Qiyu Han

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My interest lies in the theory and application of machine learning algorithms, especially in statistical inference under Reinforcement Learning and Bandit settings, as well as Causal Inference in Machine Learning. Besides, I am familiar with many statistical models and have a strong foundation in coding and mathematics.

Education

Purdue University | *Ph.D in Quantitative Method, GPA: 3.75* **Aug. 2018 - May. 2024(Expected)**
Purdue University | *M.S. in Statistics and Computer Science* **Jan. 2023 - Dec. 2023(Expected)**
New York University | *M.S. in Mathematics in Finance, GPA: 3.75* **Jan. 2018**
New York University | *B.S. in Mathematics, GPA: 3.83* **Aug. 2016**

Skills

Languages: Python(Pytorch), R, SAS, SQL, Linux/Unix, Java
Statistics courses: Probability and stochastic process, multivariate analysis, time series, non-parametric statistics, computational statistics, statistical methodology, causal inference.
CS courses: Reinforcement learning, deep learning, data mining, differential privacy, interpretable machine learning, algorithm design, game theory.
Optimization courses: Linear and non-linear programming, convex programming, and dynamic programming

Publication Preprint

1. **Qiyu Han**, Will Wei Sun, Yichen Zhang (2022). ***Online Statistical Inference for Matrix Contextual Bandit***. *arXiv* 2212.11385. Submitted to Annals of Statistics (AOS). Link
   - This work can construct a provable valid confidence interval for the low-rank matrix parameter in a fully online fashion under the contextual bandit setting.
   - This proposed inference procedure can determine the reliability of the bandit algorithm especially when the context is given by a matrix and the low-rank structure is inherited.

Ongoing Research Projects

1. ***Off-Policy Evaluation For Low-Rank Tensor Markov Decision Processes***.
   - We develop a method for off-policy evaluation in a reinforcement learning setting, where the state-action features are given in low-rank tensors under the Markov Decision Process framework.
   - We extend the off-policy evaluation problems into the low-rank tensor setting, which is advantageous to the applications whenever the features are in tensor form.
2. ***Self-interpretable and Denoising Graph Neural Networks*** (Submitted to KDD).
   - We developed a self-interpretable graph neural network model to mitigate the impact of noisy edges and nodes' features in the network data.
   - Our method has been experimentally proved to have higher prediction and interpretation accuracy on several popular graph mining tasks.
3. ***Network Data Anomaly Detection***.
   - We developed a diffusion model-based anomaly detection method.
   - By leveraging the strong capability of diffusion models to recover the true distribution, we can identify all types of anomalies, such as contextual and structural anomalies with higher accuracy and efficiency.

Past Research and Projects

1. ***Causal Discovery between Dietary Habits and Cancers***.
   - We discovered the causal relationship between dietary habits and certain types of cancers in rural areas of China by establishing the confidence interval of the treatment effect.

Working Experience

Krannert School of Management, Purdue University **August 2019 – present**
Research Assistant (Advisor: Dr.Will Wei Sun) *West Lafayette, IN*
- Reinforcement learning, Online statistical inference, Causal Inference, Neural Networks, and non-Convex optimization

Krannert School of Management, Purdue University **August 2018 – present**
Teaching Assistant *West Lafayette, IN*
- Graduate teaching assistant in Data Mining, and Business Analytics. Undergraduate teaching assistant in Optimization for Management Science, and Statistics in Business.

Honors and Awards

Magna Cum Laude **May 2016**
Dean's List of the Academic Year **May 2015**
Dean's List of the Academic Year **May 2014**