Siddharth Vishwanath

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Education

Pennsylvania State University
Aug 2017— Present

Ph.D. Candidate, Department of Statistics
GPA : 3.96/4.00

- Ph.D. Advisor : Dr. Bharath Sriperumbudur

Indian Institute of Technology, Kanpur
Jul 2010— Jun 2015

M.Sc(Integrated) in Mathematics and Scientific Computing
GPA : 8.0/10.0

- M.Sc. dissertation : Bayesian inference of three-parameter Weibull data under progressive censoring

Scholastic Achievements

- **Proficiency Medal, IIT Kanpur**
  - Recipient of the medal during graduation. Awarded during the convocation for outstanding work in the M.Sc Dissertation.

- **Academic Excellence Award, IIT Kanpur**
  - Awarded during the graduating year. Awarded to the top 5% of the Institute for achievements in academic excellence

- **KVPY Fellowship**
  - Awarded by the Department of Science and Technology (Government of India) and the Indian Institute of Science (IISc) to 45 students among thousands in the country to encourage scientific research.

- **Institute of Actuaries of India (IAI)**
  - Student member of the IAI after having cleared the ACET. The Core Technical (CT) exams are currently ongoing.

- Secured **99.9 percentile** in IIT-JEE 2010.

Experience

Goldman Sachs
Aug 2016—Present

Market Risk Strat

- Enhanced the methodology for estimating the liquidity risk arising in Margin Loan models in an exhaustive monte-carlo framework
- Developed an efficient method to estimate the Marginal VaR of a portfolio using nonparametric regression & kernel smoothing
- Examined anomalies in Interest Rate risk for stress-test scenarios, in order to automate FDSF regulatory submissions to the PRA
- The automation strategy involves setting up of machine learning models to identify and classify the nature of failures found in pricing the positions

Nomura
Jul 2015—Aug 2016

Model Validation Quant

- Reviewed theoretical assumptions, set up independent benchmarking tools & assessed performance for various in-house risk models
- Developed an alternative framework for estimating specific counterparty credit risk in a Gaussian two-factor copula model by using latin hypercube sampling and stochastic recovery rates contingent on internal rating scorecards
- Enhanced the methodology for computing counterparty exposure from Credit Default Swaps and it's implied volatility by modeling the credit-spreads using a CIR++ model and the exogenous default process in a correlated-framework as a Poisson copula. Estimated the parameters of the CIR++ model in a single stage optimization of the likelihood function and l^2-norm of the adjustment term using Limited-Memory BFGS optimization
- Backtested the Standard Initial Margin Model on portfolios using the traffic-light testing for regulatory submission to the CFTC

American Express
May 2014—Jul 2014

Customer Marketing Analytics

- Combined social-media data with American Express closed loop data to increase the efficiency of the merchant recommender engine.
- Developed a recommender engine by integrating interest-based Graph analysis in a Bayesian framework to enhance the efficiency.
- Enhanced the F_1-score of the recommender engine by 19% and captured 30% more customer enrollments for online offers.

Mu Sigma

Decision Sciences and Analytics

May 2013—Jul 2013

- Developed a Lat/Long Algorithm for computing the total number of households shopping with a client using the traced data.
- Provided insights such as changes in consumer behaviour across geographic & strategic divisions, impact of competition on sales

The Reserve Bank of India

Department of Economic and Policy Research

May 2012—Jul 2012

- Researched fiscal consolidation and decentralization techniques to improve the State's finances, and discussed reform initiatives
- Suggested Macro-Fiscal indicators that more accurately describe a State's financial situation in India, and recommended alternatives
- Enabled the State to reduce deficit indicators by 0.5% to its Domestic Product by performing statistical analyses and estimating the Tax Buoyancy

Academic Experience

- ## Summer Research Scholar
  Institute for Statistical Mathematics, Tokyo

  Jun 2018 — Aug 2018

  - **Invited by the Research Center for Statistical Machine Learning.**
  - The research efforts were focused on studying the probabilistic and statistical aspects of Topological Data Analysis.
  - Studied and characterized the finite sample, and asymptotic properties of Persistent Betti Numbers, arising in Topological Data Analysis.

- ## Generalized Kernel Models
  Regression Methods project

  Nov 2017

  - Explored the natural extension of regression using hyperplanes in Euclidean to more abstract manifolds and functions in Hilbert space
  - Focused on employing Reproducing Kernel Hilbert Spaces to estimate manifolds using high-dimensional feature mappings while preserving the low-dimensional computational complexity of the algorithm
  - Demonstrated the methodology on estimating atomic orbital shapes for electron clouds without employing Schrödinger's equation

- ## Bayesian Inference of Three-parameter Weibull Data
  Dissertation Guide: Prof. Debasis Kundu

  Jul 2014 – Jul 2015

  - Bayesian framework for estimating parameters of the tree-parameter Weibull distribution under progressive type-II censoring
  - Bayes estimates under the squared error loss and the associated highest posterior density credible intervals are obtained using Gibbs sampling
  - Explored optimal censoring schemes using a precision criterion based on the posterior variance of the quantile estimator
  - **Publication** :

