Uttam Bhat

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Postdoctoral Scholar, University of California, Merced (2017-2019)
Ph.D, Physics, Boston University (2012-2017)
Visiting Graduate Student, Santa Fe Institute (2014-2017)
B.Tech, Engineering Physics, Indian Institute of Technology Bombay (2008-2012)

Technical skills
- **Stochastic process, ODE, PDE, Numerical simulations,** Spatio temporal modeling, **Computational modeling**, **Machine Learning**, **Neural networks**, Gaussian Process, Data analysis, Scientific writing and communication
- **Python, C++**, **Pytorch**, Tensorflow, Julia, Fortran, MATLAB, Mathematica

Machine Learning, Neural Networks, Gaussian process	■ **Dynamical Recurrent Neural Network**: **NN structure** for partially observed **nonlinear dynamics** time series. Performs up to **30% more accurate** in data-limited applications ■ **Gaussian Process Regression**: Implemented **GPR** for nonlinear time series forecasting with **uncertainty quantification**
Computational Modeling, Numerical simulations Algorithms, High-Performance Computing	■ Used first-passage principles and **stochastic dynamic programming** (SDP) to solve **optimal foraging strategy** of desert rodents in the Sevilleta ecosystem. Implemented the SDP algorithm in **C++** and **OpenMP** for scalability ■ Developed a **C++ package** to simulate user-defined foragers on user-defined clustered maps. Implemented **mesh algorithms** for efficient simulations. ■ Developed a C++ package to simulate lattice foragers using **binary-tree data structure** to speed up simulations in **high dimensional** sparse landscapes by over **100x**.
Mathematical Modeling, Stochastic calculus	■ **Population dynamics in uncertain resource environments**: Modeled **uncertain clustered resource landscapes**. **Parameterized** model with **real-world resource data** from **Google Earth** to **explain the evolutionary trends** in herbivorous mammals. ■ **Optimized stochastic search with resetting**: Analytical solutions and numerics ■ **Modeling isotope variance using stochastic calculus**: Analytically solved SDE ■ **Discrete random-walk model of foraging dynamics**: Analytical solutions to a non-Markovian process of a directed random walk on a dynamic resource landscape
Leadership, Communication, Mentoring, International Olympiads	■ **16 peer-reviewed papers** in physics, ecology and interdisciplinary journals ■ **Six conference talks** on complex networks, non-equilibrium systems, ecology and ML. ■ Mentored **two doctoral students** and **one undergraduate student** ■ **Teaching assistant** for Physics Lab, Probability and Statistics ■ **Student Facilitator** for the Training and **Selection Camps for Astronomy Olympiads** ■ **Convener, Music club**, IIT Bombay. Organized **over twenty events** for a **combined audience of over 4000**. ■ Bronze medal, International Olympiad on Astronomy and Astrophysics, Indonesia, 2008. ■ Silver medal, 12th International Astronomy Olympiad, Ukraine, 2007.