Diganta Bhattacharya

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Academic Details

Examination	Institute	Year	%	Specialization
Masters of Statistics II Year	*Indian Statistical Institute*	2021-22	85.2	*Probability (Major)*
Masters of Statistics I Year	*Indian Statistical Institute*	2020-21	80.4	*Finance (Minor)*

Examination	Institute	Year	%
Bachelor of Statistics(Honours) III year	*Indian Statistical Institute*	2019-20	74.5
Bachelor of Statistics(Honours) II year	*Indian Statistical Institute*	2018-19	64.8*
Bachelor of Statistics(Honours) I year	*Indian Statistical Institute*	2017-18	74.6
Class XII (CBSE)	*D.P.S,Ruby Park*	2017	93.2

Projects at SPG Modelling Desk as Senior Associate @ Morgan Stanley [`July 2022 - Present`]

- **USA Home Price Index Anlaytics & Metropolitan Statistical Area Ranker**
  - Comprehensive tracker for **USA Housing Market** on plotly dash, using aggregated data sources from **kdb+** from 5+ vendor data sources and web-scraping **FRED** data.
  - Built **Metro-area Ranking System** using **ARIMA/XGBoost** hybrid **multi-step model** at USA, All states and top 300 MSA's, forecasting 12-month forward **HPA(12m)**.
  - **HPI-path** forecasts using **Voting Regression** on **8** different hyperparameter tuned models for a year at every level using only **macro-economic** sources **enhancing** current forecasts by around 10% **reduction** in **MSE**.
- **In-House Repeat Sales Transaction Index mimicking Case-Shiller Index**
  - Developed an automated **Monthly Index Builder** for more than **25 million** property transactions database using **Case-Shiller** methodology, reducing fit and project time to 50 **minutes** from 6+ **hours** and **pre-fetch** estimates for actual HPI **2-months** earlier.
  - Added feature to create custom index on any cohort of properties, using any score like **climate risk** to pre-bucket the properties using **hierarchical clustering**.
- **Transition Models for estimating PD, LGD, EAD: For Prime & Non-QM Loans**
  - Developed a **large exhaustive fast feature selection** method using **multi-threading** and **parallel chunk processing** to select useful features for **loan-level state transition model** on > 60 **million** rows, improving the time taken to select by $4-5$ **hours**.
  - Refactor of the legacy pipeline to support advance models like **CATBoost**, **Neural Networks** and added a hyperparameter tuner utility script using **Optuna**.
  - Developed **Survival Analysis** model for **Non-Qualified mortgage portfolios** using **Cox PH regression**, improving **90-day Delinquency** prediction AUC by 0.15, **60-day Delinquency** prediction AUC by 0.12, **Seriously Delinquent** prediction AUC by 0.17 vs. legacy models.
- **Hedge Optimizer & Scenario Analyisis : For Residential Whole Loan Portfolio**
  - **Hedge Tool** using **python** and **kdb+**, with data parsed from multiple sources like **INTEX**, internal data sources to **optimize hedging** on a selected portfolio and user defined hedge ratio, weights.
  - Developed **Scenario-Analysis framework** and a **pyQT** desktop app for any selected portfolio, for any duration, with an option to **add custom scenarios** on top of usual scenarios.
- **ResiDash & GLendA : Developer & Maintainer (Public & Private Side)**
  - **Resi-Dashboard** (ResiDash is a **plotly-Dash** based internal residential analytics website using **kdb+** and **python** on the backend to show complicated analytics on smaller datasets catering multiple desks.
  - **Global Lending App (GlendA)** is a widget-based internal **react app** catering to the private side with backend supported by **kdb+** and **python**.

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* I had undergone ACL surgery due to a sports injury and missed some exams in my second year.

Internship Projects at SPG Modelling Desk as Summer Associate @ Morgan Stanley

- `May 2021 - July 2021`
  Manager: Olgay Cangur, PhD, ED, FID Strats (NY), Morgan Stanley
  - Documentation and implementation of an existing **ANN Model for House Price Prediction for American Homes** in R and Python, with data collection, cleaning and matrix manipulation in **kdb+**.
  - Implementation of **Hedonic Pricing Model** in R and a **Geo- Spatial Pricing Model** using custom distance metrics in R to have comparisons with the original model and to have some interpretations.
  - Creating a partial **R-kdb+** framework to handle the **ANN model** FIP-wise, R and python modules for easier Model Implementations.

Internship Projects at R. C. Bose Centre for Cryptology and Security supported by @ Microsoft Research India

- `May 2019 - July 2019, May 2020 - July 2020`
  Guide: Dr. Goutam Paul, R C Bose Centre for Cryptology and Security, Indian Statistical Institute, Kolkata
  - Created & implemented $\mathbf{O}(n^2)$ algorithm for **Hidden-Subgroup problem**.
  - Built a **Zero-Knowledge Authentication**-proof prototype.

Technical Skills

- **Languages** : R, Python, Q/kdb+ , SQL , Matlab , C.
- **Tools** : LaTeX, R-Studio, MS Office (MS Excel, MS Word, MS PowerPoint), Geogebra, Desmos.
- **Other Skills** : GIT , PySpark , RShiny.

Awards & Achievements

- Qualified Regional Maths Olympiad(HBCSE) [2014], [2015], [2016].
- Qualified NTSE stage 1(NCERT), [2015] ; KVPY SA(IISc Bangalore), [2016].
- Qualified NEST Junior(NISER) AIR 67, [2014] ; NEST Senior(NISER) AIR 240, [2017].
- Came First in MTRP(ISI Kolkata), [2014] ; B.Stat(ISI) Merit List Rank 10, [2017].
- Top Quartile Asia (Pairs) in Asia Simon Marais Competition [2018].
- Asia Rank- 27 (Pairs) in Asia Simon Marais Competition [2019].
- Qualified for RC Bose Microsoft India Internship for Cryptology [2019], [2020].
- Qualified for Octro Inc. Summer Internship for [2020]; Novartis Summer Internship for [2021]; Morgan Stanley Summer Associate for [2021].
- Secured a Pre-Placement Offer for the Associate Position in Morgan Stanley, FID(Mumbai) [2022].

Certificates & Collections

- **Financial Risk Management (GARP)** Part I Cleared in January [2025].

Personal Projects

- *Coding Projects-*
  - TradeDash : A comprehensive trading dashboard for real-time market analysis and portfolio management.
  - Wall-Et : A modern, interactive financial dashboard built with Plotly Dash for tracking your stock portfolio, mutual funds, loans, credit cards, and other investments.
- *Kaggle-*
  - Finance : Jane Street Real-Time Market Data Forecasting ; Optiver Realized Volatility Prediction.
  - Miscellaneous: Abstraction and Reasoning Challenge, Bird CLEF, Drawing with LLMs.

Interests

- *Academic-* Functional Data Analysis, Neural Networks, Mean Field Games , Convex Optimization.
- *Story-board-* Manga: Zero , A Bad Attempt at Murder: Locked Room Crime Thriller.
- *Miscellaneous-* Football, Hiking, Abseiling, Surfing, Board Games.