

Jarrell WAGGONER

Biographical

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Online

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Research Interests

computer vision, segmentation, contour completion, perceptual grouping, document image analysis, event recognition, image processing, artificial intelligence, pattern recognition & machine learning, data science, functional programming, Clojure

Education

AUG. 2013 Ph.D. in COMPUTER SCIENCE & ENGINEERING **University of South Carolina**
Advisor: Dr. Song WANG
Dissertation: "Multi-Label Segmentation Propagation for Materials Science Images Incorporating Topology and Interactivity"

MAY 2009 Master of Engineering in COMPUTER SCIENCE **University of South Carolina**
GPA: 3.8/4.0 | *magna cum laude*

Industry Experience

2013—PRESENT Senior Software Engineer *Groupon, Inc.*
Tech Lead of the Supply Intelligence team building internal tools and analytics pipelines to optimize Groupon's supply funnel using **Clojure** to develop service-oriented and big data systems.
— Built a **PostgreSQL**-backed high-performance caching and write management system around **Salesforce** that hits 10K req/min
— Managed a critical business automation of the sales lead assignment process that previously required an estimated 80 managers to conduct manually; led the effort to rearchitect this legacy system from an ad-hoc job scheduling platform written in **Ruby** and **Bash** to a multi-staged **Hadoop** pipeline written in **Clojure**
— Oversaw technical decisions, engaged in mentorship, established best practices, coordinated with stakeholders, and led multiple major technical initiatives on a team of 5 developers
— Built out an ETL management and machine learning platform using **Python**, **Clojure**, **Hive**, and **Spark**

2012—2014 Technical Lead *TerraStride, Inc.*
Software developer in an agile startup environment creating the huntstand.com web application. Written using **Python**, **Django**, and **Backbone.js**; deployed to **AWS**. Responsible for curating full technology stack and coordinating with 5 developers.

2011—2013 Project Manager *Palmetto Computer Labs*
Assisted in planning the POSSCON conference. Managed the Open IT Lab and associated projects (Android Development). Provided software support for websites and managed projects.

2011 Contractor *Elastic Vision Consulting*
Created a parser and generator for XML medical records formats (CCR and CCD) in Java using JDOM, JAXB, SAX, Xerces, and Hibernate (HSQLDB), on an Axis2+Jetty6 driven server.

Research Experience

2011–2013	<p>Research Assistant funded by AFOSR</p> <p><i>Materials Volume Segmentation</i></p> <p>Developed segmentation methods for materials image volumes in <i>Python+NumPy/SciPy</i> and <i>MATLAB</i> at the COMPUTER VISION LAB at USC. Managed the lab computer network and organized weekly lab meetings. Created GUI interface using wxWidgets for assisted segmentation, and conducted large-scale evaluations on multiple datasets for metallic and biological materials.</p>
2010–2011	<p>Research Assistant funded by DARPA</p> <p><i>Video Event Recognition</i></p> <p>Explored segmentation methods for video event recognition. Attended P.I. meetings in San Diego (2010) and Colorado (2011). Developed algorithms in <i>Scheme</i> to process a corpus of thousands of videos extracted into over 3 million frames using a high-performance computing cluster.</p>
2009–2010	<p>NEH Fellow at the CENTER FOR DIGITAL HUMANITIES</p> <p><i>Digital Collation</i></p> <p>Created a DIGITAL COLLATION application to handle automatic differencing of sub-textual inconsistencies among multiple copies of <i>The Faerie Queene</i> by EDMUND SPENSER in <i>MATLAB</i> to process tens of thousands of book page images.</p>

