Patrick Ding

Texas A&M University, Department of Statistics

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Education

Texas A&M University — *College Station, TX*

PhD Statistics — *Aug 2017–May 2022*

- GPA: 3.92
- Coursework: Bayesian statistics, machine learning, spatial statistics, deep learning, statistical computing

Princeton University — *Princeton, NJ*

BSE Operations Research and Financial Engineering — *Sep 2011–Jun 2015*

- Certificate in applications of computing

Experience

Microsoft — *Redmond, WA*

Data Science Intern — *Jun 2021–Aug 2021*

- Evaluated double machine learning for estimating device specific causal effect of operating system update using AB test data
- Processed terabytes of device telemetry data using internal SQL-like tools and Spark to clean, merge, and engineer features for analysis
- Shared problem findings throughout the team and to senior leadership, including a presentation to the Chief Product Officer

Adobe — *Lehi, UT*

Data Science Intern — *May 2018–Aug 2018*

- Implemented Monte Carlo estimators of KL divergence between MCMC, variational Bayes, and MAP posteriors of state space models using R, Stan, and C++
- Evaluated machine learning models for predicting approximate inference quality for state space models
- Demonstrated viability of model for predicting when MAP gives accurate estimates

AllianceBernstein — *New York, NY*

Associate — *Jun 2015–Jun 2017*

- Guided investment decisions in Emerging Markets Multi Asset Portfolio with more than one billion dollars in assets by developing regression model for emerging market equity and foreign exchange returns
- Guided investment decisions for variance swap sleeves with tens of millions of dollars in assets by building Matlab tools for back testing market timing and selection strategies and developing regression model for predicting variance swap returns
- Expanded firm's risk management and volatility forecasting capability by modeling option implied volatility surface
- Enabled firm to fulfill additional requests for proposals by creating realistic option simulator in Matlab, supporting trading, expiration, transaction costs, and hedging behavior with multiple assets
- Communicated model results to team through daily updating Excel reports with Matlab COM automation and SQL server

Projects

Multivariate Gaussian probability and sampling

Statistics Research — *Jan 2020–Present*

- Reviewed two dozen algorithms for high dimensional multivariate Gaussian sampling and probability estimation
- Translated half dozen algorithm implementations from Matlab and Python to C++ and distributed in R packages
- Extending expectation propagation for multivariate Gaussian polytope probability estimation
- Applying normalizing flows to multivariate Gaussian probability estimation and sampling

Semi implicit variational approximation applications

Deep Learning Research — *Mar 2019–Dec 2019*

- Investigated semi-implicit variational approximations for posterior inference of Bayesian neural networks in PyTorch
- Developed semi-implicit density regression model in PyTorch

Word vectors for variational autoencoding topic modeling

Deep learning course project — *Sep 2018–Jan 2019*

- Investigated the benefits of combining word embeddings and autoencoding topic models
- Implemented variational autoencoding topic models using PyTorch

Publications

- A Sadeghian, M Armandpour, **P Ding**, DZ Wang (2019). DRUM: End-To-End Differentiable Rule Mining On Knowledge Graphs. *Advances in Neural Information Processing Systems*.
- M Armandpour, **P Ding**, J Huang, X Hu (2019). Robust negative sampling for network embedding. *Proceedings of the AAAI Conference on Artificial Intelligence*.

Skills

R	Rcpp – RcppArmadillo – data.table – dplyr – ggplot2 – mlr – R Markdown – Rstudio
Python	pandas – sklearn – NumPy – matplotlib – PyTorch – JAX
Other	Git – Markdown – LaTeX – Unix – Bash – SSH – Matlab – Stan