Andrew Ortegaray

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Education

California Institute of Technology (Caltech) Pasadena, CA
Bachelor of Science in Mathematics and Physics; GPA: 3.63 *Sep. 2016 – June 2020*

Skills

Python, Wolfram Language, Mathematica, Numpy, Scipy, Anaconda, Pandas, C++, R, Lean, Octave, Matlab, HTML, Linux, LaTeX, Bayesian Statistics, First-Order Logic, Causal Inference, Monte-Carlo Methods, Topological Data Analysis

Experience

SpaceX Seattle, WA
Starlink Analyst *Sep. 2022 – Present*

Monitored network health via collaboration with various subsystem teams across the Starlink program. Developed scalable measures of key network metrics. Managed orbital assets, terrestrial network interconnections, network location sites, and points of presence.

Satellite Performance: Analyzed two years of global satellite data and isolated satellite assets with limited performance. Improved overall network performance based upon system performance metrics.

Live Network State: Compiled live network data and simulated the network state to predict isolation/capacity limitation events in the network. Developed actionable data to prevent future risk to the network.

Art of Problem Solving Academy Bellevue, WA
Math Instructor *Sep. 2022 – Present*

Lead classes at the academy ranging from Calculus to Competition Level. Courses were general as large as 15 students and included students at the the middle school to high school level.

Wolfram Research Seattle, WA
Symbolic Algorithms Researcher *Aug. 2020 – Aug. 2021*

Fast Number Theoretic Transforms (FNTTs): Implemented FFT-style algorithms for computing FNNTs over number fields in the Wolfram Language. Constructed fast methods for matrix computation of small transforms and a fast, iterative divide-and-conquer strategy for larger transforms. New FNTTs are published and available on current Wolfram Language distributions.

Fast Multipole Methods (FMMs): Designed FMMs for fast evaluations of many-particle potentials in 1D, 2D, and 3D in the Wolfram Language. Permitted high control of accuracy in near and far regions of the potential distribution. The new implementations performed with $O(n)$ complexities at evaluation compared to default $O(n^2)$ methods with computation timing crossovers at practical particle distribution sizes ($n > 8000$).

Caltech Pasadena, CA
Teaching Assistant *Mar. 2018 – Dec. 2019*

Ph 1ab/Ph 2c: Two yearlong introductory physics courses. Graded student papers, typeset new solutions, and assisted students with course topics including mechanics, electromagnetism, and special relativity.

Ma 0: An introduction to proofs course. Held weekly office hours and graded student assignment on topics including the Peano axioms, strong induction, and complex numbers.

Ma 5a: An introductory abstract algebra course. Graded student papers, typeset new solutions, and assisted students in topics including groups, homomorphisms, Sylow's theorem, and group actions.

Projects

Wolfram Summer Program Champaign, IL

Student *June 2020 – Aug. 2020*

Developed new methods in the Wolfram Language to compute persistent homology of the Vietoris-Rips complex of point cloud data with access to generators. Implementation widely available on current Wolfram Language distributions. See papers below.

Summer Undergraduate Research Fellowship Pasadena, CA

Research Fellow *June 2016 – June 2017*

A research program at Caltech. Analyzed linguistic data in a geometric setting with the intent of determining and reproducing phylogenetic trees of different language families. See papers below.

Youth Math League Arcadia, CA

Lead Coach *Jan. 2019 – June. 2020*

Youth math program organized with the company PrepSC to prepare 5th/6th grade students for Olympiad-style competitions. Organized and lead practices and lessons for students weekly.

Papers

Heat Kernel Analysis of Syntactic Structures (with R. Berwick and M. Marcolli), *Mathematics in Computer Science*, Vol. 15 (2021), 643–660

Phylogenetics of Indo-European Language Families via an Algebro-Geometric Analysis of Their Syntactic Structures (with K. Shu, R. Berwick, and M. Marcolli), *Mathematics in Computer Science*, Vol. 15 (2021), 803-857

`Wolfram Community |` "[WSS20] Persistent Homology"