

CLANCY, RICHARD J

Website: www.rjclancy.com

EDUCATION

University of Colorado – Boulder, CO

PhD Applied Mathematics – expected May 2022

Aug 2017 – Present

Focus on methods to handle uncertain/mispecified forward models for inverse problems and associated algorithms including interpolation based trust region methods. Special attention paid to robust optimization and approximative MLEs for general noise models. Have studied blind source separation and signal processing to localize neural activity for brain-computer interfacing using MEG data.

Advisor: Stephen Becker

Texas State University – San Marcos, TX

MS Applied Mathematics

May 2017

Studied truncation error for numerical PDEs over irregular, non-uniform meshes, multigrid solvers

Thesis: “Numerical solutions to Poisson’s equation over non-uniform discretizations with associated fast solvers”

University of Colorado – Boulder, CO

BA Physics

May 2007

RESEARCH, TEACHING, AND PROFESSIONAL EXPERIENCE

University of Colorado – Boulder, CO

Research Assistant

Aug 2019 – Present

Simulate, model, and design algorithms for source localization in the brain and characterize novel magnetometers for use in biomedical applications.

University of Colorado – Boulder, CO

Teaching Assistant

Aug 2017 – May 2020

Courses taught include Calculus 2, Calculus 3, Differential Equations, Linear Algebra, and Markov Processes.

Los Alamos National Laboratory – Los Alamos, NM (remote)

Research Intern

July 2021 – September 2021

Investigated likelihood of and remedial actions for catastrophic rounding error in scientific computing pipelines. Discovered that 20% of computations in a PDE simulation were ignored due to limited dynamic range of floating point arithmetic when using single precision.

Argonne National Laboratory – Lemont, IL (remote)

Givens Associate

May 2021 – July 2021

Studied and implemented trust region method exploiting mixed precision computations for large scale scientific computing and “big data” applications. Effectively reduced the computational burden by a factor of two by using single precision arithmetic where possible. Employed limited-memory linear algebra routines allowing for the solution of problems too large to fit in memory, i.e., optimization problems in excess of 1 million variables.

FieldLine, Inc – Boulder, CO

Summer Research Intern

May 2020 – Aug 2020

Developed anomaly detection software for military/border security applications using magnetometers. Implemented signal processing algorithms to filter data and localize threats. Modeled different sensor array geometries to determine optimal configurations for counter-tunneling saving physicists and engineers months of time by running simulations rather than conducting physical experiments as done prior.

Sensory, Inc – Boulder, CO

Summer Research Intern

May 2019 – Aug 2019

Member of vision research team investigating methods for solving non-linear least squares problems to estimate pose angles and absolute distance from a camera. Contributed to production code employed on mobile devices for facial authentication and determine user engagement. Wrote scripts to parse/analyze large and messy datasets. Debugged inhouse legacy C++ code.

Texas State University – San Marcos, TX

Research Assistant / Teaching Assistant

Aug 2015 – May 2017

Studied numerical methods for solving PDEs with a focus on error analysis of non-uniform discretizations within the finite difference framework. Proved that the error of numeric solutions on an irregular mesh is an order of magnitude better than naïve analysis suggest. Developed fast-solvers based on the multigrid method.

Bluewater Financial Advisors, LLC. – Austin, TX

Risk Manager

Oversaw company-wide derivative exposure, ensuring positions remained within prescribed risk limits.
Modeled scenario pricing to optimize option trading strategies on energy futures.

Oct 2014 – Aug 2015

AAA Capital Management Advisors, LTD. – Houston/Austin, TX

Quantitative Analyst / Natural Gas Options Trader

Conducted fundamental and quantitative research at energy focused commodity trading advisor.
Assisted in the development of a proprietary risk-management system that evaluated derivative option risks in real-time. Developed and implemented automation routines for collecting large amounts of data. Built economic models and ran Monte Carlo simulations using random processes.
Ultimately managed a \$25 million discretionary option portfolio focused on natural gas.

Jul 2007 – Sep 2014

PAPERS AND MANUSCRIPTS

“TROPHY: Trust Region Optimization using Precision Hierarchy”

with Jan Hückelheim, Matt Menickelly, Paul Hovland, Prani Nalluri. In preparation

“Approximate maximum likelihood estimators for linear regression with design matrix uncertainty”

with Stephen Becker. Submitted to IEEE Transactions on Signal Processing

“A study of optically-pumped magnetometers for use in magnetoencephalography without shielding”

with Vladislav Gerginov, Svenja Knappe, Stephen Becker, Orang Alem Physics in Biology and Medicine 66, 175030

“Robust least squares for quantized data matrices”

with Stephen Becker. Signal Processing 176, 107711

“Numerical solutions to Poisson’s equation over non-uniform discretizations with associated fast solvers”

completed under the direction of Young Ju Lee MS thesis

PRESENTATIONS

“Assorted Topics in Applied Mathematics”

Institute for Human Neuroscience at Boys Town Research Hospital, Dec 2021, Omaha, NE

“Design matrix uncertainty: robust optimization and approximate MLE approaches”

SIAM Conference in Optimization, Jul 2021, Spokane, WA (remote)

“Approximate maximum likelihood estimators for linear regression with design matrix uncertainty”

SIAM Front Range Student Conference, Mar 2021, Denver, CO (remote)

“Optimal Convergence of the Shortley-Weller Formula for Poisson’s Equation over an Interior Non-Uniform Grid”

Diff. Equations and Applied Math Seminar, May 2017, Texas State University – San Marcos, TX

SERVICE

SIAM CU Graduate Student Chapter, Boulder, CO

President

Coordinate and plan SIAM related activities, organize talks, and oversee operations.

Spring 2020 – Present

ICML 2021, NeurIPS 2021, ICLR 2022

Reviewer

Evaluated submissions for acceptance at conferences

2021

SIAM Front Range Student Conference, Denver, CO (remote)

Organizer

Helped organize and schedule a student run conference for university students in the region to share their research or present on a topic of interest.

Spring 2021

Graduate Student Orientation, Boulder, CO

Mentor

Teach first year graduate students the ropes and provide assistance when difficulties arise.

Fall 2018 – Present

Summer Stem Camp on Data Science and Machine Learning – Longmont, CO and Aurora, CO

Teacher

Volunteered to teach mini-course intended to excite middle and high school students about research/careers in data science and machine learning.

Summer 2018 and 2019

MTY Academy – Austin, TX

Teacher

Taught local middle school students geometry as part of summer enrichment program.

Summer 2016 and 2017

COMPUTER LITERACY

Extensive experience with MATLAB, Python (Scikit-learn, Numpy, Pandas, etc.) and Visual Basic for Applications.

Comfortable working from Linux/Unix command line with some parallel computing experience.

Classroom experience with SQL, C++, and R.