

Renjie Shao

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EDUCATION

University of Michigan

Ann Arbor, MI

Master of Science in Quantitative Finance and Risk Management, **GPA:3.87**

Sep 2021 - May 2023

Bachelor of Science in Economics and Financial Mathematics (Double Major), **GPA: 3.94**

Sep 2017 - Aug 2021

Courses Highlight: Machine Learning, Artificial Intelligence, Probability Theory, Stochastic Calculus, Computational Finance

Award & Honors: Sims Honor Scholarship, Cole Excellence Award, Dean's list

PROFESSIONAL EXPERIENCE

1st Michigan Realty

Bloomfield Hills, MI

Data Scientist

Sep 2023 - Jun 2024

- Developed an ETL framework using pandas and numpy to analyze Michigan's monthly property listing and delisting cycles
- Applied NLP techniques Term Frequency- Inverse Document Frequency (TF-IDF) to transform addresses from past and present listings into standardized subdivisions, improving data accuracy and usability for downstream analysis.
- Designed a metric for determining investment viability based on value against historical rental and purchasing prices
- Integrated data visualization using Plotly & Dash to facilitate users in identifying behaviors in market dynamics

Apexus Technologies

New Jersey, NJ

Quantitative Researcher Intern

Jun 2024 - Present

- Applied PCA techniques and DNNs on top of raw market data (OLHC/variants of returns) to build a forecasting signal
- Fetches transactions and receipts from RPC endpoint and decode Swap and Transfer event logs. Using those decoded event logs to identify all historical arbitrage trade and calculate the revenue and profit for each arbitrage trade.
- Detected Market Regime using Hidden Markov Model, and check the correlation of stocks market with Dow Jones Industrial Average (DJIA) and the Nasdaq 100 Index using python api and beautiful soup.

RESEARCH EXPERIENCE

American Put Pricing Model (under Dr. Dominykas Norgilas' supervision)

Dec 2021-May 2023

- Collaborated in developing a solution to finding upper bound of American puts prices, based on the prices of European puts
- Structured the consistent price process for American put price utilizing cheapest super-hedging techniques to solve model
- Demonstrated the highest price is equal to the cheapest super-hedge by applying left-curtain martingale coupling

Solving Partial Differential Equations (PDEs) using Machine Learning Methods

Mar 2023-May 2023

- Applied the Deep Galerkin Method (DGM) toward solving classical free-boundary Black-Scholes PDEs for multi-dimensional European options and single-dimensional American options
- Implemented heuristic methods for solving PDEs without analytical solutions for sufficiently smooth payoff functions
- Validated results and accuracy against Monte Carlo simulations for European options, and the Barone-Adesi/Whaley model & Least-Squares Monte Carlo method for American options

Conditional Generative Adversarial Network (cGAN) Algorithm

Mar 2023 -May 2023

- Designed and implemented a modified cGAN model aimed at colorizing black & white ink paintings of landscapes
- Preprocessed image dataset using Gaussian blurring and grayscale conversions to identify edges through pixel intensity
- Evaluated model by re-mapping edges of generated painted images to the originals, and using the PSNR (peak signal-to-noise ratio) metric to assess the quality of image colorization and reconstruction

Bayesian Distance Clustering (BDC) Algorithm

Sep 2021-Nov 2021

- Implemented and applied Bayesian Distance Clustering on the Fashion MNIST and Chinese MNIST datasets to leverage the benefits of both distance-based clustering, as well as model-based clustering
- Evaluated BDC implementation against the Gaussian Mixture model, Spectral Clustering, and Density-based Spatial Clustering according to Adjusted Rand Index, Normalized Mutual Information, and Adjusted Mutual Information metrics
- Analyzed and consolidated results to determine that Bayesian Distance Clustering excelled in clustering symmetric and skewed Gaussian distributions which overlap

SKILLS

C++, Python, R, SQL, MATLAB, Mathematica, Excel, Latex, Machine learning, Monte Carlo, AI algorithm, Derivative Pricing

INTERESTS

Poker, Ultimate Frisbee, Boxing, Swimming, Gym, Chess, Reading, Board Game, Go