Giuseppe Barbalinardo

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Experience

Senior Data Scientist – Tonal Systems, Inc. - San Francisco Jan '21 – Now

- Designed and implemented machine learning algorithms and models to perfect and improve the Tonal trainer.
- Performed data analysis and research on large-scale dataset to predict and describe users' behaviors.
- Developed algorithms to detect motion patterns via sensor trajectories analysis.
- Implemented the deployed algorithms and models in the production environment.

Ph. D. Researcher – University of California - Davis Sept '16 - Dec '20

- Research on predicting statistical properties of materials by using ensemble and time-series analysis. Focus on novel model development and implementation to improve both data collection and analytics for large scale simulations.
- Development of a novel software to model to describe for heat in solids, which uses advanced statistical tools to reduce ~10x the computational cost of data collection and analytics of atomic positions and movements. Simulations performed on the MPS computing cluster at UC Davis. Published model and results in Nature Communication.
- Collaboration in the implementation of modern Artificial Intelligence architectures to model interatomic forces, and atomic trajectories, reducing the simulation time by ~100x compared to full calculations, and thus allowing to scale to larger systems. Results published in the Journal of Applied Physics (2019).
- Teaching Assistant for the graduate class of Mathematical Methods for Scientists. Teaching numerical algorithms using Python, including: Optimization Methods (Gradient Descent, quasi-Newton, BFGS), Partial Differential Equations, Regularization, Dimensionality Reduction, Penalized Regressions, LASSO, Fast Fourier Transform, and Linear Algebra.
- Collaborated with cross-functional research groups at SISSA (Italy), and the Centre of Excellence at the Aalto University (Finland), and at the Bohai University in Jinzhou (China).

Software Developer and Engineering Manager – Grio - San Francisco May '14 – Aug '16

Software Developer and Engineering Manager Dec '15 - Aug '16

- Managed a team of 6-8 software developers across several simultaneous projects, while continuing hands-on coding.
- Designed and implemented the apprentice program and mentored junior developers.
- Organized the company's first hackathon.

Software Developer May '14 – Nov '15

- Contributed to projects with diverse technology stacks, coding in Java, Objective C, SQL, and Python.
- Developed the Target iPad app in an Agile-driven team of 12 people.
- Developed the Texture Next Issue app, through prototyping, validation and iterations of the product.
- Collaborated with the marketing and business team at Twitter. Developed a Python/AngularJS dashboard to convert proprietary meta-language to Ruby and later application to over 10 marketing campaigns.
- Presented 4 Tech Talks at the company all-hands meeting.

Education

University of California, Davis
Ph.D. Computational Chemical Physics, GPA 4.0, 2021, Advisor: Dr. D. Donadio
Relevant coursework: Artificial Intelligence, Statistical Mechanics, Mathematical Methods for Scientists
University of California, San Diego
M.Sc. Physics, Condensed Matter Theory, 2013
Relevant coursework: Stochastic Methods, Computational Physics II: PDE and Matrices, Equilibrium Statistical Mechanics, Non-Equilibrium Statistical Mechanics
University of Milan-Bicocca, Italy
M.Sc. Theoretical Physics, Summa Cum Laude, 2011
B.Sc. Physics, 2008
Relevant coursework: Linear Algebra, Group Theory, Probability and Statistics, Field Theory, Computational Physics
Uppsala University, Sweden
Master Thesis Dissertation, 2011

Skills

Technologies
- Python (Numpy, Tensorflow, Keras, Scikit Learn, Pandas, Matplotlib, PySpark, MPI4py)
- DB (PostgreSQL / MySQL)
- Infrastructure (Docker / Kubernetes / Google Cloud)
- Mobile (Objective C, Swift, Android)
- Others (GoLang / HPC / MPI / CUDA / Linux / JAVA SE)
- Software Development (Design Patterns / Algorithms)
- Advanced Math Tools (Statistics / Probability / Linear Algebra / Stochastic Methods / Information theory)

Data Science, Machine Learning and Artificial Intelligence
- Time series analysis
- Predictive modeling
- Forecasting
- Causal inference
- Optimization
- Dimensionality reduction
- Regularization
- Clusterization
- Neural Networks
- Natural Language Processing
- Markov Chain Montecarlo

Research and Projects

Lead developer and creator of kALDo, a modern Tensorflow-based open-source software package for heat transport simulations, optimized to run large-scale simulations on CPUs and GPUs.
- Development from conception to release, including unit-tests, documentation, continuous integration, and deployment using Docker and CircleCI. Implementation of Google Colab tutorials.
- Published code paper and reference results on the Journal of Applied Physics, Physical Review B, and Physical Review Letters.

Co-founder of Ergo (June 2019), a AI-NLP driven dashboard that pulls the latest news stories across media sources and highlights relevant content in an effort to combat the spread of misinformation.
- Implementation of the main machine learning algorithms, including Sentence Transformer (SBERT), Dimensionality reduction using principal component analysis, Entity Extraction, and Clusterization, using Python, Numpy, Tensorflow and Pytorch.
- Development of the main stack, Flask, Postgres, VueJS, Grafana, Docker, Kubernetes, and Google Cloud.

Awards

- Recipient of the prestigious Software Development Investment Fellowship (~$78,000) from the National Science Foundation, Molecular Sciences Software Institute.
- Recipient of the 2020 Peter A. Rock Graduate Fellowship for the highest academic merit and research in Chemical Physics by UC Davis..
- Distinguished M.Sc. thesis award. Fellowship for the dissertation: “Quantum Theory of the Inverse Faraday Effect” from the Lerici Foundation in Stockholm
- Summa Cum Laude M.Sc. Degree in Theoretical Physics, from University of Milan, Bicocca

Academic publications

- Barbalinardo, G., Chen, Z., Dong, H., Zheyong, F. and Donadio, D. arXiv:2103.10633 and accepted for publication on Physical Review Letters - June 2021
- Lundgren, N.W., Barbalinardo, G. and Donadio, D., Physical Review B 103, 024204
- G Barbalinardo, Z Chen, NW Lundgren, D Donadio, Journal of Applied Physics 128 (13), 135104
- Claudia Mangold, Shunda Chen, Giuseppe Barbalinardo, Joerg Behler, Pascal Pochet, Konstantinos Termentzidis, Yang Han, Laurent Chaput, David Lacroix, Davide Donadio, Journal of Applied Physics 127
- Leyla Isaeva, Giuseppe Barbalinardo, Davide Donadio & Stefano Baroni, Nature Communications volume 10, Article number: 3853 (2019)
- G Barbalinardo, CA Sievers, S Chen, D Donadio, 2018 IEEE-NANO 18414617
- M Battiato, G Barbalinardo, PM Oppeneer. Physical Review B 89 (1), 014413, - January 2014
- M Battiato, G Barbalinardo, K Carva, PM Oppeneer. Physical Review B 85 (4), 045117 - January 2012