**Xinyuan Song**

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**SUMMARY**

Self-motivated quantitative researcher and data scientist backed up by strong mathematical knowledge and programming skills.

Experienced in quantitative equity alpha research and trading, options futures and other derivatives pricing, portfolio management, and risk modeling, 4+ years of applying AI techniques (deep learning) in financial predictive models.

**EDUCATION**

**Peking University** Beijing, China

BS in Physics (minor in Mathematics)Sept. 2014 - Jul. 2020

**SKILLS**

* **Programming Languages:** **Python** (machine learning), **Java** (object-oriented design)**, C**, **C++** (infrastructure and high-frequency trading system design), **R**, **SAS** (statistical analysis), **MATLAB** (data analysis and modeling)
* **Machine learning:** Integrated learning, feature engineering, deep learning (**NLP**, Sequence models, image-processing)
* **Databases:** relational databases (**Oracle**, **MySQL**), databases (**MongoDB**), financial databases (**Wind**, **Bloomberg**).

**PROFESSIONAL EXPERIENCE**

**QiLin Investment Co., Ltd.** Shanghai, China

Machine learning engineer Intern Jun. 2019 - present

* Self-innovated more than 1000 trophy stock alphas based on **3D-Ising** model, fluid dissipative structure and statistical models.
* (**Seq2Seq**) Designed and participated in Implementing an end2end gated option pricing model based on 100 custom **RNN** cells, which is **economically rational**. Applied cybernetics methods (e.g. series and parallel connections, attention algorithms) on cells. Applied divide-and-conquer learning algorithms to address heterogeneity of option moneyness and time-to-maturity. The model functions are naturally encoded consistently with a valid call option surface to enforce no-arbitrage principles.
* (**Convoluted NN**) Designed and implemented a multi-input asynchronous predictive network based on **convoluted NN**. Applied deep convoluted neural networks based on different tasks. Conducted signal detection tasks on complex financial datasets (e.g. Faster **RCNN**, **Yolo**, multi-box-detector). Conducted features extraction tasks on time-series analysis (**DeepLab**, **MobileNet**, etc.). Self-developed convoluted **RNN** cells and the performance exceeded the former traditional networks. Trained, validated (tuned hyperparameters), and tested these neural networks on **Raw5** and **Fundamentals101** stock datasets yearly, outperforming classic stock alpha models.
* (**NLP**) Did **BERT** **NLU** pre-training and **GPT** tasks on time-seq data. Applied transfer learning methods from **Transformer** baseline models (e.g. **BERT**, **HCAN**, **RE2**) to sequence analysis. Improved alpha portfolio performance by another 3% with **NLU** techniques.

**Github:** [**https://github.com/Hik289/QILIN.git**](https://github.com/Hik289/QILIN.git) **&** [**https://github.com/Hik289/finnacial-indicators-summary.git**](https://github.com/Hik289/finnacial-indicators-summary.git)

**Langboat Co., Ltd** Beijing, China

Machine learning engineer Intern Jan. 2022 - Mar. 2022

* Worked in a team of ten responsible for OO designing and developing financial research and judgment platform.
* (**NLP**) Conducted pre-training and inference process on **BERT** and **MENGZI** models. Developed heuristic algorithms to do semantic analysis based on news events, research reports, and financial statements and implemented automated testing on various corpus sources, and improved model performance.

**Northeast Securities Co., Ltd** Beijing, China

Fixed Income Department full-time Sept. 2020 - Jan. 2022

* (Full-Stack) Developed, deployed, and supported a high-frequency trading system based on **Numba**, which can support live data fetching (option and future markets, multi-asset), database interaction, strategy research (alpha developing and strategy back-testing), live trading, risk analysis, and visualization. It has a well-designed structure with full integration between back-testing and lives to trade, various quant batteries (indicator and algorithm class, pre-trained deep learning models, etc.), flexible interface for detailed strategies implementation. Optimized computing performance with **C++** multi-threaded programming and computer cache segments.