    `S. Vishwanath, D. Kundu (2017)` ``*Bayesian inference and optimal censoring scheme under progressive censoring*'', `Advances in Reliability and System Engineering, Springer (J.P.Davim & M.Ram - Editors) ISBN 978-3-319-48875-2`

- ## Workshop & Talk for the Bioinformatics Group
  Maharani Laxmi Ammanni College, Bangalore

  Aug 2016 & Dec 2015

  - The workshop was designed to be a hands-on demonstration of statistical methods and it's applications in **R.**
  - The topics covered ranged from ANOVA, design and analysis of experiments to Data-mining and multivariate statistics.
  - Theoretical material was bolstered with real-life examples implemented in **R** to facilitate a more holistic understanding.

- ## A Survey of Conventional and Ensemble Classification Techniques
  Mentor: Prof. Amit Mitra

  Jan 2015 — Apr 2015

  - The project explored the classification problem which has received considerable importance in data-mining literature
  - Classification techniques are explored in a unified framework for the waveform data introduced by Breiman et al (1984)
  - The highlight is the performance of ensemble classifiers - where the consensus of multiple classifiers in the ensemble is used
  - In addition to this, the project also examines the characteristics of classifiers which make the resulting ensemble powerful

- ## The Kalman Filter: Theory and Implementation
  Mentor: Prof. Subhra Shankar Dhar

  Jan 2014 — Apr 2014

  - The applications of Kalman filters are examined for control & navigation systems for object tracking

- Applications to finance are demonstrated by modeling stochastic betas for the Capital Asset Pricing Model
- Demonstrated the advantage in using stochastic difference equations in forecasting from time series data with noisy inputs

- **Capital Asset Pricing Model :** *An Empirical Investigation*   *Jul 2013 — Nov 2013*
  Mentor: Prof. Amit Mitra
  - The model is examined from a time-series perspective while scrutinizing the validity from a regression framework
  - The betas of the securities are modeled with a deterministic time trend in the CAPM framework (as precursor to stochastic beta models)
  - Stochastic volatility models are explored ranging from simple GARCH models to more exotic E-GARCH-M models

- **LR Parsers**   *Jul 2012 — Nov 2012*
  Mentor: Prof. Akash Anand
  - Outlined the theory, provided the algorithm that Parsers implement and demonstrated the parsing technique, with emphasis on LR Parsers.
  - Developed a program in Python that implements the concept of LR Parsers for Context Free Grammars.

- **Object Tracking : A Mathematical Modeling Approach**   *Jan 2012 — Apr 2012*
  Mentor : Prof. Peeyush Chandra
  - Project examined the method of finding the MH370 Malaysian Airlines aircraft using the principles of mathematical modeling
  - Two methods are explored. First using moving-average filters, the second using recursive Bayes filters to produce maximum a posteriori estimates

Skills

Programming	R, C/C++, Python, Tensorflow, Matlab, SQL, SAS, Stata, Java, Pig Latin & LaTeX
Environment	UNIX, Windows, OS-X
Languages	English - Vernacular
	French - Proficient. Obtained certificate with distinction.
	Kannada, Hindi - Native tongue

Relevant Coursework

Machine Learning	Statistical Simulation & Data Analysis	Data Structures & Algorithms
Non-Linear Regression	Statistical & AI techniques in Data Mining	Mathematical Economics
Applied Stochastic Processes	Advanced Econometrics	Mathematical Finance
Probability and Statistics	Empirical Methods in Microeconomics	Time Series Analysis
Microeconomics	Mathematical Modeling	Discrete Mathematics
Economic Analysis for Management	Financial Economics	Numerical Analysis

Positions of Responsibility

- **Finance Convener, Students' Senate, IIT Kanpur**   *Mar 2013 — Feb 2014*
  - Managed a budget of INR 20 million which encompasses activities of all student bodies, clubs and hobby groups
  - Supervised all financial transactions in the Students' Senate including the intercollegiate festivals.
  - Sanctioned the creation of a Gymkhana Corpus and restructured Seed Funds to ensure optimal use of financial resources.

- **Undergraduate Senator, Students' Senate, IIT Kanpur**   *Mar 2013 — Feb 2014*
  - Elected to represent the student community in the Students' Senate.
  - Appointed by the Dean in the Institute Anti-ragging committee
  - Undertook administrative responsibilities under the Senate in ad-hoc committees for examining and solving students' issues.

- **Co-ordinator, English Literary Society, IIT Kanpur**   *Mar 2012 — Feb 2013*
  - Mentored the incoming freshmen in activities like Parliamentary Debate, JAM, Cryptic crosswords, Extempore and more
  - Represented the College in intercollegiate festivals for Parliamentary Debate, Extempore and Cryptic crosswords.
  - Led a team of 20 people to English literary competitions in various intercollegiate festivals.