Anupreet Porwal

porwalanupreet@gmail.com | (+91) 9621 252 233 | anupreet-porwal.github.io

Education

Indian Institute of Technology Kanpur, India *(2012-17)*
B.S. – M.S. Dual Degree, Mathematics and Scientific Computing
Bachelor's GPA: **9.1/10.0**; Master's GPA: **10.0/10.0**
Department Rank: **1** (out of 55 students)

All India Senior School Certificate Examination *(2010-12)*
St.Paul's Convent Sr.Sec. School, Ujjain; Cumulative Percentage: **93.4%**

All India Secondary School Examination *(2010)*
St.Paul's Convent Sr.Sec. School, Ujjain; GPA: **9.8/10.0**

Research Interests

- Probabilistic Machine Learning, Bayesian Statistics
- Statistical Modelling Techniques: Regression Analysis, Time Series Analysis

Submitted Publications

- "Large sample consistency properties of Exponentially Embedded Family (EEF) rule for model order estimation of complex superimposed exponential signal model", **Anupreet Porwal**, Sharmishtha Mitra and Amit Mitra, preprint, communicated to *Journal of Statistical Planning and Inference*.
- "Order estimation of 2-dimensional complex superimposed exponential signal model using Exponentially Embedded Family (EEF) rule: Large sample consistency properties", **Anupreet Porwal**, Sharmishtha Mitra and Amit Mitra, preprint, communicated to *Multidimensional Systems and Signal Processing*.

Conference Presentations

- S Mitra and **A Porwal**, Order Estimation of Superimposed Nonlinear Complex Cisoid Model Using Adaptively Penalizing Likelihood Rule: Consistency Results - *DEStech Transactions on Engineering and Technology, Proceedings of International Conference on Economics, Statistics and Management Science, Hong Kong, 2017.*

Scholastic Achievements

- **B.D.Sanghi Gold Medal 2017**: Best academic performance in Mathematics and Statistics Dept.
- **Prof. Burton J. Moyer Gold Medal**: Best graduating Master's student among all the Natural Sciences department in 2017.
- **Proficiency Medal 2017**: Best graduate project work in Department of Mathematics and Statistics.
- **Academic Excellence Awardee (top 10% of 830 students)** for exemplary academic performance in consecutive academic years 2014-15 and 2015-16.
- Inspire and Masters T.A. Scholarship: Conferred by Dept. of Science and Technology, Govt. of India.
- Awarded with **A* grade**, for exceptional performance in Time series analysis, bayesian machine learning and statistical data mining.
- Recipient of **Kishore Vaigyanik Protsahan Yojana (KVPY)** fellowship award, 2012 given to top 1% among 40,000 applicants by Department of Science and Technology (DST), Government of India.

Master's Project

On Large sample consistency of model order selection rules *(2016-17)*
Prof. Amit Mitra, Indian Institute of Technology Kanpur
Prof. Sharmishtha Mitra, Indian Institute of Technology Kanpur

1.Estimating model order for 1-D and 2-D cisoid models using adaptively penalizing likelihood rule (PAL): Large sample consistency properties [Report | Presentation]

- Researched on a model order estimation technique based on adaptively penalizing the likelihood.
- Proved the consistency of the technique for 1-Dimensional and 2-Dimensional cisoid models which are the building blocks of digital signal processing.
- Investigated the performance of PAL rule using numerical simulations and inferred its performance to be superior to existing order selection rules of AIC and BIC.

2.On consistency of Exponentially Embedded Family (EEF) rule for 1-D and 2-D complex sinusoidal models [Report | Presentation]

- Analyzed a novel rule based on the use of exponential embedding of PDFs for model order selection.

- Derived the behaviour of model variance as a function of model parameters for two cases based on under and over estimation of model order.
- Proved the large sample consistency of EEF rule for 1-D and 2-D complex sinusoidal models and performed experiments to empirically validate the superior performance of EEF rule in comparison to AIC and BIC rules.

Academic Projects

Small Variance Asymptotics (SVA) for Non-parametric Latent Feature Relational Model (LFRM) [Report | Presentation] *(Spring'17)*
Prof. Piyush Rai, Indian Institute of Technology Kanpur

- Established a connection between non-parametric Latent Feature Relational Model (LFRM) and its non-probabilistic counterpart using SVA.
- Utilized connection between exponential families and Bregman divergence to scale the covariance of exponential families before applying small variance asymptotics.
- Applied MAD-Bayes approach to devise a scalable K-means style objective function with the flexibility of Non-parametric bayesian techniques through an extra penalty term on number of features.
- Proposed a greedy algorithm to optimize the objective function; Inferred the number of latent binary features and learn the relational entities that possess that feature.

Image segmentation using Dirichlet Process Mixture Model [Report | Poster] *(Spring'16)*
Prof. Piyush Rai, Indian Institute of Technology Kanpur

- Explored the application of unconstrained and constrained DPMM for image segmentation.
- Studied the incorporation of Markov Random Field (MRF) as a constraint on DPMM for spatial coupling of coherent segments.
- Reviewed the effects of concentration parameter, controlling the number of cluster, and MRF cost parameter, controlling the dependence on the neighborhood sites, by performing experiments on IBSR dataset.

