Samanvay Malapally Sudhakara

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Education

The University of Illinois at Urbana-Champaign — Champaign,Illinois
M.S. in Financial Engineering, GPA: 3.77/4.0 May 2024

Ramaiah Institute of Technology — Bangalore, India
B.E. in Mechanical Engineering, GPA: 3.52/4.0 July 2021

Skills

- **Programming Languages:** Python, C++, R, SQL, Bash
- **Frameworks:** Tensorflow, Pytorch, Quantlib, Docker, Scikit-learn, Scipy, Rugarch.
- **Coursework :** Statistical modeling, Derivatives pricing, Time Series Analysis, Portfolio Optimisation, Game Theory and Fair Division. Stochastic Calculus, Numerical methods, Linear Programming and Convex Optimisation.
- **Financial tools/platforms:** Bloomberg Terminal, RCM-X StrategyStudio, Metatrader4, KiteTrade, OandaV20.
- **ML/AI:** Regression and Classification models, Ensemble Techniques with Trees, Reinforcement Learning, Deep Learning, Generative AI and Large Language Models.

Professional Experience

Quantitative Trader (practicum), bp Trading Aug 2023 - Dec 2023

- Developed a **Forex ladder trading strategy** focusing on grid and lot sizing optimizations to enhance return potential using quantitative methods.
- **Sped up backtest up to 2000x** using **Just-In-Time Compilation** on Tick level data from various major currency pairs.
- **Applied hyperparameter tuning**, trying various automated techniques such as **Optuna, PySwarm, DEAP** (Genetic Algorithms) and utilized strategy validation techniques such as **Walk-Forward Analysis and Monte Carlo simulations**, to refine proprietary trading models.

Generative AI intern, JIA Finance June 2023 - Aug 2023

- Developed an advanced automated system leveraging the **OpenAI GPT 3.5, GPT 4 APIs, LangChain, and FAISS/Chroma DB** for interpreting mortgage guidelines. This system rapidly validates loan requirements using **Retrieval Augmented Generation (RAG)**, enhancing the speed and accuracy of mortgage processing.
- Constructed sophisticated chained prompt pipelines designed to parse PDFs, ensuring meticulous data cleanup and preservation of critical information. This setup also facilitates the creation of a vector store, enabling the chatbot to efficiently retrieve and utilize data.
- Engineered specialized task-specific Q&A chains and refined query processing using a **recursive tree approach** combined with **LLM-based memoization**. This significantly increased the response accuracy for complex mortgage-related inquiries, boosting performance from **55 % to 80 % accuracy**.

Quantitative Analyst (practicum) , JIA Finance Jan 2023 - May 2023

- Utilized **AWS Sagemaker and Redshift Connector** for EDA on over **100M Fannie Mae mortgage records**, applying data manipulation and visualization tools for insights.
- **Modeled loan survival and default rates curves**, employing the **Cox Proportional Hazard Model and Kaplan Meier Estimator** and assessing the impact of macroeconomic factors.
- Crafted a comprehensive **cash flow model for Mortgage Backed Securities (MBS)** integrating credit default, prepayment, and loss severity with a **Cox Ingersoll Ross (CIR) interest rate model**.

Relevant Projects

High Frequency Trading Backtesting Pipelines:

- Built complete backtesting pipelines in bash for streamlining backtest through Command line and For hyperparameter tuning in bash scripts. (repository)
- Built pipelines to procure and parse **Level 2 Order Book and Market By Order (MBO)** data from **IEX, Nasdaq's ITCH, and CME Globex** datasets and conducted extensive analysis prior to conducting **microsecond-level backtesting on RCM-X's Studio Studio(SS)** platform.

- Designed and implemented various **mean reverting and trend following market-making strategies** (repository)

Reinforcement Learning for Trading:

- **Development of DQN and DDPG in C++ with Torch Integration**: Engineered a robust Deep Q-Network (DQN) for a market taking agent and a Deep Deterministic Policy Gradient(DDPG) in C++ integrated with the Libtorch API library and SQLite Database and backtested with RCMXs Strategy Studio. Deployed Trained models live using Google Cloud VM instances to ensure robust scalability and stability. (repository)

Trading Strategy Development, Testing, and Deployment:

- Developed sophisticated algorithms within a **centralized strategy engine** for medium frequency trading on **OANDA's V20 platform**, utilizing advanced data scraping for live and historical data. Enhanced the engine to handle multiple strategies and positions seamlessly, and deployed strategies via OANDA's API from demo to live trading environments.
- Created a versatile trading module for Indian markets using the **Kite Connect API**, featuring a **custom strategy management engine** for concurrent trading strategies and real-time data distribution. Streamlined automation of login processes, secure token generation, and implemented robust **safety protocols and kill switches**. Optimized deployment on **Google Cloud Platform** for scalability and efficiency.

Large Language Model Projects:

- **LLM-Driven Stock Signal Extraction Using Langchain and OpenAI API**: Utilize Langchain and OpenAI's GPT 3.5 and GPT 4 model APIs to extract trading signals from news RSS feeds and financial data analysis, synthesizing diverse data streams into predictive models for equity price forecasting.
- **Llama 2 deployment using Google Cloud Services**: Utilized Llama endpoints from **Vertex AI** coupled with web searching capabilities using **serapi** library to create advanced chatbots that use latest information for responses.

Certifications

- **Bloomberg Market Concepts**: Portfolio Management, Equities , Fixed Income, Macro Economics, Terminal Basics.
- **Machine Learning Specialisation**: Linear Regression, Logistic Regression, Decision Trees, Random Forests, Adaboost, Support Vector Machines, Recommender systems, Reinforcement Learning, Q-Learning.
- **Deep Learning Specialisation**: Neural Networks, Hyper Parameter Tuning, Regularisation and Optimisation, Convolutional Neural Networks, Sequence Models.