Johannes S. Otterbach, Ph.D.

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PROFILE

Self-motivated Ph.D.-level Physicist with a curious, analytical mind and a passion for all things AI, quantum & data. Experience building large-scale machine learning systems using pytorch, managing and analyzing data using Python (NumPy, SciPy, pandas, scikit-learn), Apache Spark (SparkSQL, MLlib), Postgres, MATLAB, MATHEMATICA and developing algorithms and software for near-term quantum hardware. Expert knowledge of advanced mathematics, statistics machine learning and AI, and strong communication skills for presenting and visualizing complex concepts to diverse audiences.

PROFESSIONAL DEVELOPMENT

Machine Learning Researcher 06/2018 - present
OpenAI, San Francisco, CA

- Basic research in the area of Unsupervised and Generative Models with focus on Likelihood models such as Energy-Based Models, Normalizing Flows, Recurrent Networks and Autoregressors.

Research Scientist and Software Engineer 04/2017 - 05/2018
Rigetti Quantum Computing, Berkeley, CA

- Prototyping and demonstrating applications for near-term quantum devices, such as Quantum Machine Learning and Combinatorial Optimization Problems.
- Developing and maintaining an OCaml-based simulator of a quantum processing unit.
- Managing, coordinating and actively participating in a small research team for near-term applications.
- Engaging with customers; estimating benefits using quantum computations and translating problems to quantum algorithms.

Senior Data Scientist 12/2016 - 03/2017
Data Scientist 08/2015 - 11/2016
LendUp, San Francisco, CA

- Architect of new machine learning model scoring service with ability to serve models developed in several different languages and frameworks.
- Implemented Python variants of various learning algorithms, such as Generalized Additive Models and Constrained Linear Models.
- Contributed to key algorithms to generate model insights and auditability for regulatory compliance.
- Supported Data Scientists with ad-hoc and production algorithms for feature analysis and selection. Provided dashboards and automated reports for business stakeholders.
- Developed and deployed several models for credit underwriting, including models for new products.
- Analysed and integrated new data sources into production systems to increase data redundancy.

Infrastructure Quality Engineer (Machine Learning) 4/2014 - 7/2015
Palantir Technologies, London, UK (until 1/2015) and Palo Alto, CA

- Analyzed TB-sized, disparate customer-dataset and implemented new propensity model pipeline using Apache Spark, surfacing previously unknown churn indicators.
- Solidified and scaled end-to-end PySpark ETL-machine learning pipeline, resulting in a ∼5x increase in handled data-scale and ∼5x decrease of training time.
- Reduced feature engineering development times by 3x through creating new featurization prototypes in quick iterations with product and data-science teams.

- Deployed, debugged and maintained complex, distributed software stacks, containing Apache Spark, Hadoop HDFS and IPython Notebook servers, on cloud-based AWS systems. Optimized the stacks for best computational performance and stability.
- Developed CometD-based user-scale testing and analytics framework resulting in a ∼10x improvement in handled users.

Postdoctoral Research Fellow (Theoretical Quantum Physics) 9/2011 - 3/2014
Harvard Quantum Optics Center, Cambridge, MA

- Studied phase diagrams of strongly interaction 1D cold atom systems with numeric and analytic tools.
- Simulated the time-evolution of models with spatial and temporal randomness using Markov processes and ensemble theory, creating insights into highly correlated states of matter.
- Explained and matched experimental observations to theoretical models using fitted statistical simulations and analytic solutions.
- Presented research results to general as well as expert audiences through invited seminars, conferences, talks and posters.
- Collaborated, influenced and contributed to research projects with international teams.

EDUCATION

Ph.D. in Physics, *GPA: 4.0 with distinction*, 10/2011
Theoretical Quantum Optics Group of Prof. Dr. M. Fleischhauer
University of Kaiserslautern, Germany

B.S./M.S. in Physics, *GPA: 3.93*, 5/2008
University of Kaiserslautern, Germany

TECHNICAL SKILLS

- Programming languages: Python, Java, Apache Spark, Scala, JavaScript, SQL and Shell scripting. Familiarity with OCaml, Cyton/C, Hadoop HDFS, AWS S3, R as well as ReactJS, Redux and Gatsby.
- Experience with mathematical and statistical Python libraries such as pandas, scikit-learn, NumPy and SciPy, PyTorch, TensorFlow, Owl, and software such as MATLAB and MATHEMATICA.
- Advanced mathematics and physics toolset paired knowledge of software best practices and applied machine learning ideally suited to tackle bleeding-edge challenges in AI and Deep Learning.

SELECTED SCHOLARSHIPS AND AWARDS

Prize Fellowship of the Harvard Quantum Optics Center 2011-2013
2011 Award of the Friends of the University of Kaiserslautern for an outstanding scientific performance as a Ph.D. student in physics 6/2012
Foundation of German Business scholarship 2005-2008

SELECTED PUBLICATIONS

20 in total with 200+ citations. Complete list available upon request.

1. J. S. Otterbach et. al., *Unsupervised Machine Learning on a Hybrid Quantum Computer*, arxiv:1712.05771.
2. A. V. Gorshkov, J. Otterbach, E. Demler, M. Fleischhauer, M. D. Lukin, *Photonic Phase Gate via an Exchange of Fermionic Spin Waves in a Spin Chain*, Phys. Rev. Lett. 105, 060502 (2010)
3. J. Otterbach, M. Moos, D. Muth, M. Fleischhauer, *Wigner Crystallization of Single Photons in Cold Rydberg Ensemble*, Phys. Rev. Lett. 111, 113001 (2013).

LANGUAGE SKILLS

German: Native speaker. English: Fluent. Swedish and French: Basic

ACTIVITIES

Avid boulderer and climber. Enjoys slacklining and a good game of Ultimate Frisbee with friends. Good food or an outdoor trip are always welcome.