RITVIK KAPILA

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EDUCATION

Indian Institute of Technology Delhi Jun'17 - May'21
B.Tech, Electrical Engineering, Awarded ***Academic Merit Scholarship*** *CGPA:* ***9.113/10***

Institut National des Sciences Appliquées de Lyon, France Sep'19 - Jan'20
Information Science and Technology, Semester Exchange *CGPA:* ***3.9/4.0***

WORK EXPERIENCE

NK Securities Research Jul'21 - Present
Quantitative Researcher *Gurugram, India*

- Designed mathematical models using time series data to predict the movement of the derivatives market
- Implemented cutting edge statistical analysis techniques for improved consistency across market variations
- Performed optimization on support-resistance strategy using hyper-parameter tuning for futures & options

Goldman Sachs May'20 - Jun'20
Market Risk Analyst *Bangalore, India*

- Designed a software for modelling predictions of repurchase and overnight rates for USD & EUR currencies
- Managed the firm's risk associated with repo rates using Interest-Repo Rate Stress Test model projections
- Employed parallel diddles and interpolations to inspect price and flooring functions using scenario generation

RESEARCH EXPERIENCE

Channel Estimation using Deep Learning [thesis] Jul'20 - Dec'20
Undergraduate Thesis Project, Prof. Manav Bhatnagar *IIT Delhi*

- Modelled MIMO channel features as 2D image and used blind estimation by implementing **CNNs & GANs**
- Designed a linear super resolution framework cascaded with de-noising neural network for best performance
- Achieved MSE of 0.0011 and reduced training time by **28%**, optimized trainable parameters from 8129 to 26

Network Automation using Machine Learning Jan'20 - May'20
Research Fellowship by IRD, IIT Delhi and Nokia Communication Technologies

- Designed an **LSTM** based optical character recognition framework to perform graph digitization in real time
- Developed automated configurable XML database parser for live integration with NOKIA framework [code]
- Formulated regression analysis and heat maps on performance of network through performance indicators

Smart Building Energy Consumption Analysis [code] Sep'19 - Dec'19
Member of CITI Lab Research Group, Prof. Frédéric Le Mouël *INSA Lyon*

- Implemented pattern recognition and modelled energy usage time series sensor data in smart buildings
- Designed software for outlier detection and feature extraction; implemented regression models for prediction
- Formulated spatio-temporal summarization and obtained **94.8%** accuracy on room location, date and time

MAJOR PROJECTS

Tree Structured Neuron Classification [code] Jan'20 - May'20
Deep Learning Research Project, Prof. Jayadeva *IIT Delhi*

- Formulated a constructive algorithm for binary nonlinear classification in multi dimensional input space
- Designed linear programming framework for optimization & **twin SVM** classifier to tackle class imbalance
- Achieved accuracy of over **96.5%** on UCI dataset with more than **26%** reduction in training time of model

Robust Neural Network and SVR design Jan'20 - Feb'20
Machine Learning Project, Prof. Prathosh A. P. *IIT Delhi*

- Developed customized python library for neural networks with 98.2% accuracy on MNIST dataset [code]
- Published open source libraries for implementation of ϵ-SVR and RH-SVR using convex optimization [code]

Air Quality Wireless Sensor Network, Software Engineering Project [code] Sep'19 - Dec'19

- Engineered a system for time series analysis of air quality sensors with optimized computing performance
- Programmed the software for pattern recognition in displaying detailed specification of correlated sensors

Interference mitigation in LiFi Networks [ppt] May'19 - Jul'19
Summer Undergraduate Research Award, Prof. Abhishek Dixit *IIT Delhi*

- Developed a LiFi model using spacial multiplexing to achieve higher data rates than single Tx-Rx model
- Implemented MIMO interference mitigation techniques in verilog at receiver to improve BER performance

Reconfigurable Beacon, Demonstrated at **Open House**'19 [blog] Jan'19 - May'19

- Configured bluetooth low energy modules as economical, compact beacons for use in the way-finding project
- Developed android app to configure the beacon using AT commands for modification of beacon services

