TIANYANG XIE

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EDUCATION

University of Arizona Eller College of Management *Sep 2021 -*
Ph.D in Management Information System

University of Minnesota - Twin Cities *Sep 2017 - Dec 2020*
M.S in Statistics Overall GPA: 3.8/4.0

- Core Courses: Theory of Statistics, Advanced Regression, Experimental Design, Optimization

- PhD Level Courses: Mathematical Statistics, Asymptotic Theory, Theory of Probability, Stochastic Process, Statistical Learning, Statistical Computing

- Qualifying: Have passed Ph.D theoretical qualifying exam (Sep 2019)

Shanghai Univeristy of Finance & Economics *Sep 2013 - June 2017*
B.A in Mathematical Economics Overall GPA: 3.55/4.0

- Core Courses: Mathematical Analysis(4.0/4.0), Probability and Mathematical Statistics(4.0/4.0), Econometrics(4.0/4.0), Time Series(4.0/4.0), Data Mining, Linear Algebra, Real Analysis, Stochastic Process

- Scholarships: 3rd Prize of Renmin Fellowship (10%)

RESEARCH

Implied Volatility Surface with SC-BNN Jun 2020 - Dec 2020
With Prof. Dacheng Xiu *Booth School of Business, U Chicago*

This project aimed to employ advanced machine learning techniques on interpolating the implied volatility surface inferred from Black-scholes formula. We brought up a new method called shape-constrained Bayesian neural network (SC-BNN) to address the challenge of Bayesian inference with arbitrage-free constraints in neural network setting.

The method modified the prior by introducing the cosine-approximated skewed normal PDF as the penalizing factor to measure satisfaction of the constraints, and we employed "bayes-by-backprop" to do variational inference for the posterior.

- Project repository: https://github.com/TYtianyang/IVS.

Forecasting with Multiple Seasonality Feb 2019 - June 2020
With Prof. Jie Ding *Department of Statistics, UMN*

We introduced a new modeling procedure named 'MS' for forecasting univariate time series with multiple seasonality. As the the main developer of algorithms and R package, I designed four modules for 'MS': (i) Seasonality detection module, where Discrete Fourier Transformation (DFT) was utilized for suggesting seasonality candidates; (ii) Parallel fitting module, written in Rcpp and R parallel, would fit the generalized seasonal ARMA model with L-BFGS algorithms for different seasonality candidates; (iii) Model selection module, where the optimal model was selected by minimizing Bridge Criterion (BC); (iv) Forecasting module, would perform n-step ahead dynamic forecast on the optimal model.

Unlike the classical approaches accommodating single seasonality effect, 'MS' introduced multiple seasonality, and doesn't require pre-specification for seasonality periods. Instead, 'MS' only required knowing the number of seasonality effects. Simulation and empirical studies showed its superior performance than benchmark methods including ARMA, TBATS, light-tuned LSTM, especially than the Facebook Prophet model. The paper is accepted by IEEE Big Data 2020.

- Paper: (arXiv:2008.12340).

- R package: [(https://github.com/TYtianyang/tsms)](https://github.com/TYtianyang/tsms).
- Oral presentation: [(http://jding.org/jie-uploads/2020/11/tsms_pre.mp4)](http://jding.org/jie-uploads/2020/11/tsms_pre.mp4).

Absenteeism Prediction with PBD   Sep 2019 - May 2020
With Prof. Qie He   *Department of ISyE, UMN*

The project aimed to help Metro Transit, the largest public transportation company in Twin Cities, optimize their workforce management. My duty included developing day-ahead and season-ahead statistical prediction model for bus operators' absenteeism. The main challenge was the incompatibility between response and features: individual-level associations are inferred from labeled data available only at the aggregate level.

I reproduced an experimental GLM model based Poisson Binomial Distribution (PBD) with normal approximation techniques, and developed a system-embedded dynamic predictive algorithm which would evolve as daily data came in. The cross validation based on historical data showed its superior performance among traditional methods with feature engineering, including logistic regression, svm, tree, random forest and splines. The results received very good feedback as one of the best analytical tools for the company.

- Project repository: https://github.com/TYtianyang/MetroTransitPrediction.

EXPERIENCE

Data Scientist - Modeling Specialist   Sep 2019 - May 2020
Metro Transit   *Minneapolis,MN*

Responsible for statistical model development of absenteeism prediction.

T.A for Applied Regression Techniques   Feb 2019- Jun 2019
Teaching Assistant of Prof. Sara Algeri   *Minneapolis,MN*

Taught regression courses for graduate students in interdisciplinary fields.

T.A for Experiment Design   Sep 2018 - Dec 2018
Teaching Assistant of Prof. Gary W Oehlert   *Minneapolis,MN*

Taught experimental design courses for graduate students in interdisciplinary fields.

Harvard University, China Gazetteer Project   July 2016 - August 2016
Visiting Researcher to Prof. Richard B. Freeman   *Cambridge,MA*

The China Gazetteer Project aimed to provide the integration of Chinese historical, social and economic data during year 1950-1978 in geographic information system on a county level basis. I worked as algorithms developer, designing text mining techniques to accelerate the construction of data base.

National Mathematical Contest in Modeling   August 2015
Second Prize, Nation-wide top 8%   *Shanghai, China*

SKILLS & INTEREST

- <u>Coding Ability:</u> R(proficient), Python(proficient), C++, Matlab, Markdown, LaTeX.
- <u>Analytics:</u> Statistical Modeling(proficient), Deep Learning(proficient), Optimization, etc.
- <u>Research Interest:</u> Graph Learning, Time Series, Machine Learning, Mathematical Finance.