PRITHVI THAKUR

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Personal Website | LinkedIn | GitHub

KEY SKILLS

- Data scientist with six years of experience in Python, Julia, and Matlab with a focus on multi-threading, distributed high performance computing, finite- and spectral-element analysis, and large systems of linear and nonlinear equations. Proficient in building and compiling new softwares on multiple remote and local systems using C, cmake, and bash. Developer, maintainer, and contributor of multiple open source softwares: GitHub Link.
- Five years experience working with numerical models and teleseismic earthquake data. Proficient in earthquake physics and statistics including magnitude-frequency relationships, source spectrum models, and rupture mechanisms.
- Proficient at designing and developing new research ideas by perusing existing literature, identifying key knowledge gaps, and incorporating editorial and reviewer feedback. Involved in multiple original and innovative research projects that led to authorship of 5 publications and various conference presentations.
- Engaging public speaker who helps audience with very diverse academic backgrounds understand and retain information through visually innovative and well-structured presentations using modern tools such as Canva, Keynote, Adobe Illustrator, and Latex. Have given conference and invited talks both with U.S. and internationally. Actively collaborated with various scientists from across the globe: able to communicate ideas, prepare analyses, and work in a team with various backgrounds.

Softwares/Developer Tools: Python, Julia, Matlab, Git and Github, Generic Mapping Tools (GMT), LaTeX, Markdown, Obsidian MD, vim, Selenium IDE, Adobe Photoshop and Illustrator, Visual Studio.
Scientific Expertise: General Purpose Programming, Numerical Modeling, High Performance Computing, Bayesian Inference, Machine Learning, Scientific and Technical Writing.

EXPERIENCE

Graduate Research Assistant September 2017 – Present
University of Michigan *Ann Arbor, MI*

- Created high performance efficient numerical models to study the long-term sequences of seismic and aseismic slip in strike-slip fault zones. Our current implementation in Julia language using efficient multigrid solvers and multi-threaded parallelism is faster than the previous implementations by over 60 times.
- Demonstrated the effects of fault zone geometry, compliance, and maturity on dynamic earthquake cycles for the first time: showed that the depth-distribution of earthquakes can be constrained by fault zone geometry and recurrence of earthquakes can be highly irregular in immature fault zones.
- Developer and maintainer of high-performance earthquake cycle simulation code SPEAR with 6 stars and 4 forks on github. This code has been used for community benchmarking project operated by Southern California Earthquake Center (SCEC).
- Taught several graduate courses (Physical Oceanography, Seismology, Various Minicourses) with over 20 students in each course.

Project Assistant June 2016 – March 2017
Indian Institute of Science *Bengaluru, India*

- Clustered and optimized earthquake focal mechanism data to delineate the spatiotemporal stressing history of the Sumatra-Andaman subduction zone. Worked extensively with Linux shell script (Ubuntu/RHEL), Generic Mapping Tools, and Python to extract, visualize, cluster, and correlate teleseismic data and infer the tectonic history.
- Taught and mentored several undergraduate students, some of whom were admitted to prestigious graduate programs in physics, mathematics, and geophysics.

Undergraduate Research Assistant July 2014 – May 2016
Indian Institute of Technology *Roorkee, India*

- Developed the first hybrid clustering-optimization algorithm to invert tectonic stress and simultaneously cluster tectonic fault-slip data (HGA), written in python. The method uses a unique loss function with genetic algorithm in parallel to group similar stress-states and invert each group for their respective stress-tensor. This code has 12 stars and 5 forks on github.
- Demonstrated the efficacy and increased accuracy of the above method against other existing methods (linearized and quasi-linear direct inversion and grid search algorithms) in complex scenarios such as oblique faulting and noisy data.

Summer Internship Summer 2013

Indian Institute of Remote Sensing *Dehradun, India*

- Studied the global gravity anomalies, geoid height variations, and tectonic deformation of the 2011 Tohoku earthquake using data from the satellites GRACE and GOCE.
- Analyzed the seasonal changes in north Indian terrestrial water storage using the earth observation satellites GRACE and TRMM, and the softwares MATLAB and ArcGIS.

PROFESSIONAL ACTIVITIES AND AWARDS

- Reviewer for Journal of Geophysical Research: Solid Earth and Journal of Structural Geology.
- Co-convener for SSA 2022 and Session Chair for AGU 2021 Fall Meeting.
- Member of American Geophysical Union and Southern California Earthquake Center: Involved in community led effort to benchmark earthquake simulation codes. Regularly attend meetings and deliver scientific talks.
- Awarded the prestigious Rackham Pre-Doctoral Fellowship that covers tuition and stipend for the final year of my PhD. Total Amount: USD 36,000.
- Three-time Recipient of Univ. of Michigan's departmental Turner Award for writing outstanding Research Proposal. Cumulative Award Amount: USD 4500.
- Co-wrote two grant proposals (SCEC and NSF-CAREER) with my advisor Prof. Yihe Huang that helped fund a part of my graduate research.
- Recipient of NSF Travel Grant for Numerical Modeling of Earthquake Motions (NMEM) workshop in Smolenice Castle, Slovakia, 2019.
- Recipient of Ministry of Human Resource and Development Scholarship, Qualified Graduate Aptitude Test in Engineering 2015 (India).
- Organized and participated in a community outreach program for high school students EarthCamp, 2021 as a geophysics ambassador.

EDUCATION

University of Michigan Ann Arbor, MI

PhD in Geophysics: specialization in computational seismology *September. 2017 – May 2022 (expected)*

Indian Institute of Technology Roorkee, India

Integrated Masters (BS + MS) in Geology *Aug. 2011 – May 2016*

PUBLICATIONS AND CONFERENCES

- Authored five publications in high-impact journals, four of which are first-authored. Two of these publications featured novel optimization and clustering techniques and the other three featured new and innovative high-performance numerical models. These publications have garnered 47 citations and h-index of 4 on google scholar.
- Authored twelve conference abstracts and presented them in oral and poster format at various national and international conferences.

ACTIVITIES AND OTHER INTERESTS

- Self-taught multi-instrumentalist and amateur music producer. Played live in dozens of venues and recorded several original compositions - Soundcloud Link. Served as the secretary of the music club at IIT-Roorkee and was involved in recruiting new talents and leading shows with over 30 participants at live venues with hundreds of people.
- Audio and video editing enthusiast: Recorded and produced seismic station de-installation video and music using iMovie, Davinci Resolve, and Ableton Live for scientific outreach: Youtube Link.
- Creator of Personal Scientific Blog for scicomm and outreach.
- Event organization and planning: served as the head of cultural events, Hamrock Society at IIT-Roorkee. Involved with recruiting students, organizing events, securing sponsorship, and inviting guest speakers. Also served as the treasurer of Geoscience Club at Univ. of Michigan Earth department for two years - kept track of finances and co-organized several field trips and cultural events.