Teaching Experience

2008–2009	<p>GK-12 Fellow at CRAYTON MIDDLE SCHOOL</p> <p><i>8th Grade Science</i></p> <p>Served in Crayton Middle School, coordinating with the classroom instructor to enhance the science curriculum and activities in an 8th grade science classroom. Subsequently coordinated and taught at the GK-12 INSTITUTE FOR TEACHERS, presenting the activities developed and delivered in the classroom.</p>
2007–2008, 2011	<p>Graduate Teaching Assistant at USC</p> <p><i>Web Development</i></p> <p>Supervised CSCE 145 labs, covering software development with JAVA, and taught CSCE 102, covering JAVASCRIPT, HTML, and CSS. Taught CSCE 211 covering digital logic design.</p>
SPRING 2007	<p>Instructor for CSCE 204 at USCL</p> <p><i>Introductory Programming</i></p> <p>Hired as special faculty. Taught introductory Visual Basic for majors and non-majors. Selected textbooks, developed all course material, graded all assignments. Worked with Dr. Noni M. Bohonak</p>
FALL 2006	<p>Camp Instructor for USCL ARTS AND SCIENCES ADVENTURE CAMP</p> <p><i>5th-8th Grade Students</i></p> <p>Worked in collaboration with Dr. Dwayne Brown. One of two instructors teaching Math and Computer Science to grade school students.</p>
2003–2007	<p>Professional Tutor at USCL ACADEMIC SUCCESS CENTER</p> <p><i>High School and College Students</i></p> <p>Student and graduate tutor for college-level Mathematics, Computer Science, Physics, and English classes.</p>

Publications

- [C1] **Jarrell Waggoner**, Youjie Zhou, Jeff Simmons, Marc De Graef, and Song Wang. Topology-preserving multi-label image segmentation. In *IEEE Workshop on Applications of Computer Vision (WACV)*, pages 1084–1091, Waikoloa Beach, HI, 2015. [\[PDF\]](#).
- [C2] **Jarrell Waggoner**, Youjie Zhou, Jeff Simmons, Marc De Graef, and Song Wang. Graph-cut based interactive segmentation of 3D materials-science images. *Machine Vision and Applications*, 25:1615–1629, 2014. [\[PDF\]](#).