Mobile Phone Router and Tracking System, Data Structures [code] Jul'18 - Aug'18

- Optimized the shortest path algorithm for connecting and tracking a device using trees and skiplist ADT
- Implemented a hierarchical tree structure which linked all the mobile stations to the Central Server

Web Search Engine, Data Structures [code] Sep'18 - Oct'18

- Designed data structure displaying results via ranking algorithm; used hash maps for OR & AND queries
- Developed search functionality and ranked documents using the tf-idf scoring model and AVL trees

TEACHING EXPERIENCE AND TALKS

- **UG Teaching Assistant**: Intro. to Electrical Engineering, Prof. Prathosh A. P. Jan'21 - May'21
  - Delivered weekly tutorial to a batch of 400+ freshmen from Electrical Engineering department
- **UG Teaching Assistant**: Principles of Electronic Materials, Prof. Pintu Das Jul'20 - Nov'20
  - Designed problem sets and assisted in evaluation of 200+ sophomores from CS and Mathematics deptt.
- Gave talk on Modularized Load Balancing for multipath data center networks at CITI Lab, France [report]
- Delivered an interactive talk on Image processing and noise separation at research group of INSA Lyon [ppt]
- Presented a paper on "Overview of Statistical Learning Theory" to a group of 50+ masters and PhD students

RELEVANT COURSES AND TECHNICAL SKILLS

- **Computer Science**: Machine Intelligence and Learning, Data Structures and Algorithms, Software Engineering, Operating Systems, Signal and Image Processing, Database Management, Data Mining, Computer Networks, Special Topics in High Speed Networks, Computer Architecture
- **Electrical & Mathematics**: Signals and Systems, Digital Electronics, Communication Engineering, Probability and Stochastic Processes, Linear Algebra, Differential Equations, Calculus
- **Programming skills**: C, C++, Java, Python, MATLAB, OCaml, SQL, Pytorch, Keras, Tensorflow, Numpy, Pandas, Scikit, Android Studio, HTML/CSS, Git, Linux, LaTeX

ACADEMIC ACHIEVEMENTS

- **IITD Academic Merit Award**: Ranked amongst top 7% students, achieving SGPA of **10/10** (2017-21)
- **Industrial R&D, IIT Delhi and NOKIA Fellowship**: Selected for fully funded research program(2020)
- **Student Exchange** at INSA Lyon: Selected for outstanding scholastic and extra-curricular record (2019)
- **Summer Undergraduate Research Award**: Conferred SURA Award for outstanding research (2019)
- **International Chemistry Olympiad Camp**:Awarded **Gold** medal for being in **top 354** students (2017)
- **Joint Entrance Examination**: Secured All India Rank 299 from over 1.3 million candidates (2017)
- **National Standard Examination in Physics**: Conferred for being in top 1% candidates in India (2017)
- **KVPY Fellow**: Fellowship by Dept. of Science and Tech., India for exceptional scientific aptitude (2017)
- **National Talent Search Scholar**: NTSE scholarship for mental ability and scholastic aptitude (2015)

EXTRA-CURRICULAR ACTIVITIES

Basketball, Board of Sports Activities, IIT Delhi Jul'17 - May'21

- **Winner, Gold Medal** at Inter-IIT tournament held at IIT Guwahati and won the General Championship
- **IITD Blazer Award**: Among 25 students conferred for consistent contribution to sports at IIT Delhi
- **Outstanding Contribution in Sports Award**: Felicitated by Board of Hostel Management, IIT Delhi

Student Academic Mentor, Board of Student Welfare, IIT Delhi Apr'20 - May'21

- Organized group orientation sessions and guided 5 sophomores towards academic and internship activities

Electrical Engineering Society, Executive, IIT Delhi Jul'18 - May'19

- Led a team for organizing 10+ workshops and talks attended by 200+ participants from the institute