

CHARLES PARKER

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EDUCATION

Ph.D., Computer Science September 2002 - August 2007
Oregon State University Corvallis, OR
Graduate Research: Machine Learning

B.S., Electrical and Computer Engineering September 1998 - December 2001
Northwestern University Evanston, IL
Curriculum Focus: Microcontroller Systems Design

WORK EXPERIENCE

Co-Founder / Principal Scientist July 2023 - Present (part-time)
Comigo Lake Bluff, IL
Helped drive software strategy and business initiatives for a large language model based cognitive behavioral companion. Provided deep technical expertise around NLP and large language model interaction. Assisted with aspects of company growth strategy and intellectual property management.

Senior Machine Learning Engineer August 2022 - Present
Tignis, Inc. Seattle, WA
Lead technical development of multiple aspects of Tignis' AI process control software. Major initiatives and responsibilities included:

- **End-to-end process control solution** Managed greenfield construction of an automated process control solution prototyped by in-house data scientists, formalizing workflows and use cases in the UI and hardening the software for production use.
- **Efficient multivariate correlations** Took ownership of a multivariate correlation tool developed in-house, identified problems, and added patent-pending algorithmic solutions
- **Large language model prototyping** Prototyped and benchmarked several LLM-based additions to the product, including summarization of statistical reports, database querying in natural language, and new user experiences based on textual navigation.
- **Major architectural decision steering** Served on the architecture committee, making overarching software architecture, tooling and best practice decisions for the entire organization.

Vice President, Machine Learning Algorithms November 2015 - August 2022
BigML, Inc. Corvallis, OR
Lead multi-disciplinary teams working in Python, Java, JavaScript, and Clojure to improve current product offerings while also developing and deploying new functionality. Supported customers and potential investors with product exploration and early-stage product utilization. Served as a technical lecturer for BigML sponsored machine learning schools in Europe, Asia, and South America, as a presenter of quarterly product webinars introducing new features, and as a product ambassador at AI-related events worldwide. Initiated and maintained the following product features:

- **Computer vision stack implementation** Lead implementation team for all computer vision functionality on the platform, including algorithms for fine-tuning common deep learning architectures for image classification and object detection using TensorFlow and Keras.
- **Natural language processing and understanding** Served as primary developer for all natural language processing features on the platform, including basic textual processing such as tokenization and word stemming through higher-level techniques such as latent topic modeling, word embeddings, and transformers.

- **Real-world Bayesian parameter optimization** Implemented several popular algorithms for automatic parameter optimization using an in-house domain-specific language, which enabled users optimize the hyper-parameters of machine learning algorithms with little expertise and minimal effort.

Senior Quantitative Research Analyst

November 2012 - November 2015

Allston Trading

Chicago, IL

Conducted research and analysis to support and extend a portfolio of futures trading strategies. Utilized machine learning techniques to build a generalized strategy creation framework for market making strategies across a variety of U.S. and European futures, including equity index, treasury, currency and energy products. Parallelized analysis using a MapReduce framework on Hadoop. Developed web-based tools and visualizations for post-trade analysis using JavaScript and D3.

Senior Machine Learning Engineer

September 2011 - November 2012

BigML, Inc.

Corvallis, OR

Collaborated with development team to build a scalable infrastructure for machine learning on large data. Utilized tools such Hadoop and Storm to specify a generic interface from machine learning algorithms to massively parallel architectures. Developed performance benchmarks, data generators, and algorithms for data set manipulation. Worked closely with existing and potential clients and investors to help understand and utilize the system. Created short films and animations to be utilized as product demonstrations.

Adjunct Faculty

January 2009 - May 2011 (part-time)

University of Rochester

Rochester, NY

Taught courses in the computer science department at the University of Rochester. Participated in curriculum committee meetings to design new courses, and implemented these designs. Collaborated with undergraduate researchers to design course syllabus and materials. Managed a staff of up to 15 undergraduate teaching assistants, graduate teaching assistants, and “workshop facilitators”. Developed exams for student evaluation.