- [C3] Youjie Zhou, Lili Ju, Yu Cao, **Jarrell Waggoner**, Yuewei Lin, Jeff Simmons, and Song Wang. Edge-weighted centroid voronoi tessellation with propagation of consistency constraint for 3D grain segmentation in microscopic superalloy images. In *CVPR Workshop on Perception Beyond the Visible Spectrum (PBVS)*, 2014. [PDF].
- [C4] Dhaval Salvi, **Jarrell Waggoner**, Andrew Temlyakov, and Song Wang. A graph-based algorithm for multi-target tracking with occlusion. In *IEEE Workshop on Applications of Computer Vision (WACV)*, 2013. [PDF].
- [C5] Dhaval Salvi, Jun Zhou, **Jarrell Waggoner**, and Song Wang. Handwritten text segmentation using average longest path algorithm. In *IEEE Workshop on Applications of Computer Vision (WACV)*, 2013. [PDF].
- [C6] Andrew Temlyakov, Pahal Dalal, **Jarrell Waggoner**, Dhaval Salvi, and Song Wang. Shape and image retrieval by organizing instances using population cues. In *IEEE Workshop on Applications of Computer Vision (WACV)*, 2013. [PDF].
- [C7] **Jarrell Waggoner**. *Multi-Label Segmentation Propagation for Materials Science Images Incorporating Topology and Interactivity*. Dissertation, University of South Carolina, 2013. [PDF].
- [C8] **Jarrell Waggoner**, Jeff Simmons, Marc De Graef, and Song Wang. 3D materials image segmentation by 2D propagation: A graph-cut approach considering homomorphism. *IEEE Transactions on Image Processing*, 22, 2013. [PDF].
- [C9] **Jarrell Waggoner**, Youjie Zhou, Jeff Simmons, Ayman Salem, Marc De Graef, and Song Wang. Interactive grain image segmentation using graph cut algorithms. In *Proceedings of SPIE (Computational Imaging XI)*, Burlingame, CA, 2013. [PDF].
- [C10] Andrei Barbu, Alexander Bridge, Zachary Burchill, Dan Coroian, Sven Dickinson, Sanja Fidler, Aaron Michaux, Sam Mussman, Siddharth Narayanaswamy, Dhaval Salvi, Lara Schmidt, Jiangnan Shangguan, Jeffrey Mark Siskind, **Jarrell Waggoner**, Song Wang, Jinlian Wei, Yifan Yin, and Zhiqi Zhang. Video in sentences out. In *Conference on Uncertainty in Artificial Intelligence*, pages 102–112, 2012. [PDF].
- [C11] Andrei Barbu, Alexander Bridge, Dan Coroian, Sven Dickinson, Sam Mussman, Siddharth Narayanaswamy, Dhaval Salvi, Lara Schmidt, Jiangnan Shangguan, Jeffrey Mark Siskind, **Jarrell Waggoner**, Song Wang, Jinlian Wei, Yifan Yin, and Zhiqi Zhang. Large-scale automatic labeling of video events with verbs based on event-participant interaction. Technical report, 2012. [PDF].
- [C12] **Jarrell Waggoner**, Jeff Simmons, Marc De Graef, and Song Wang. Graph cut approaches for materials segmentation preserving shape, appearance, and topology. In *International Conference on 3D Materials Science*, pages 147–152, Seven Springs, PA, 2012. [PDF].
- [C13] **Jarrell Waggoner**, Jeff Simmons, and Song Wang. Combining global labeling and local relabeling for metallic image segmentation. In *Proceedings of SPIE (Computational Imaging X)*, volume 8296, Burlingame, CA, 2012. [PDF].
- [C14] Zhiqi Zhang, Sanja Fidler, **Jarrell Waggoner**, Yu Cao, Sven Dickinson, Jeffrey Mark Siskind, and Song Wang. Superedge grouping for object localization by combining appearance and shape information. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 3266–3273, Providence, RI, 2012. [PDF].
- [C15] Song Wang, **Jarrell Waggoner**, and Jeff Simmons. Graph-cut methods for grain boundary segmentation. *JOM Journal of the Minerals, Metals and Materials Society*, 63:49–51, 2011. [PDF].
- [C16] Andrew Temlyakov, Brent C. Munsell, **Jarrell Waggoner**, and Song Wang. Two perceptually motivated strategies for shape classification. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 2289–2296, 2010. [PDF].
- [C17] Zhiqi Zhang, Yu Cao, Dhaval Salvi, Kenton Oliver, **Jarrell Waggoner**, and Song Wang. Free-shape subwindow search for object localization. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 1086–1093, San Francisco, CA, 2010. [PDF].

Posters/Presentations

- [P1] Rules Engines: Logic As Data Structure. *Palmetto Open Source Software Conference*. Columbia, SC. April 14, 2015.
- [P2] Python for Computer Vision. *All Things Open*. Raleigh, SC. October 24, 2013.
- [P3] Interactive Grain Image Segmentation Using Graph Cut Algorithms. *USC Graduate Student Day*. Columbia, SC. April 12, 2013.
- [P4] Extending Django. *Palmetto Open Source Software Conference*. Columbia, SC. March 28, 2013.
- [P5] Computer Science: Research, Industry, and Entrepreneurship. *Careers in Science Lecture Series*. Lancaster, SC. March 6, 2013.
- [P6] Interactive Grain Image Segmentation Using Graph Cut Algorithms. *SPIE (Computational Imaging XI)*. Burlingame, CA. February 6, 2013.
- [P7] Homeomorphic Multi-Structure Propagation for Metallic Image Segmentation. *Gamecock Computing Research Symposium*. Columbia, SC. October 5, 2012.
- [P8] Android Application Development Workshop. *Appathon Contest*. Columbia, SC. November 17, 2012.
- [P9] Open Source and Education. *SC Municipal Technology Association (SCMTA) Conference*. Charleston, SC. September 6, 2012.
- [P10] Open Source and Higher Education. *SC Technical College System (SCTCS) Conference*. Columbia, SC. September 25, 2012.
- [P11] Introduction to Android Development. *Digital Humanities High Performance Computing (DHHPC) Workshop*. Columbia, SC. August 8, 2012.
- [P12] Combining Global Labeling and Local Relabeling for Metallic Image Segmentation. *SPIE (Computational Imaging X)*. Burlingame, CA. January 23, 2012.
- [P13] Open Source and Government. *SC Government Management Information Systems (SCGMIS) Software Developers Workshop*. Columbia, SC. January 19, 2012.
- [P14] Superpixel Contour Completion. *DARPA Mind's Eye PI Meeting*. Denver, CO. January 20, 2011.

