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SUMMARY

Experienced statistician with expertise in teaching, research and pharmaceutical/health care data analysis using state of the art machine learning/deep learning algorithms, high performance computing and Bayesian methodology with applications in Epidemiology, Biostatistics and Pharmacometrics

RESEARCH INTERESTS

Theory and methods:
Bayesian algorithms and modeling, Monte Carlo simulation methods, time series analysis, segmentation modeling and clustering, change-point detection, shape analysis, Gaussian processes and spatial statistics, experimental design and linear mixed models, longitudinal data analysis using non-linear mixed effects models

Application:
Epidemiology, Tumor Pathology and imaging data modeling, pharmacometrics, count data and clinical trials

TECHNICAL SKILLS

- `R`: Machine learning (`Keras`, `Caret`), Data wrangling (`Tidyverse`), Web development (`Shiny`)
- `C++`, `Stan`: High performance and Bayesian computing
- Other languages/software: `SAS`, `NONMEM`, `SPSS`, LaTeX, `Python`, `SQL`
- OS & Version Control: `Linux`, `macOS` & `Git`, `Subversion`

EDUCATION

Doctor of Philosophy, Statistics — Aug 2019 –
The University of Texas at Dallas, Richardson, TX
Advisor: Dr. Qiwei Li
GPA - 3.94/4.00

Master of Science, Applied Statistics — Aug 2017 – May 2019
Rochester Institute of Technology, Rochester, NY
Advisor: Dr. Robert Parody
Thesis - Simulation-Based Inference on Mixture Experiments
GPA - 3.88/4.00

Bachelor of Science (Honors), Statistics — Aug 2014 - May 2017
University of Delhi, New Delhi, India
First Division with Distinction

EXPERIENCE

Modeling & Simulation Intern supervised by Dr. Mark Peterson

Vertex Pharmaceuticals

Longitudinal Analysis of DMD natural history data May 2021 – Aug 2021

- Performed longitudinal data analysis of Duchenne Muscular Dystrophy (DMD) natural history data using Bayesian non-linear mixed effects models
- Developed Bayesian PK/PD and sigmoid E-max non-linear models to explain disease progression in patients
- Explored `Stan`, `Rstan` & `NONMEM` for model fitting and post-processing
- Performed simulation studies key to conduct clinical trials for new treatments of DMD
- Developed `R Shiny` dashboard to perform real-time simulations, predictions and visualizations

Research Assistant supervised by Dr. Qiwei Li

BayesLASA Aug 2021 –

- Explored a Bayesian landmark detection model to perform shape analysis on tumor pathology imaging data
- Detected rough tumor boundaries as a biomarker of malignant tumors
- Conducted simulation studies and visualizations to compare performance with competitors

BayesSMEG Aug 2020 –

- Developed a multiple peak detection and segmentation modeling approach utilizing epidemiological dynamics under a Bayesian framework
- Developed a novel Reversible Jump MCMC to incorporate randomness in wave counts that allows an automatic change point algorithm
- Implemented external clustering measures (unsupervised learning) to demonstrate improved segmentation performance over competitive methods

BayesEpiModels May 2020 – Feb 2021

- Implemented Bayesian stochastic growth and compartmental models for the analysis of COVID-19 daily report data
- Designed a program to perform Time-Series Cross-Validation to compare performance of six stochastic growth models, a stochastic SIR model and ARIMA model on US state-wise and country-wise COVID-19 data
- Contributed in developing a `RShiny` dashboard to summarize results

Research Assistant supervised by Dr. Robert Parody Aug 2018 – May 2019

- Derived a pivotal quantity to construct prediction intervals of response generated via simplex-lattice designs
- Developed a Monte Carlo simulation algorithm to optimize a maximax criterion in order to realize the theoretical pivotal quantity
- Implemented a pseudocomponent technique to drastically reduce algorithm complexity and program runtime
- Proved that the simulation-based pivotal quantity was over 100% more efficient than the Scheffe adaptation

PROJECTS

Consultancy Projects

Clinical study on cosmetic treatments with **Stephens & Associates** and **L'Oréal** 2021

- Analyzed a double-blinded, split-face, randomized, and controlled clinical study to evaluate the cosmetic efficacy of a topical formulation vs benchmark to improve skin appearance as an auxiliary treatment after facial microneedling
- Provided consultancy on performing a Bayesian analysis using a linear mixed-effects model to measure effect on eye wrinkles and radiance across different treatments
- Performed Bayesian hypothesis testing via posterior predictive simulation to detect improvement in response via new treatment over benchmark