Research Scientist

September 2007 - September 2011

Eastman Kodak Company

Rochester, NY

Engaged in industrial research for product development and improvement, especially in the fields of machine learning, data mining, computer vision, and natural language processing. Worked with business units and external partners to leverage and implement practical research findings for use in products. Developed patents to improve and expand Kodak’s intellectual property portfolio. Participated in the following research efforts:

- **Pattern mining for machine reliability** Applied machine learning and pattern mining techniques to a database of observed part failures to determine superior methods for predicting failure prediction and correlations between part failure rates.
- **Text mining and topic modeling for scanned document databases** Used standard string processing techniques and latent Dirichlet allocation to determine latent topics in a set of unstructured documents acquired via scanner.
- **Audio event localization and categorization in consumer video** Developed algorithms for locating audio events (e.g., applause, music, laughter) in consumer videos.
- **Automatic print dating and text source determination** Served as machine learning expert for the Kodak “Scan The World” project and developed a decision tree-based algorithm to identify the dates of photographic prints based on visually determined attributes of the given print.
- **Photographic Print Authentication** Developed an algorithm and interface to assist in art print authentication via microscopic examination of the print substrate.

Graduate Research Assistant

January 2006 - September 2007

Oregon State University

Corvallis, OR

Developed and tested machine learning research code. Integrated with other machine learning modules from several different universities and the Advanced Technology Laboratory at Lockheed Martin. Participated in teleconferences and meetings to focus research direction and resolve integration issues. Prepared requirements

documents and component walkthroughs to satisfy grant administration requirements. Won the OSU COE Outstanding Graduate Research Assistant of the Year for 2006-2007 academic year.

Graduate Teaching Assistant

September 2002 - June 2006

Oregon State University

Corvallis, OR

Assisted students in comprehending course material. Assisted professors in developing class exercises and material. Created and delivered several lectures in professors' absence. Demonstrated problem solving techniques in group recitation sessions and through one-on-one tutoring. Nominated for OSU COE Outstanding Teaching Assistant of the year for the 2002-2003 and 2004-2005 academic years.

Programmer/Analyst

December 2001 - June 2002

Grossman and Associates

Chicago, IL

Programmed, debugged, and tested modules within a complex financial accounting software program. Dealt with client issues and service requirements, constructing software fixes and new features as appropriate. Wrote end-user documentation for completed modules.

