Deepak Bastola - Curriculum Vitae

RESEARCH INTERESTS	Machine Learning and Data Science, High-dimensional Statistics, Time Series Methodology, Markov Chain Monte Carlo (MCMC), Bayesian Computation

EDUCATION

University of California, Riverside, Riverside, California, USA

Ph.D. in Applied Statistics **Sept. 2016 - August 2021**

- Dissertation Topic: "Higher Order Accurate Estimation of Variance in Markov Chain Monte Carlo (MCMC)"
- Advisor: **Dr. James M. Flegal**
- **Relevant Coursework:** Computational Statistics, Stochastic Processes, Machine Learning, Bayesian Statistics, Advanced Probability, Linear Regression, Experimental Design

University of Goettingen, Goettingen, Germany
University of Padova, Padova, Italy
University of Innsbruck, Innsbruck, Austria

Erasmus Mundus Joint M.S. in Astronomy and Astrophysics **Oct. 2015**
- Thesis Topic: "Study of feedback mechanisms from Active Galactic Nuclei (AGNs)"
- Advisor: Dr. Wolfram Schmidt
- **Relevant Coursework:** Data Analysis in Astrophysics, Galaxy Dynamics, Stellar Populations, Cosmology, Stellar Astrophysics, Compact Objects

Texas A & M University, College Station, Texas, USA

B.S. Physics, B.S. Mathematics **May 2013**
- Thesis Topic: "A study of properties of Type Ia Supernova and the calibration of multiband photometry"
- Advisor: Dr. Kevin Krisciunas
- **Relevant Coursework:** Linear Algebra, Real Analysis, Probability, Computational Physics, Thermal & Statistical Mechanics, Foundation of Mathematics, General Relativity

SKILLS

R, RStudio, Python, Git, Jupyter, SQL, Linux, Latex, High Performance Computing, Simulations, Matlab, Fortran, SAS, Microsoft Office

RESEARCH EXPERIENCES

University of California, Riverside, California, USA

Ph.D. Dissertation Research **Sep. 2018 - Aug. 2021**

- To get optimal bias-variance trade-off in uncertainty quantification of highly correlated finite sample Markov Chain Monte Carlo (MCMC) output, constructed near-optimal linear combination of variance estimators.

University of Goettingen, Goettingen, Germany

M.S. Thesis **Mar. 2015 - Oct. 2015**

- To analyze the effects of incomplete physics and low resolution in Black Hole simulations, ran largescale cosmological simulations using High Performance Computing (HPC) platform and visualized results in matplotlib.

Texas A & M University, College Station, Texas, USA

B.S. Thesis **Aug. 2011 - Dec. 2012**

- To disentangle the systematic bias, instrumental bias, and measurement uncertainties of the photometry of Supernova in ultraviolet band regime, conducted a study that led to an undergraduate thesis and a second author publication.

WORK EXPERIENCES	**Carleton College**, Northfield, Minnesota, USA

Visiting Assistant Professor   **Sep. 2021 - present**

- Taught five introductory courses in statistics, linear regression, and data science and supervised a capstone level group project on Hierarchaial Bayesian Spatial Modeling.
- Teaching introduction to data science and supervising a capstone level group project on Stock Price Prediction using Neural Networks and Social Sentiments.

University of California, Riverside, Riverside, California, USA

Associate Instructor   **Mar. 2021 - June 2021**

- Taught an undergraduate course in introduction to quality improvements.

University of California, Riverside, Riverside, California, USA

Associate Instructor   **July 2020 - Sept. 2020**

- Devised curriculum and taught an undergraduate summer course in introduction to statistics.

