Aric Cutuli

ajcutuli@gmail.com | ajcutuli.github.io | ajcutuli | ajcutuli

Education

Columbia University *Sep 2022 - Dec 2023*
M.S. Financial Engineering New York, NY
University of California, Los Angeles *Sep 2019 - Jun 2022*
B.S. Mathematics/Economics, Specialization in Computing Los Angeles, CA

Research Interests

Mathematical Finance
- Stochastic analysis
- Behavioral finance
- Game theory
- Market microstructure

Statistics & Machine Learning
- Uncertainty quantification
- Bayesian networks
- Reinforcement learning
- Scientific machine learning

Research Experience

Research Assistant *Feb 2023 – Present*
Columbia University, Center for Climate Systems Research New York, NY
- Probabilistic modeling of human migration flows
- Supervisors: Upmanu Lall, Michael J. Puma

Research Assistant *Dec 2021 – Feb 2022*
AbleMarkets Remote
- Collated literature for a survey on the economics of automated market makers and decentralized exchanges

Professional Experience

Quantitative Summer Analyst, Equities Central Risk *Jun 2023 – Aug 2023*
Citigroup New York, NY
- Calibration and uncertainty quantification of systematic order filtering strategies using alternative data

Quantitative Summer Analyst, Data Science *Jun 2022 – Aug 2022*
Citigroup New York, NY
- Language model fine-tuning for news classification

Quantitative Developer *Dec 2021 – May 2022*
Consulting Startup Remote
- Derivative pricing and risk management tools for trading bots

Data Analyst Intern *Jun 2021 – Aug 2021*
Edelman Financial Engines Santa Clara, CA
- Identification of fiduciary performance issues through statistical testing

Research Papers

Working papers
1. A Bayesian Hierarchical Framework for Modeling Migration Flows. **Aric Cutuli**, Upmanu Lall, Michael J. Puma, Emile Esmaili, Rachata Muneepeerakul. (2023).
2. Modeling Migration Flows with Non-Homogeneous Hidden Markov Models. Emile Esmaili, Upmanu Lall, Michael J. Puma, **Aric Cutuli**, Rachata Muneepeerakul. (2023).

Technical Reports
- Separation Capacity of Randomly Initialized Deep Neural Networks. **Aric Cutuli**, Harold Haodong Miao, Weitao Zhu. (2023). Columbia University, EECS 6699: Mathematics of Deep Learning.

Personal Projects & Blog Articles

Hawkes Processes and Time Clustering in Finance *May 2023 – Jun 2023*
- Brief article discussing maximum likelihood procedure for calibrating Hawkes processes

Trading in the Limit Order Book with CNN-LSTM *Jan 2022 – Jul 2022*
- Replication of a paper using deep learning, prediction sampling, and Shannon entropy to extract spatio-temporal information from the limit order book and forecast directional moves

Portfolio Allocation Across Global Equity Exchanges *Aug 2021*
- Exploratory article identifying a few global equity indices as producers of a historically mean-variance optimal portfolio

Invited Talks

- A Bayesian Hierarchical Framework for Modeling Migration Flows.
  AGU23, San Francisco, CA, December 2023. (Poster)
  MURI Migration 2023 Annual Evaluation, Virtual, August 2023. (15 min)
- Modeling Migration Flows with Non-Homogeneous Hidden Markov Models.
  AGU23, San Francisco, CA, December 2023. (Poster)
- A Survey of Hawkes Processes in Finance.
  Directed Reading Program Student Colloquium, University of California, Los Angeles, January 2022. (15 min)

Teaching Experience

Course Assistant
Columbia University, School of Engineering and Applied Sciences
- IEOR 4733 - Algorithmic Trading, Spring 2023

Grants, Scholarships, & Awards

University Grant, *University of California, Los Angeles*	*$ 40,000*
Legacy Scholar, *Elks National Foundation*	*$ 4,000*
IAHF Scholar, *Italian American Heritage Foundation*	*$ 1,000*
Most Valuable Student Scholar, *CA-Hawaii Elks Foundation*	*$ 200*

Coursework

*** doctorate course*
** graduate course*

- Continuous-time RL **
- Bayesian models in ML **
- Computational stochastic modeling **
- Math of deep learning **
- Reinforcement learning *
- Time series & statistics *
- Optimization *
- Sampling & Monte Carlo simulations *
- Stochastic calculus *
- Stochastic processes *
- Object-oriented programming *
- Trading systems *
- Linear algebra
- Algorithms
- Econometrics
- Real analysis
- Numerical analysis

Programming Skills

- Python
- C++
- q/kdb+
- Java
- pandas
- scikit-learn
- statsmodels
- NumPyro
- Stan
- TensorFlow
- PyTorch
- JAX