Anurag Sharma, Dual Degree Student
Department of Mathematics and Statistics, IIT Kanpur
sharmaan@iitk.ac.in | (+91) 8601035165 | anurags92.github.io

Education

Indian Institute of Technology, Kanpur *(2012 - present)*
Bachelor of Science - Masters of Science (BS – MS)
Major: Mathematics and Scientific Computing
Minor: Computer Science (Artificial Intelligence), English Literature
Cumulative Performance Index: *10/10**, *8.4/10*† *(∗-PG,†-UG)*

All India Senior School Certificate Examination *(2011)*
Nalanda Acdemy, Kota; Aggregate : *84.5%*

Indian Certificate of Secondary Education Examination *(2009)*
Veda Vyasa DAV Public School, New Delhi; Aggregate : *94.5%*

Research Interests

- Machine Learning, Computational Biology, Scalable Architecture
- Statistical Learning Theory, Bioinformatics

Internships

Anomaly Detection in Risk Measure Values *(Summer'16)*
Finance Division, Goldman Sachs, Bengaluru, India

- Implemented statistical anomaly detection methods on risk measure time series to handle problems around missing data, seasonality and trend drifts
- Built a web platform to visualize time series data of model risk values
- Devised algorithm to do automated root cause analysis of anomalous points
- **Received full time offer** by the firm based on internship review

Sketchmap algorithm for Dimensionality reduction *(Summer'15)*
Prof. Michele Ceriotti, COSMO Laboratory, EPFL, Switzerland

- Implemented Sketchmap algorithm to study high-dimensional molecular simulations
- Implemented random sampling, farthest point sampling and staged sampling for selecting landmark points used for projection in lower dimensionality space
- Contributed to Plumed, an open source library for free energy calculations

Support Vector - Quantile Regression Hybrid *(Summer'14)*
Prof. V. Ravi, Reserve Bank of India, Hyderabad

- Developed prediction models for Fraud Analytics and Churn Prediction
- **Best paper award** for Support Vector - QRRF for Regression Problems at Multi-Disciplinary International Workshop on Artificial Intelligence, 2014

Research Projects (AI/ML)

Estimating Error Rates from Unlabeled Data
Prof. Piyush Rai, Indian Institute of Technology, Kanpur

- Reviewed state of the art methods for estimating error rates of classifiers (Naive Bayes, LDA, k-NN and SVM) in absence of labelled data
- Analysed and implemented Agreement Rates Approach, Maximum likelihood method and Graphical Probabilistic Models for error rate estimation

Gesture Recognition using Laptop webcam [video]

- Navigation and OS operations using specific gestures detected by a webcam
- Implemented Gesture Recognition using machine learning (using SVM for classification of gesture images).

Emotion Detection in Music [presentation]
Prof. Tanaya Guha, Indian Institute of Technology, Kanpur

- Prediction of emotion expression of a music clip: emotion quantified using Arousal-Valence Model
- Studied the behaviour and stability of different ML models subject to our dataset: SVM, Random Forest and Elastic Net Regression
- Explored relationship between AV values and used the predicted arousal values as a feature in prediction of valence: resulting in improved performance on test dataset

Internet Analytics
Prof. Matthias Grossglauser, LCA, EPFL, Switzerland

- *Social and Information Networks*: Studied and simulated link prediction and graph sampling on Wikipedia articles and IMDB movie dataset
- *Dimensionality Reduction and Recommender Systems*: Implemented PCA, similarity based recommender system and ALS-WR algorithm on Apache for Netflix dataset
- *Search and Retrieval text documents*: Used Latent Semantic Indexing, SVD and Naive Bayes classifier for detecting fake hotel reviews

Social Network Analytics
Prof. Matthias Grossglauser, LCA, EPFL, Switzerland

- *Clustering and Community Detection*: Implemented k-means and Gaussian mixture models for identifying clusters of geo-tagged tweets and Louvian algorithm for community detection on Wikipedia pages on Hadoop clusters

Automated Number Plate Detection
Prof. Harish Karnick, Indian Institute of Technology, Kanpur

- Implemented sliding window approach based on Histogram of Oriented Gradients (HOG) features for license plate detection
- Compared SVM, Random Forest, Adaboost and logistic regression based classifiers to detect the location of number plate on surveillance camera feed

Research Projects (Mathematics)

Determined Circles in Euclidean Plane
Dr Frank de Zeeuw, Discrete Combinatorial Geometry Lab, EPFL, Switzerland

- Studied Kelly's result on ordinary lines and determined circles.
- Developed a new method to calculate number of determined circles in a plane which can be extended to improve the current bounds.

Probabilistic Methods in Combinatorics with concentration on Graphs
Prof. Rajat Mittal, CSE, IIT Kanpur

- Studied applications of probabilistic methods in Set theory and Graph theory Presented a simplified version of Moser's constructive proof of Lovasz Local Lemma

Introductory Graph colorings
Prof. Basudeb Datta, Indian Institute of Sciences, Bangalore

- Reviewed parts of Douglas B. West's Introductory Graph theory covering Matching, Cuts and Connectivity and Coloring of Graphs

Causal Relationships Between Econometric Parameters [report]
Prof. Amit Mitra, Indian Institute of Technology, Kanpur

- Used Time Series Econometric modelling to analyze the data of the policy macroeconomic variables using Augmented Dicky-Fuller and Granger Causality test
- Established that both FDI inflows and Exports have a direct causal linkage with the GDP of India but there is no reciprocal causality between them

Scholastic Achievements

- Ranked in top 5 in the graduating class of Dept. of Mathematics, IIT Kanpur
- **Selected in 2 students among 800** under IITK - EPFL Student Mobility Program
- Awarded **KVPY Fellowship** by the Dept. of Science and Technology, Govt. of India
- Ranked in **Top 0.5%** (1203 amongst 0.5 million students) in IIT-JEE 2012.
- Recipient of **Inspire** Scholarship awarded by Department of Science and Technology
- Ranked 22^{nd} among 800 teams at ACM Inter Collegiate Programming Competition
- Awarded Junior Science Talent Search Scholarship (JSTSE) by Delhi State Govt
- First Runner-up in Internet of Things competition for building a smart-mirror, at the 4^{th} Inter-IIT Technical meet

Relevant Coursework

Machine Leaning:

- Statistical Learning Theory
- Machine Learning Tools and Techniques
- Probabilistic Machine Learning
- Optimization Techniques
- Natural Language Processing
- Random Walks
- Internet Analytics
- Time Series Analysis
- Neurobiology

Mathematics:

- Linear & Abstract Algebra
- Probability and Statistics
- Topics in Topology
- Applied Stochastic Process
- Real & Complex Analysis
- Graph Theory
- Partial Differential Equations
- Several Variable Calculus

Technical Skills

Programming: C, C++, Python, R, Octave, Scala
Web Development: HTML, CSS, JavaScript
Other Tools: Bash, Matlab, Git, LaTeX, Hadoop
Operating Systems: Windows, Linux(Ubuntu), Mac OS

References

Available on request.