University of California, Riverside, Riverside, California, USA

Teaching Assistant   **Sept. 2017 - Aug. 2021**

- Led lab and discussion sessions for 30 plus students on average each quarter
- Held office hours, graded exams, and helped students with programming in R and Minitab

Texas A & M University, College Station, Texas, USA

Student Technician   **May 2011 - Aug. 2011**

- Worked on data reduction and uncertainty estimation in photometric data from Supernovae
- Published a second author paper and bachelors thesis under a prestigious undergraduate research scholars program

PUBLICATIONS

- **Bastola, D.**, Flegal, J., Vats, D. *First Order Unbiased Estimators in Markov Chain Monte-Carlo (MCMC)* 2022 **Forthcoming**
- Krisciunas, K., **Bastola, D.**, Espinoza, J., Gonzalez, D., Gonzalez, L., Gonzalez, S., Hamuy, M., Hsiao, E.Y., Morrell, N., Phillips, M.M., Suntzeff, N.B. *Fixing the U-band photometry of Type Ia supernovae.* 2013, AJ, 145, 11
- **Bastola, D.** 2012. *A Study of Properties of Type Ia Supernova and the Calibration of Multi-band Photometry.* Honors and Undergraduate Research. `http://hdl.handle.net/1969.1/148620`

RELEVANT PROJECTS

Predictive Models for Heart Disease Detection

University of California, Riverside   **Spring 2018**

- Compared the predictive power of various machine learning algorithms in terms of misspecification rate (MSR) and receiver operating characteristic (ROC)
- Concluded that logistic regression with regularization and ensemble-based methods like random forest, neural net, boosted tree outperform other methods

Nonparametric Regression Analysis

University of California, Riverside   **Winter 2018**

- Density estimation of regression function using kernel smoothing, local polynomial regression, and spline smoothing methods to identify variables that have predictive power
- Tuned parameters in the model by cross-validation procedures, used extensive visualizations, and reported the findings in a research paper

Longitudinal Analysis Group Project

University of California, Riverside   **Winter 2018**

- Collaborated with other statistics PhD students to model longitudinal data, identified the correct covariance structure, and quantitatively inferred important variables and treatment effects in toenail onchomycosis
- Effectively communicated with the professor during project meetings, conducted an oral presentation, and reported the findings in a research paper

Black-Scholes Geometric Brownian Motion

University of California, Riverside   **Spring 2017**

- Modeled stock prices as geometric Brownian motion and simulated European call options
- Provided probability weighted present value of the options intrinsic value, presented the findings orally, and wrote a research paper

Survival Analysis of Primary Biliary Cirrhosis (PBC)

University of California, Riverside   **Fall 2017**

- Investigated treatment effects on survival of patients with Primary Biliary Cirrhosis (PBC) using Cox proportional hazard model
- Concluded that treatment was ineffective, identified important covariates for future predictions, and reported findings in a research paper

CONFERENCES & POSTER PRESENTATIONS

Oral presentation on Asymmetric Loss Functions in MCMC Estimation for Graduate Student Seminar, Department of Statistics, UC Riverside, USA, 2020

Poster presentation of masters thesis at the Gran Sasso Science Institute, L'Aquila, Italy, 2015.

Oral presentation at the Annual Physics & Astronomy Research Conference, Texas A & M University, College Station, Texas, USA, 2011.

Oral Presentation at the Astronomy Undergraduate Research Symposium, University of Austin, Austin, Texas, USA, 2011.

HONORS AND AWARDS

Dean's Distinguished Fellowship, University of California, Riverside, 2016-17

Erasmus Mundus Category A Fellowship, European Commission, 2013-15

Jack-McIntyre Scholarships, Physics & Astronomy Dept, Texas A & M University, 2012-13

Coleman Loyd Scholarships, Physics & Astronomy Dept, Texas A & M University, 2010-12

Dean's List, Texas A & M University, 2010-12

Mahatma Gandhi Outstanding Student, Indian Embassy, Nepal, 2005

PROFESSIONAL MEMBERSHIPS

American Statistical Association, Institute of Mathematical Statistics, Astronomers without Borders

EXTRACURRICULAR ACTIVITIES

President of Nepalese Student Association, Texas A & M University, 2012-13

HOBBIES   Chess, Hiking, Biking, Music, Traveling