Honors/Awards

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|------|---|------|
| 2012 | Gamecock Computing Research Symposium Poster Session, First Place | USC |
| | Graduate Student Day Presentation, First Place | |
| 2011 | Graduate Student Day Presentation, Second Place | |
| 2010 | Graduate Student Day Presentation, Honorable Mention | |
| 2009 | Upsilon Pi Epsilon | |
| | | |
| 2004 | Clara P. Hammond Award | USCL |
| | Science and Mathematics Award | |
| | Highest Academic Average Award | |

Classes Taught

2012–2013 » Open Source 101	Open Source Software	IT-ology USC
2012–2013 » Version Control 101	git, github	
2012–2013 » Command Line 101	Linux, BASH	
Fall 2011 » CSCE 211	Digital Logic Design	USC
Summer II 2008 » CSCE 102	HTML/CSS/JavaScript	
Spring 2008 » CSCE 145 Lab	Java	
Fall 2007 » CSCE 145 Lab	Java	
Spring 2007 » CSCE 204	Visual Basic	USCL
Spring 2007 » Math 241 & Math 242	Maple	

Service

ITERN MENTORING	Groupon internship program, 2014
WEBMASTER	Winter Vision Meetings, 2013
WEBMASTER	Workshop on the Applications of Computer Vision, 2013
JUDGE	Discovery Day — Undergraduate Research Presentations
REVIEWER	Pattern Recognition Letters
REVIEWER	IEEE Transactions on Pattern Analysis and Machine Intelligence
MEMBER	Institute of Electrical and Electronics Engineers (IEEE)
SYSADMIN	Computer Vision Lab

Personal and Open Source Projects

MATSCISEG	Framework for propagated 3D volume segmentation, used in my dissertation work. Algorithms created in Python and C++ and exposed as a web API using Django . Includes a web application that consumes the API created in JavaScript , and jQuery . github.com/malloc47/matsciseq
NONPARTISAN.ME	Google Chrome extension that filters social media websites for political keywords. Available in the Chrome Web Store . Featured in the Charleston City Paper . github.com/malloc47/nonpartisan.me
TERM-DO	An interactive terminal prompt that displays potential command completions as you type. A hybrid of gnome-do and Emacs's ido-mode. Works on many tested VT100 terminal types; built in C++ . Includes client/server architecture implemented with boost.interprocess and full-featured plugin system. Available in the Arch Linux AUR . github.com/malloc47/term-do
RATIO CONTOUR	Maintainer and contributor for the Ratio Contour project, a salient object detection and segmentation method used for computer vision applications. Developed in C and MATLAB . github.com/malloc47/ratio-contour
DIGITAL COLLATION	Research project to “collate” high-resolution documents by using image registration, accomplished using the SIFT feature detector and a thin plate spline warping technique, written in MATLAB . github.com/malloc47/digital-collation
BEFUNGE.PY	Complete Befunge interpreter written in Python . Implements the Befunge 93 specification, and is one of the closest Python equivalents to the C reference implementation. github.com/malloc47/befunge.py

Skills & Languages

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|----------------|---------------------|-------------------|------------------|
| • • • Bash | • • • Java | • • MATLAB | • • • GNU/Linux |
| • • • C/C++ | • • JavaScript | • • Django | • • • Hadoop |
| • • • Clojure | • • \LaTeX | • • • git | • • Hive |
| • • Emacs Lisp | • • • Python | • • • NumPy/SciPy | • • • PostgreSQL |
| • Haskell | • • • Scheme | • • • OpenCV | • • • Spark |

- Small-scale projects and/or assignments
- • Multiple projects and/or experience teaching
- • • Large-scale and/or multi-group projects

Activities

teaching, programming, open source software, system administration, data visualization, Linux, [music composition](#)