Stony Brook
New York 11790

VAISHALI SHARMA

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Education

Stony Brook University — **New York**

- **MS in Applied Mathematics and Statistics**; GPA: 3.75/4 — **Jan 2021 – Present**
  Related Coursework: High Frequency Finance; Financial Derivatives and Stochastic Calculus; Portfolio Theory; Foundations of Quantitative Finance; Probability; Data Analysis; Analytical methods of linear algebra.

Maharshi Dayanand University — **Haryana,India**

- **MSc. Pure Mathematics**, CGPA: 7.12/10 — **Jul 2014 – Jun 2016**
- **B.A. Mathematics and Economics**, CGPA: 7.8/10 — **Jul 2011 – Jun 2014**

Research Experience

Indian Institute of Science — **Bengaluru**
Research Associate — **Jan 2019 – Dec 2020**

- Worked on SERB funded project "Simulation, Control and Estimation of Path Constrained Stochastic Dynamics"; SERB is Science and Engineering Research Board under Department of Science and Technology, Government of India
- Developed methods for finding numerical solutions of stochastic differential equations; worked on the problem of controlling a particle in a fluid flow using Stochastic Differential Algebraic Equations (SDAEs); using Julia and python for simulation.

National Institute of Advanced Studies — **Bengaluru**
Research Associate — **July 2018 – Dec 2019**

- Research on Causal Inference as member of Consciousness Studies Program (CSP) and focusing on three ladders of causation viz. Association, Intervention and Counterfactual reasoning
- Investigated theory of Causal Emergence using tools from Information Theory. Related Project: "Macro Overpowers Micro Proven By Quantification Of The Causal Emergence"

DIPS Mathematics Academy — **New Delhi**
Temporary Faculty — **Jan 2017- June 2018**

- Held assignment discussion classes for preparation of competitive CSIR-NET/ IIT JAM/ GATE Exams (CSIR NET is National Test for lectureship and junior research fellowship)

SBU Projects

- Statistical modeling/Hypothesis testing for IBM HR Data Analysis: analysis on how various factors impact each other was done through hypotheses testing. Employee Attrition Performance measures various self-reported and employee offered details on personnel professional performance,location and personal lives. Initially, exploratory data analysis was conducted from which two scientific questions of interest stemmed. Hypothesis tests were then conducted to test 1) Effect of employees gender on Percent Salary Hike. 2) Which factors impact attrition. Wilcoxon Signed-Rank Test and Multiple Logistic Regression were used to test the aforementioned hypotheses respectively. We were able to conclude, through the Wilcoxon Rank-Sum test, that we cannot reject the assumption that there is no relationship between Gender and Pay Salary Hike. Through Logistic Regression, we were able to identify the variables which impact attrition. We were able to confidently reach conclusions in all the 3 instances (original data, Data Missing Completely At Random and Data Missing Not At Random) for both hypotheses.

- Prediction of the price for European Style option: we used the black Scholes formula and Monte Carlo Simulation techniques using Scikit, numpy, pandas in Python to determine the fair price in the present; the risk-neutral expected value was used and the price of the option was found through Black-Scholes formula that offered a baseline to check against our Monte Carlo pricing method. Considering the sample size of generated paths in the simulation and parameter sets, it was found that the option price attained through Black-Scholes method [ie 27.736] was almost close to the price attained through Monte Carlo simulation [ie 24.631].

- Statistical modeling/Hypothesis testing for Covid-19 Data analysis: Performed data imputation by using mice package and KNN Imputation and removing outliers using the Tukeys rule. Performed variable transformation using box-cox transformation and feature scaling using Min-Max Scaling. Hypothesis testing like Walds test, Z-test was done to check how the independent variables are affecting COVID19 deaths and cases; predicting the COVID-19 fatality and

cases for the upcoming week based on the last seven weeks data by using Auto Regression and Moving average models.

- Project on Book Search Engine: created an application to search about different books on the basis of title, author name, country of issuance etc. Used JavaScript to display the data and Node.js as back-end.Technology Stack: JavaScript, jQuery, Bootstrap, CSS, HTML, Node.js

Skills and Languages

Python; R; Mathematica; Matlab;Java; C++; LaTeX; Octave; SQL; SAS; Tableau; Power BI; Julia; Advanced Microsoft Excel

Additional Experience and Awards

- Hosted National Mathematical Conference 2015
- Participated in National Science Olympiad 2008 and National Maths Olympiad 2009
- Won first prize in English vocabulary competition in S.M.M. Palwal 2014
- Won third prize in inter-college Economics declamation 2013
- Hosted DIPS Academy Annual Function 2016,2017
- Participated in Festivals of Proposition: proposing a dynamic map for Cubbon park using people's experience
- Introduction to Statistics (2013). **edx.org**