Other Projects

- A comparison of Deep Feedforward Neural Network model with LDA, QDA and SVM for image classification 2021
- Unsupervised learning of major league baseball data via PCA, K-means and Hierarchical clustering algorithms 2020
- Clinical Analysis of Cardiac Surgery and Percutaneous Coronary Interventions 2018
- Regression Analysis of Automobile Fuel Efficiency Data 2017
- Time Series Analysis of US Household Electricity Data 2015

HONORS AND AWARDS

- First prize in poster competition at The Conference of Texas Statisticians (COTS-2020) Sep 2020
- Best Student Research Award in Methodology and Theory at UP-STAT 2019 conference Apr 2019
- Judge and mentor at ASA DataFest 2019, RIT Mar 2019
- RIT merit scholarship for graduate studies Aug 2017 – May 2019
- Appreciation letter from The Minister of Human Resources, The Government of India for Class XII Board Examinations May 2014

PUBLICATIONS

$^{+}$**First**/Co-first author

1. Q. Li^{+}, **T. Bedi**$^{+}$, C. Lehmann, G. Xiao, Y. Xie, "Evaluating short-term forecasting of COVID-19 cases among different epidemiological models under a Bayesian framework", ***GigaScience***
2. **T. Bedi**$^{+}$, G. Xiao, Y. Xie, Q. Li "BayesSMEG: Bayesian segmentation modeling of Epidemiological growth", in preparation
3. C. Zhang, Q. Li, **T. Bedi**, C. Moon, G. Xiao, M. Chen, "Bayesian Landmark-based Shape Analysis of Tumor Pathology Images", accepted in ***Journal of Applied Statistics***

CONFERENCES

Contributed Oral Presentations

1. "BayesSMEG: Bayesian Segmentation Modeling for Epidemic Growth Models", Joint Statistical Meetings (**JSM 2021**)
2. "BayesSMEG: Bayesian Segmentation Modeling for Epidemic Growth Models", Eastern North American Region Spring Meetings (**ENAR 2021**)
3. "Evaluating short-term forecasting of COVID-19 cases among different epidemiological models under a Bayesian framework", NSF Student Conference on COVID 19 Modelling (**NSF 2021**)
4. "Evaluating short-term forecasting of COVID-19 cases among different epidemiological models under a Bayesian framework", Data Science Conference on COVID-19 (**DSCC-19**)
5. "Simulation-based Inference on a Simplex-Lattice Design", 8^{th} Annual Conference of the Upstate New York Chapters of the American Statistical Association (**UP-STAT 2019**)

Contributed Poster Presentations

6. "Evaluating short-term forecasting of COVID-19 cases among different epidemiological models under a Bayesian framework", The Conference of Texas Statisticians (**COTS 2020**)
7. "Evaluating short-term forecasting of COVID-19 cases among different epidemiological models under a Bayesian framework", International Chinese Statistical Association Applied Statistics Symposium (**ICSA 2020**)

TEACHING EXPERIENCE

Teaching Assistant Aug 2019 –
The University of Texas at Dallas, Richardson, TX

- STAT 6337 Advanced Statistical Methods I with Dr. Swati Biswas
- STAT 6331 Statistical Inference I with Dr. Pankaj Choudhary
- STAT 4352 Mathematical Statistics with Dr. Swati Biswas
- STAT 3355 Data Analysis for Statisticians and Actuaries with Dr. Qiwei Li
- STAT 3360 Probability and Statistics for Management and Economics with Dr. Yuly Koshevnik
- STAT 2332 Introductory Statistics for Life Sciences with Dr. Kemelli Estacio-Hiroms
- MATH 2418 Linear Algebra with Dr. Luis Felipe Pereira
- MATH 2413 Differential Calculus with Dr. My Linh Nguyen

Teaching Assistant Aug 2017 – May 2019
Rochester Institute of Technology, Rochester, NY

- STAT-631 Foundations of Statistics with Dr. Ernest Fokoue
- STAT-641 Applied Linear Models - Regression with Dr. Ernest Fokoue
- STAT-146 Introduction to Statistics II with Dr. Bernadette Lanciaux

Teaching Volunteer Oct 2015 – Apr 2016
Department of ED Support, Make a Difference, India

- High-school level math courses

PROFESSIONAL ACTIVITIES

Invited Reviewer

- Epidemiology and Infection
- Signa Vitae, Journal of Anaesthesia, Intensive Care and Emergency Medicine

Contributed Session Chair

- "Graphic Modeling, and Spatial-temporal Data Analysis," Eastern North American Region Spring Meetings (**ENAR 2021**)

Membership

- American Statistical Association (ASA)
  - Section on Bayesian Statistical Science
  - Section on Statistical Learning and Data Science
  - Section on Statistics in Epidemiology
- Eastern North American Region Biometric Society (ENAR)
- International Chinese Statistical Association (ICSA)