Giuseppe Barbalinardo

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I am interested in the overlapping areas between software development and scientific modeling, and passionate about AI and Natural Language Processing.

Research Highlights

My Ph.D research focuses on modeling heat transfer at the atomistic level. I contributed to this field with a novel theory development (Nature Communications 2019), numerical solutions (Journal of Applied Physics 2020) and by using modern machine learning techniques (Journal of Applied Physics 2020).

I am the main developer of kALDo, a modern open-source Python-Tensorflow package for Anharmonic Lattice Dynamics calculations: *github.com/nanotheorygroup/kaldo*

Experience

Graduate Student Researcher Jul' 19 - Dec '20
Nanotheory Research Group led by Dr. D. Donadio,
University of California Davis

- Awarded the Software Development Investment Fellowship from the National Science Foundation - Molecular Sciences Software Institute.
- 2020 recipient of the Peter A. Rock Graduate Fellowship in Chemical Physics by UC Davis.

Teaching Assistant Sept '16 - Jun' 19
University of California Davis

- Teaching Assistant for the graduate class of Mathematical Methods for Chemists. Helped students in learning numerical algorithms using Python: Fast Fourier Transform, Eigenvalues using Lanczos and Householder, Optimization using Gradient Descent and BFGS, Partial Differential Equations, and Regularization and dimensionality reduction using LASSO and LARS.
- Teaching Assistant for the graduate classes of Quantum Mechanics (1 & 2) in the Chemistry Department. Taught Educational Python lectures and tutorials. Implemented a code for students to numerically solve Schrodinger equation using Discrete Variable Representation.

iOS Engineering Manager Jan '16 - Aug '16
Bitalign Inc. dba Grio San Francisco

- Managed and led the iOS team of 8 software developers across several simultaneous projects.
- Collaborated with several companies in the Bay Area and delivered high-quality software. Examples include Texture by Next Issue Media (now acquired by Apple).
- Designed and implemented the apprentice program and mentored junior developers.
- Organized the company's first hackathon and presented Tech Talks.

Software Engineer May '14 – Dec '15
Bitalign Inc. dba Grio San Francisco

- Developed software using Swift, Objective C, Java (Android) and Ruby on Rails in an Agile-methodology driven environment.
- Partnered with clients in the Bay Area including the development of the Target iPad app.
- Designed high-level software architecture for new projects, including a collaboration with Twitter where I developed a dashboard to convert proprietary meta-language to Ruby and later applied to over 10 marketing campaigns.

Education

Ph.D. Computational Chemical Physics. Sept '16 - Dec '20
University of California Davis

- Coursework average GPA: 4.0.
- Relevant coursework: Mathematical Methods, AI and NLP, Statistical Mechanics.

M.Sc. Condensed Matter Theory. Apr '12 – Dec '13
University of California San Diego

- Relevant coursework: Stochastic Methods, Computational Physics II: PDE and Matrices, Equilibrium Statistical Mechanics, Non-Equilibrium Statistical Mechanics, Quantum Field Theory.

M.Sc. Theoretical Physics Dec '08 – Jul '11
University of Milan, Bicocca Milan, Italy
Uppsala University (Master Thesis) Uppsala, Sweden

- Distinguished thesis award fellowship for the dissertation: "Quantum Theory of the Inverse Faraday Effect", issued by the: Lerici Foundation in Stockholm.
- Graduated with academic honor, *magna cum laude*.
- Relevant coursework: Linear Algebra, Group Theory, Probability and Statistics, Field Theory, Computational Physics.

Other Activities

I am the co-founder of ERGO, an AI powered platform that pulls the latest news stories across media sources and highlights relevant content to combat the spread of misinformation: *www.searchergo.com*
Technologies: Python, Postgres, VueJS, NLP algorithms, in particular the Transformer (sentence).

Skills

Mathematical Methods
Linear Algebra / Statistics / Probability Theory / Information Theory / Stochastic Methods / Differential Equations / Markov Chain Monte Carlo / Numerical Methods / Algorithms

Machine Learning
Regressions and penalized regressions / Dimensionality reduction using LASSO, Single Value Decomposition and Principal Component Analysis / Optimization methods / Deep Neural Networks / Time series analysis using LSTM and Wavenet / NLP algorithms / BERT and Sentence Transformer.

Technologies
Python / Objective C / Swift / Tensorflow / Keras / Pytorch / PostgreSQL / MySQL / JAVA SE / Android / Javascript / VueJS / Ruby on Rails / Docker / Kubernetes / Fortran / BLAS / Lapack / MPI / CUDA / High Performance Computing