SELECTED PUBLICATIONS

- [1] Charles Parker. "On Measuring the Performance of Binary Classifiers". In: *Knowledge and Information Systems* 35 (1 2013), pp. 131–152. DOI: 10.1007/s10115-012-0558-x.
- [2] X. Shelley Zhang, S. Yoon, P. DiBona, D. S. Appling, L. Ding, J. R. Doppa, D. Greeny, J. K. Guo, U. Kuter, G. Levine, R. L. MacTavish, D. McFarlane, J. R. Michaelis, Hala Mostafa, S. Ontañón, C. Parker, J. Radhakrishnan, A. Rebguns, B. Shrestha, Z. Song, E. B. Trehwitt, Huzaifa Zafar, Chongjie Zhang, Daniel Corkill, G. DeJong, T. G. Dietterich, S. Kambhampati, and Victor Lesser. "An Ensemble Architecture for Learning Complex Problem-Solving Techniques from Demonstration". In: *ACM Transactions on Intelligent Systems and Technology (TIST)* 4.3 (2012), 75:1–75:38. URL: <http://mas.cs.umass.edu/paper/514>.
- [3] Charles Parker. "An Analysis of Performance Measures for Binary Classification". In: *The International Conference on Data Mining*. Vancouver, Canada, Dec. 2011, pp. 517–526. URL: <http://www.clparker.org/parker-measure.pdf>.
- [4] Charles Parker, Dhiraj Joshi, Phoury Lei, and Jiebo Luo. "Finding geographically representative music via social media". In: *Proceedings of the First International ACM Workshop on Music Information Retrieval with User-centered and Multimodal Strategies*. Nov. 2011, pp. 27–32.
- [5] Charles Parker. "An Empirical Study of Feature Extraction Methods for Audio Classification". In: *ICPR '10: The Twentieth International Conference on Pattern Recognition*. Istanbul, Turkey, Aug. 2010, pp. 4593–4596. URL: <http://www.clparker.org/parker-audio.pdf>.
- [6] Charles Parker. "Anchor Point Selection by KL-Divergence". In: *WNYIPW '10: The Western New York Image Processing Workshop*. Rochester, NY, Nov. 2010. URL: <http://www.clparker.org/parker-kld.pdf>.
- [7] Charles Parker and Paul Messier. "Automating Art Print Authentication Using Metric Learning". In: *IAAI '09: The Twenty-First Innovative Applications of Artificial Intelligence Conference*. Pasadena, CA, July 2009. URL: <http://www.clparker.org/parker-art.pdf>.
- [8] X. Shelley Zhang, S. Yoon, P. DiBona, D. S. Appling, L. Ding, J. R. Doppa, D. Greeny, J. K. Guo, U. Kuter, G. Levine, R. L. MacTavish, D. McFarlane, J. R. Michaelis, Hala Mostafa, S. Ontañón, C. Parker, J. Radhakrishnan, A. Rebguns, B. Shrestha, Z. Song, E. B. Trehwitt, Huzaifa Zafar, Chongjie Zhang, Daniel Corkill, G. DeJong, T. G. Dietterich, S. Kambhampati, and Victor Lesser. "An Ensemble Learning and Problem Solving Architecture for Airspace Management". In: *IAAI '09: The Twenty-First Innovative Applications of Artificial Intelligence Conference*. Pasadena, CA, July 2009, pp. 203–210. URL: <http://www.clparker.org/parker-dtl.pdf>.
- [9] Charles Parker. *An Analysis of Kodak NexPress Failure Data*. Tech. rep. 344794L. Rochester, NY: Eastman Kodak Company, Dec. 2008.
- [10] Charles Parker. "Structured Gradient Boosting". PhD thesis. Corvallis, OR: Oregon State University, Aug. 2007. URL: <http://www.clparker.org/parker-thesis.pdf>.

- [11] Charles Parker, Alan Fern, and Prasad Tadepalli. “Learning for Efficient Retrieval of Structured Data with Noisy Queries”. In: *ICML '07: The Twenty-Fourth International Conference on Machine Learning*. Corvallis, OR, June 2007, pp. 729–736. URL: <http://www.clparker.org/parker-ret.pdf>.
- [12] Charles Parker, Prasad Tadepalli, Weng-Keen Wong, Thomas Dietterich, and Alan Fern. “Learning from Demonstrations via Structured Prediction”. In: *AAAI '07 Workshop on Acquiring Planning Knowledge via Demonstration*. Vancouver, BC, Canada, July 2007. URL: <http://www.clparker.org/parker-plan.pdf>.
- [13] Charles Parker, Alan Fern, and Prasad Tadepalli. “Gradient Boosting for Sequence Alignment”. In: *AAAI '06: The Twenty-First National Conference on Artificial Intelligence*. Boston, MA, July 2006, pp. 452–457. URL: <http://www.clparker.org/parker-grad.pdf>.
- [14] Charles Parker. “Applications of Binary Classification and Adaptive Boosting to the Query-by-Humming Problem”. In: *International Symposium on Music Information Retrieval*. London, England, Sept. 2005, pp. 245–251. URL: <http://www.clparker.org/parker-ismir.pdf>.
- [15] Charles Parker. “A Fast Tree-Based Method for Melodic Retrieval”. In: *ACM Joint International Conference on Digital Libraries*. Tucson, AZ, June 2004. URL: <http://www.clparker.org/parker-tree.pdf>.
- [16] Charles Parker. “Examining Synthetic Databases in Melodic Retrieval Testing”. In: *International Conference on Computer Music*. Miami, FL, Nov. 2004. URL: <http://www.clparker.org/parker-syn.pdf>.
- [17] Charles Parker. “Towards Intelligent String Matching in Query-by-Humming Systems”. In: *IEEE International Conference on Multimedia and Expo*. Baltimore, MD, June 2003, pp. 25–28. URL: <http://www.clparker.org/parker-qbh.pdf>.

