, Rochester, NY; Hobart and William Smith Colleges Department of Mathematics and Computer Science, Geneva, NY; General Electric Visualization and Computer Vision Laboratory, Niskayuna, NY; February-March 2005.

Annual presentations given at Eastman Kodak Company Imaging Science Division Technical Presentations, 2001-2004.

“Manmade-natural photo classification using ICA”, *IEEE Western New York Image Processing Workshop*, September 24, 2004. **Won "Best Student Paper" Award.**

“A generalized temporal context model for semantic scene classification”, *IEEE Workshop on Learning in Computer Vision and Pattern Recognition (in conjunction with CVPR2004)*, Washington, DC, June 28, 2004.

“Multi-label machine learning and its application to semantic scene classification”, *International Symposium on Electronic Imaging*, January 21, 2004.

“Using image transform-based bootstrapping to improve scene classification”, *International Symposium on Electronic Imaging*, January 21, 2004.

“Outdoor scene classification”, *IEEE Western New York Image Processing Workshop*, October 17, 2003.

“Sunset scene classification using simulated image recomposition”, *International Conference on Multimedia and Expo*, July 8, 2003.

“Sunset scene classification”, *URCS Vision Group*, April 2, 2003.

“MASSES: Material and spatial simulated experimental scenes”, *Center for Electronic Imaging Systems (CEIS) Electronic Imaging Research Showcase*, January 29, 2003.

“State of the art in scene categorization”, *URCS Vision Group*, April 17, 2002.

“Single-frame orientation using low-level features”, *Center for Electronic Imaging Systems (CEIS) Winter Technology Interchange*, January 30, 2002.

“Single-frame orientation using low-level features”, *URCS Vision Group*, October 24, 2001.

“Twenty-first century portraits by Van Gogh: Learning and using a painter's style”, Joint work with Kyros Kutulakos and Andrew Blake, *URCS Vision Group*, January 26, 2001.

PROFESSIONAL SERVICES

- Department Representative to the *Computer Science Teachers Association*.
- Program committee, Workshop on Semantic Learning Applications in Multimedia, *IEEE Conference on Computer Vision and Pattern Recognition*, New York, NY, 2006.
- Reviewed papers for *Pattern Recognition*, *IEEE Signal Processing Magazine*, *SPIE Journal of Electronic Imaging*, *Image and Vision Computing*, *Iranian Journal of Electrical and Computer Engineering*, *Pattern Analysis and Applications*, and the *Workshop on Semantic Learning Applications in Multimedia*.
- Member of the *IEEE* and the *IEEE Computer Society*.
- Member of the RHIT Imaging Group.

DEPARTMENT AND UNIVERSITY SERVICE

- Academic advisor to 13 second-year Computer Science majors.
- Assisted with Laptop orientation for first-year students, August, 2005.
- Represented CSSE department at Admissions open houses, 2005-2006.
- Served as a RosE-Portfolio rater, May 2006.
- URCS Curriculum Committee, 2004-5.
- Organized bi-weekly Vision Interest Meetings at URCS, 2004-5.
- URCS Graduate Representative to the Faculty, 2003-4.
- URCS Graduate Admissions Committee, 2002-3.

PERSONAL DATA

Place of Birth: Gardner, Massachusetts, USA

Citizenship: USA

REFERENCES

Available upon request