Qilong Pan

CONTACT INFORMATION

Personal website: jack-pan-ai.github.io
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EDUCATION

King Abdullah University of Science and Technology, Saudi Arabia
M.S. Statistics, GPA:3.7/4
Advisor: Dr.Ying Sun

Wuhan University of Technology, Wuhan, China
B.S. Statistics, GPA: 92.3/100
Advisor: Dr.Yufeng Gui & Dr.Xinping Xiao

Huazhong University of Science and Technology, Wuhan, China
B.A. English, GPA: 84.7/100
Favorite novel: The woman on the roof, Lasse Summanen (Sweden)

HONORS AND AWARDS

National encouragement scholarship 2019, 2020 (3/63);
First-Prize Scholarship of WHUT (4/63);
Excellent student 2018, 2019, 2020 (2/63)
Outstanding Graduates of WHUT 2021 (2/63)

RESEARCH EXPERIENCE

High Performance Computing (HPC), Oct, 2022 - May, 2023
(In progress) Scalable and distributed log-likelihood computation.

Aim: Approximate scalable Gaussian Process in the heterogeneous multicore architecture;

- Created independent parallel tasks from the composite form of log-likelihood;
- Reduced the computation of conditional log-likelihood by the Vecchia approximation, such as clustering and ordering;
- Analyzed the total complexity in terms of computations and variance;
- (C programming) Investigated heterogeneous scheduling and communication from low level perspective.

Generative Models, Oct, 2022 - May, 2023
(In progress) Fast Sampling for Denoising Diffusion Probabilistic Models (DDPM)

Aim: Speed up the Langevin sampling by pre-conditioned Metropolis (precondition-MALA) Adjusted method;

- Analyzed the convergence rate of pre-conditioned MALA under assumptions of tail and smoothness conditions.

Generative Models, Feb, 20222 - Oct, 2022
Spatial random field generation using Generative Adversarial Networks (GANs)
https://github.com/jack-pan-ai/temspGANs

Aim: Establish a random field generator by GANs;

- Proposed new visualized evaluation criteria for GANs under spatial applications, such as adjusted variogram and functional boxplot;
- Circumvented the notorious statistical parameter estimation for random field generation by adversarial training;
- Applied the StyleSwin GANs to the spatial random field generation.

Generative Models, Feb, 20222 - Oct, 2022
Visually evaluating GANs using Itself under multivariate time series,
https://arxiv.org/abs/2208.02649
https://github.com/jack-pan-ai/GaussianGANs

Aim: Evaluating GANs using statistical methods;

- Trained GANs to approximate the transformation function of KS test;
- Constructed a statistic using χ^2 distribution to evaluate the goodness of the transformation function.
- Used the well-trained GANs to evaluate the original GANs itself.

Causal inference, Feb, 2021 - Jun, 2021
Unbiased Estimator using propensity socre in recommendation system, Bachelor dissertation.

Aim: Ranking learning from the biased dataset.

- Constructed the unbiased estimator using propensity scores and measurement error model, and then reconstructed the loss function;
- Adopted clipping method to reduce the variance estimator at the expense of certain unbiased properties.

Compositional data analysis, Feb, 2020 - Dec, 2020
Compositional data analysis in Grey Model (http://arxiv.org/abs/2011.01501)

Aim: Extend the Grey Model from Euclidean space into Simplex space.

- Deduced the explicit form of GM(1,1) in Simplex Space via Aitchison geometry to achieve the prediction of compositional data;
- Proved the mathematical equivalence of parameter estimation in GM(1,1) of Simplex space with that of Euclidean space (least square method was applied).

Competitions

China Undergraduate Mathematical Contest in Modeling, Oct 2020
(2nd National-level Award Top 3.1%)

- **Purpose**: drivers' decision and queue rule.
- Parametric model: established generalized linear model to quantify the uncertainty of level-up bonus via multiple factors;
- Nonparametric model: designed a rectangular detection algorithm to obtain the overall distribution of random variables from the large data of GPS routes;

International Mathematical Contest in Modeling (MCM)
(Meritorious Winner (approximately 8% of teams))

- **Purpose 1**: Knapsack problem, studying the optimal packing manner of 4 medical packages with different sizes; where the Monte Carlo method was used to approximate the optimal packing manner;
- **Purpose 2**: Path planning, designing the UAV delivery route with the highest transport efficiency, where the route was arranged by the Depth First Search & Breadth First Search simultaneously in a multipoint network.

Skills and Courses

Programing: Pytorch/python/sklearn (proficient), C (proficient), R (competent);
Courses:

- CS: Stochastic Gradient Descent; Data Structure; C programming;
- Math: Mathematical Analysis; Linear Algebra; Numerical optimization;
- Statistics: Probability; Statistical inference; Stochastics process.