**Github:** [**https://github.com/Hik289/high-frequency-trading-system.git**](https://github.com/Hik289/high-frequency-trading-system.git) **&** [**https://github.com/Hik289/deep-learning.git**](https://github.com/Hik289/deep-learning.git)

(Strategic) Classic quantitative indicator strategies: self-innovated more than 400 trophies (top 0.5%) minute-frequency and order-oriented options and futures factors. Applied machine learning, wavelet transformation, and spectrum analysis techniques. Established PDEs by using the option two-dimensional surface structure, tested the consistency of volatility asymmetry and option-implied skewness, conducted statistical arbitrage strategies and option hedging strategies, etc.

* (Machine learning) Applied machine learning (e.g. lasso, ridge, tree, **GBDT**) and integrated learning techniques (e.g. clustering, **Adaboost**). Combined diversified options and future factors to deliver superior predicting power. Developed deep neural networks using **Tensorflow** and **Keras** (mostly **Ptyorch**) framework. Developed **CUDA** functions with architectures of **RapidsAI** and **Copy** for high-performance computing.

**Huatai Securities Co., Ltd** Beijing, China

Research Department Intern Sept. 2021 - Dec. 2021

* (Research) Conducted deep research on industry rotation strategy based on financial data, consistent expectation data, capital flow data, and macro data. Conducted descriptive analysis and signal analysis to extract patterns and trading opportunities.

**Github:** [**https://github.com/Hik289/huatai-financial-engineering.git**](https://github.com/Hik289/huatai-financial-engineering.git)

* Finished in-depth research reports: *Huatai Securities: prosperity, congestion and northbound capital tracking (2021.10)* and *Huatai industry allocation strategy: capital flow perspective (2021.11).*

**Boundless Asset Management Co., Ltd** Beijing, China

Quantitative researcher Intern Mar. 2019 - Jun. 2019

* Replicated the index momentum strategy by stock portfolio with the same moving average crossover signals.
* Created a signal-delta-scaled portfolio as a momentum strategy to smooth **PNL** and reduce cost.

**Github:** [**https://github.com/Hik289/quant.git**](https://github.com/Hik289/quant.git)

* Deployed server-side programs to handle 150 queries per second on **Oracle** and **MongoDB** databases. Built relational and **NoSQL** databases (**MySQL**, **MongoDB**) to capture data from **Wind** and **Bloomberg** **API.**

**ACADEMIC EXPERIENCE**

**Machine learning** Beijing, China

Instructor: Li Jing, Peking University, School of physics Feb. 2020 - Jun. 2020

* Used a radiation transfer model to derive the atmospheric thermodynamics model formula, and built semi-parametric neural networks using **Tensorflow** for supervised learning. Improved deep neural networks by hyperparameter tuning, regularization, and optimization. Conducted K-fold cross-validation test and developed the radiative transfer matrix method.
* Used **SVM** unsupervised learning to do supporting cluster analysis. The supervised and unsupervised learning resulted in a 70% accuracy increase over the traditional physics radiative models.

**Quantitative biology** Beijing, China

Instructor: Chao Tang, Peking University, AAIS Jun. 2018 - Jul. 2019

* Completed a **MATLAB** program to show how two secondary populations overcome one major population through co-ordinary. Built up an imperfect population using the **PDE**s model, analyzed the effects of predation and self-consumption, deployed numerical methods to simulate solutions’ trajectories, and finally determined the optimal predation rate and the lowest self-consumption rate.

**Particle Physics** Beijing, China

Instructor: Jing Shu, ITP, Chinese Academy of Sciences Nov. 2017 - Dec. 2018

* Studied the **ROOT** platform (written in **C++**) and constructed a program to automatically draw the Feynman and Dalits diagrams of the collisions. Incorporated principle of quantum mechanics, conducted data spectrum analysis, high-pass processing, and wavelet transforming.

**Data Science**  Beijing, China; Geneva Switzerland

Instructor: Ming Zhang, Peking University, EECS Dec. 2015 - Dec. 2017

* Programmed the test server’s internal utilities and progressed remote data transmission through a single-chip computer.
* Developed several terminal servers for data sharing across a local area network connection, and performed the appropriate database API development and algorithm optimization.