Peng Wang

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Education

Master in the Department of Industrial Engineering and Mangement, Shanghai Jiao Tong University Sep 2021 - Mar 2024

- **Research Direction**: Applied machine learning and Statistics in wind energy field, including Bayesian learning, Bayesian neural networks, High-dimensional statistical process control and monitoring, Spatial-temporal prediction and Heteroscedasticity modeling. (GPA: 3.73/4.0)
- **Field Courses**: Advanced statistics, Advanced operations research, Data mining, Quality and reliability engineering, Optimization method. I also learned Statistical Inference, Bayesian Statistics and Time Series Analysis by reading teaching materials.

Bachelor in the Department of Industrial Engineering and Management, Shanghai Jiao Tong University Sep 2017 - Jul 2021

- **Awards**: National First Prize for China Undergraduate Mathematical Contest in Modeling (top 0.6%), Finalist Prize for Mathematical Contest in Modeling (MCM) hosted by U.S. COMAP (top 1%), Outstanding Graduate of Shanghai Jiao Tong University. (GPA: 3.69/4.0)
- **Field Courses**: Advanced mathematics, Linear algebra, Fundamental mathematical statistics, Stochastic model, Economics.

Academic Achievement

- WANG P, LI Y, ZHANG G. Probabilistic power curve estimation based on meteorological factors and density LSTM[J]. Energy (IF: 9), 2023: 126768. [link]
- WANG P, LI Y, ZHANG Y. Probabilistic Forecasting of Wind Power Generation Using Online LASSO VAR and EGARCH Model[J]. Journal of Shanghai Jiao Tong University, 2023, 57(7): 845-858. [link]
- WANG P, LI Y, TSUNG F. A Directional Monitoring Approach of Sequential Incomplete Wind Power Curves with Copula-based Variational Inference. 2023. arXiv: 2311.02411. [link]
- WANG P, LI Y, WU Z, SU Y. Collaborative Monitoring of Wind Turbine Performance Degradation based on Probabilistic Power Curve Comparison. Renewable Energy (IF: 8.7), in revision.
- WU Z, LI Y, WANG P. A Hierarchical Modeling Strategy for Condition Monitoring and Fault Diagnosis of Wind Turbine using SCADA data. Renewable Energy (IF: 8.7), in revision.

Research Experience

Project: Probabilistic Power Curve Estimation and Monitoring based on Bayesian Learning Mar 2022 - May 2023

- Proposed a new probabilistic power curve named Density LSTM with free-form probability density function as output, and negative logarithmic likelihood as loss function rather than the expected value or quantiles of wind power output.
- Wind turbine performance degradation monitoring: Firstly, defined a new metric to calculate the deviation of different probabilistic power curves. Then, monitored the deviation vector by new-proposed nonparametric control chart named boundary corrected kernel density estimation.
- Supervised by Prof. Yanting Li, Department of Industrial Engineering and Management, SJTU.

Graduate Visiting Research Project: Sequential Incomplete Profile Directional Monitoring Jul 2023 - Sep 2023

- Estimated sequential incomplete profiles by a new approach named Weighted Copula-based Variational Inference, which is superior to Mean Field Variational Bayesian because the latter severely underestimated the variance of parameters.
- Proposed directional change point detection algorithm based on Bayesian posterior regularization and Bayesian likelihood ratio test.
- Supervised by Prof. Fugee TSUNG, Department of Industrial Engineering and Decision Analytics, HKUST.

Undergraduate Thesis Project: Decreasing Pollution Emission based on Reinforcement Learning Nov 2020 - Jun 2021

- Proposed new feature selection ensemble algorithm based on Similarity (Laplace Score, Spectral Analysis) and Mutual Information (Joint mutual Information, Minimum Redundancy and Maximum Correlation) to select sensor features in the vehicle production shop.

- Constructed drying room simulation program and used Deep Deterministic Policy Gradient (DDPG) to optimize the operation parameters of drying room based on minimizing the pollution emission.
- Cosupervised by Prof. Yanting Li and Prof. Xiaofeng Gao, Department of Computer Science and Engineering, SJTU.

Project: Ensemble Probabilistic Forecast of Wind Power based on Online Lasso VAR and EGARCH Jul 2021 - Mar 2022

- Proposed Online Lasso VAR to forecast wind power in temporal-spatial domain to solve the seasonality and time-varying correlation of wind speed between wind turbines.
- Used EGARCH to modify the prediction result of Online Lasso VAR with heteroscedastic residuals.
- Supervised by Prof. Yanting Li, Department of Industrial Engineering and Management, SJTU.

Additional Experience

Quantitative Finance Strategy Research Jun 2022 - Feb 2023

- Mined high frequency signals of convertible bonds and stocks based on the comparison of buyer and seller's orderbook strength, the latest transaction intention, large order, withdrawal order, etc.
- Designed a multi-type asset forecasting strategy: Aligned assist asset data to main asset based on time stamps and proposed the cross asset signals to forecast future returns with high interpretability and prediction accuracy.
- Constructed LightGBM model and used several strategies to prevent over-fitting.

Hobbies and Activities

- **Hobbies:** Jogging, tennis and badminton etc.
- **Activities:** Mathematical modeling. I was a part-time teacher of International Department of Affiliated High School of Jiao Tong University to teach students the knowledge of mathematical modeling and tutor students to participate in HiMCM, IMMC and other competitions. Two teams were awarded for Finalist Prize and three teams were awarded for Meritorious Prize.