Rahul Venkatesh

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Education

National University of Singapore (NUS) — Singapore
Master of Science in Data Science and Machine Learning — *Aug 2023 – Present*

Indian Institute of Technology (IIT), Delhi — New Delhi, India
Bachelor of Technology in Computer Science and Engineering — *Jul 2016 – Jun 2020*

Technical Skills

Languages: Python, C++, SQL, Bash

Libraries/Frameworks: NumPy, Pandas, Scikit-learn, TensorFlow, Matplotlib, MongoDB

Work Experience

Squarepoint Capital — Paris, France
Software Engineer — *Aug 2020 – Jun 2023*

- Developed and supported **low-latency** order entry gateways (OEG) for algorithmic trading in production.
- Built new OEGs to $5+$ **exchanges**, including **CME, ICE** and **OSE** over OUCH and FIX protocols.
- Designed frameworks for trading 2 asset classes: **bonds** and **non-deliverable forwards (NDF)**.

Projects

Sentiment Analysis - Financial tweets — Source code

- Preprocessed data by tokenizing, **stemming/lemmatizing** and vectorizing (**BoW and TF-IDF**) the text.
- Employed traditional ML models like Logistic Regression, SVM and **Naive Bayes** as baseline.
- Trained **LSTM** with both untrained and **pretrained embeddings** as an improvement over baseline.
- Tuned hyperparameters by randomized search and cross validation for robust and enhanced performance.

Option Pricing — Source code

- Implemented **Least-Square Policy Iteration** (RL) to learn optimal exercise policy for American options.
- Developed **Monte Carlo**, **tree models** and **PDE solvers** to price options like (quanto) European, Asian and DNT.
- Solved convex optimization problem to build **arbitrage free smile** interpolator and implied **volatility surface**.

Simple Stock Price Prediction — Source code

- Conducted time series analysis with **seasonal decomposition** and **stationarity** tests to identify patterns.
- Employed **Moving Average** and **Exponential Smoothing** to approximate prices and remove noise.
- Used diverse forecasting methods, including **ARIMA** and **LSTM** (Recurrent Neural Network).
- Tested models against historical data to assess predictive performance and validate effectiveness.

Numerical Solution to System of PDEs: Radiative Transfer (RT) — Source code

- Solved system of PDEs modelling scattering in RT in 3D space in 6 directions for a range of σ (scattering coefficient).
- Designed stable numerical schemes for **Fixed-point** and **Symmetric Gauss-Seidel** (SGS) method with relaxation.
- Optimized SGS algorithm using matrix manipulation techniques for a 15x speed boost resulting in faster runtime.