Pricing weather derivatives using time series analysis *(Dec'14)*
Prof. Diganta Mukherjee, Indian Statistical Institute Kolkata

- Implemented a generalized extreme valued time series model in R on maximum temperature data of 24 weather stations in West Bengal.
- Forecasted the future values of maximum temperature to efficiently predict the option prices for weather derivatives that are used to hedge against adverse weather.

Analysis of economic development indicators [Report | Presentation] *(Spring'15)*
Prof. Sharmishtha Mitra, Indian Institute of Technology Kanpur

- Modelled the dependence of GDP growth rate on other critical economic development indicators and predicted them with an accuracy of 72% using multiple linear regression for 121 countries.
- Captured the current status of a country's social and economic development with the inclusion of human development index as categorical variable and improved the model accuracy by 6%.

Give me some credit [Report] *(Spring'15)*
Prof. Amit Mitra, Indian Institute of Technology Kanpur

- Attempted the Kaggle's Challenge of predicting the probability that somebody will experience financial distress in the next two years.
- Implemented credit scoring algorithms such as SVM, random forest and logistic regression to determine loan authorization and achieved the best case AUC score of 0.83 with random forest algorithm.

Statistical Methods in Market Research Analysis *(Summer'14)*
Prof. Amit Mitra, Indian Institute of Technology Kanpur

- Established associative rules between products sold by a company using market basket analysis to study product combinations constituting a typical transaction.
- Utilised principal component analysis for dimensionality reduction for faster information processing.
- Predicted consumer lifetime value for a company enabling them to decide their marketing strategies efficiently and used it to classify consumers using multinomial logistic regression.

Teaching Experience

Teaching Assistant,*Statistical Inference* *(Spring'17)*
Instructor: Prof. Amit Mitra, Indian Institute of Technology Kanpur

- Conducted weekly tutorial sessions to discuss problem sets and served as a liason between course taught students and science faculty.

Senior Academic Mentor, *Counselling Service* *(2014-15)*

- Organized remedial classes and provided peer-to-peer mentorship to academically deficient students of the department.

Professional Experience

Analyst, North American Liability Strategies, Deutsche Bank, Mumbai *(Summer'17-Present)*

- Conducted statistical tests on non-financial non-utilities members of S&P 1500 index to **determine rating metrics that drive credit ratings** for different industries.
- Established that **Overrated companies suffer** in their valuation by regressing EV/LTM EBITDA as a function of difference in true rating and predicted rating from ratings drivers model.
- Support **analytics around pension de-risking structures** like buy-ins, buy-outs and share repurchases suitable to client's unique position.

Summer Intern, EMEA Industrials, Deutsche Bank, Mumbai *(Summer'16)*

- **Proposed transformative acquisition** of a leading Swedish sports equipment producer by the largest RV equipment producer of the world and conceptualized **financial and strategic rationale** with better financial outlook for the combined entity.
- Inferred a **valuation range of €1.8-1.9bn** for the target using peer benchmarking, precedent transactions and **Discounted Cash Flow (DCF)** analysis.
- Awarded a **Pre-Placement Offer** for my outstanding performance during the internship.

Summer Analyst, Pervazive Automation Solutions Pvt. Ltd., Bengaluru *(Summer'15)*

- Pervazive is India's top emerging machine intelligence company for networks.
- **Devised automated learning algorithm** using decision trees based on network health statistics to semantically classify machine generated network errors.
- **Designed** a system to identify the valuable customers facing network congestion.
- **Formulated** real time subscriber offers for high valued customers based on network congestion on **SAP HANA PAL** platform for quick processing.

Relevant Coursework

Statistics and Machine Leaning:

- Regression Analysis
- Time Series Analysis
- Bayesian Data analysis
- Probability and Statistics
- Statistical Inference
- Non-Linear Regression
- Prob. Machine learning
- Bayesian Machine learning
- Learning with Kernels
- Statistical Data Mining
- Robust Statistical Methods
- Applied Stochastic Processes

Other Relevant Courses:

- Real & Complex Analysis
- Matrix theory & Linear Est.
- Intro. to Programming
- Data Structures & Algo.
- Convex Optimization
- Mathematical Modelling

Technical Skills

Programming Languages: C, C++, Python, R, Octave
Other Tools: MySQL, HTML5, LaTeX, SAS, Microsoft Office, MATLAB

Positions of Responsibility

Student Undergraduate Committee Student Nominee, *IIT Kanpur* *(2016-17)*

- Nominated by student senate to represent the undergraduate student community in determination, coordination and review of general policies for the institute.

Department Undergraduate Committee Student Nominee *(2014-15)*

- Elected to represent the interests of 150 undergraduate students in academic and general affairs.
- Involved in decision making matters like course restructuring, template changes and student appeals.

References

Prof. Debasis Kundu
Professor
Dept. of Mathematics & Stat.
IIT Kanpur
Email: *kundu@iitk.ac.in*

Prof. Amit Mitra
Professor
Dept. of Mathematics & Stat.
IIT Kanpur
Email: *amitra@iitk.ac.in*

Prof. Piyush Rai
Assistant Professor
Department of Computer Sci.
IIT Kanpur
Email: *Piyush@cse.iitk.ac.in*