Ken Deng

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GitHub Profile
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Education

•University of Edinburgh (UoE) *2023-2025*
Bsc joint degree Mathematics and Statistics Grade/Rank: 84.4/10%

•South China University of Technology (SCUT) *2021-2025*
Bsc Mathematics and Applied Math (Stat) Grade/Rank: 87.86/(6/64)

Personal Projects

•Regression Analysis of 3D Printing Materials *2024.2*

Using a 3D Printing Material Dataset to Establish Weight Prediction Models

- Based on the principles of physics, establish a linear regression model and assume that the error variance depends on the independent variables. We further discuss the changes in model parameters under Bayesian theory and perform importance sampling on the Gaussian approximation of the model parameters to estimate the confidence intervals and prediction intervals.
- R is used for parameter estimation. By observing the estimator and its confidence interval, it is verified that the theoretical weight and actual weight of the material have a strong linear relationship.

•Police Allocation Optimization *2024.1*

Based on the accident dataset, optimize the police allocation plan to respond to accidents timely.

- Based on the spatial queue model, a model containing realistic constraints is proposed to describe the police allocation system. Different system metrics are proposed to determine whether the system is surplus or overloaded. Genetic algorithms are used to solve and we define some new mutation operators to improve the efficiency.
- Python (Simpy) is employed to simulate the allocation system and verify the effectiveness of the improved algorithm, ensuring strong robustness and convergence speed. Additionally, it ensures that the global optimal solution effectively addresses accidents of varying severity levels. Contributed to the Scottish Police Project Defense.

•Handwritten Digit Image Recognition *2023.7*

Image recognition classification on mnist dataset

- Using torchvision.transforms, we designed rotation and translation operators for input images to achieve data augmentation.
- Utilizing continuous convolution blocks and linear layers, we constructed a classification prediction model in PyTorch. Integrating batch normalization within the network significantly enhanced model performance. Employing cross-entropy as the loss function, our model achieved an accuracy of 97% on the test set.

•Forecast for Second-Hand Sailboat Prices *2023.4*

Based on the sailboat dataset, try to build a model to predict prices and explain the impact of region on prices.

- A prediction model is established based on the XGboost algorithm. In order to reduce the impact of data collinearity, stepwise regression is used for feature selection, and variance analysis is used to discuss whether there are significant differences in prices in different regions.
- Taking Hong Kong as an example, Python (XGBregressor) was used to predict and explain the generalization ability of the model, and Python (statsmodels) was used to conduct variance analysis and use p-value to verify that there are significant differences in sailboat prices in different regions.

Technical Skills

Soft Skills: Python(pandas, matplotlib, sklearn, pytorch), R(dplyr, ggplot2), SQL, MATLAB, C++
Other Skills: LaTeX, Origin, SPSS, Word, Excel
Languages: English, Mandarin, Cantonese

Positions in Campus

•Student Assistant, SCUT Innovation and entrepreneurship incubation base *2022.9-2023.9*
•Public Relations Officer, School of Mathematics Student Union (SCUT) *2021.9-2022.9*

Awards and Honors

•Finalist (Top 3) Edinburgh Operation Research Challenge with Police Scotland *2024.1*
•1st class scholarship SCUT *2023.9*
•Outstanding student leader SCUT *2023.9*
•3rd prize Chinese College Mathematical Modeling Contest *2022.10*
•3rd class scholarship SCUT *2022.9*