UNITED STATES PATENTS

- [1] Charles Parker. “Prediction Characterization for Black Box Machine Learning Models”. U.S. Patent 11,328,220. May 2022.
- [2] Jiebo Luo, Dhiraj Joshi, and Charles Parker. “Automatically selecting thematically representative music”. U.S. Patent 10,089,392. Oct. 2018.
- [3] Francisco J. Martin, Adam Ashenfelter, Justin J. Donaldson, Jos Verwoerd, Jose Antonio Ortega, and Charles Parker. “Evolving parallel system to automatically improve the performance of multiple concurrent tasks on large datasets”. U.S. Patent 9,558,036. Jan. 2017.
- [4] Francisco J. Martin, Oscar Rovira, Jos Verwoerd, Poul Petersen, Charles Parker, Jose Antonio Ortega, Beatriz Garcia, Justin J. Donaldson, Antonio Blasco, and Adam Ashenfelter. “Predictive modeling and data analysis in a secure shared system”. 9,576,246. Feb. 2017.
- [5] Francisco J. Martin, Adam Ashenfelter, Justin J. Donaldson, Jos Verwoerd, Jose Antonio Ortega, and Charles Parker. “Methods for building regression trees in a distributed computing environment”. U.S. Patent 9,269,054. Feb. 2016.
- [6] Charles Parker and Adam Ashenfelter. “Interactive visualization of big data sets and models including textual data”. U.S. Patent 9,501,540. Nov. 2016.
- [7] Alexander C. Loui, Wei Jiang, Kevin M. Gobeyn, and Charles Parker. “Audio signal semantic concept classification method”. U.S. Patent 9,111,547. Aug. 2015.
- [8] Jiebo Luo, Dhiraj Joshi, and Charles Parker. “Automatically selecting thematically representative music”. U.S. Patent 9,098,579. Aug. 2015.
- [9] Francisco J. Martin, Adam Ashenfelter, Justin J. Donaldson, Jos Verwoerd, Jose Antonio Ortega, and Charles Parker. “Evolving parallel system to automatically improve the performance of multiple concurrent tasks on large datasets”. U.S. Patent 9,098,326. Aug. 2015.
- [10] Alexander C. Loui, Wei Jiang, Kevin M. Gobeyn, and Charles Parker. “Audio based control of equipment and systems”. U.S. Patent 8,880,444. Nov. 2014.
- [11] Andrew C. Blose, Andrew C. Gallagher, Joseph A. Manico, and Charles L. Parker. “Use of handwritten notations from photographs”. U.S. Patent 8,531,482. Sept. 2013.

- [12] Andrew C. Blose, Andrew C. Gallagher, Joseph A. Manico, and Charles L. Parker. “Using handwritten notations in digital video presentations”. U.S. Patent 8,396,304. Mar. 2013.

INVITED TALKS

- AI Innovation Summit, “Really Automating Machine Learning” Chicago, IL. May, 2019.
- MLPrague, “Really Automating Machine Learning” Prague, Czech Republic. March, 2018.
- PAPIs.io, “Automated Machine Learning: Mostly Unhelpful” Boston, MA. October 2017.
- International Joint Conference on Artificial Intelligence, “Automated Machine Learning: Mostly Unhelpful” Melbourne, Australia. August 2017.
- Real-Time Big Data Meetup, “Real-time Machine Learning”. Menlo Park, CA. March, 2013.
- Galois, Inc., “An Analysis of Analysis”. April, 2012.
- Oregon State University, “An Analysis of Analysis”. January, 2012.
- Sandia Labs, “An Analysis of Analysis”. June, 2011.
- Accenture Labs, “New Directions for Multi-label Classification”. April, 2011.
- Kodak Digital Imaging Forum, “Submodularity and Sparse Coding”. November, 2009.
- 2008 Digital Imaging Conference, “Machine Learning and Image Processing Techniques for Automatic Print Dating”. November, 2008.
- Kodak Digital Imaging Forum, “Four Short Lectures on Machine Learning”. December, 2007.
- University of Rochester, “Structured Gradient Boosting”. October, 2007.
- Kodak Intelligent Systems Research Center, “Machine Learning for Sequence Data Retrieval: A Comprehensive Approach”. June, 2007.

REFERENCES

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