

# KAIWEN ZHOU

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## EDUCATION

### Zhejiang University (ZJU)

Sep 2017 – Present

*B.S. in Statistics* GPA: 3.89/4.00, 88.07/100

- Main courses: *Fundamentals of Data Structure, Natural Language Processing, Object-Oriented Programming, Advanced Algebra, Mathematical Analysis, Probability Theory, Mathematical Statistics, Multi-Variable Statistical Analysis, etc.*

## RESEARCH EXPERIENCES

### Dialogue summarization with saliency guidance

Sep 2020 – Present

*Research Assistant* Advisor: Prof. Lifu Huang, Virginia Tech

#### ■ Summary generation model

- Predicted sentence weights using BERTSum, then generated token weights based on sentence weight and self-attention score, then combined the word weights into the decoding process of BART model.
- Pretrained a completeness discriminator for generated summary using customized training data by randomly deleting sentences from the reference summary to use in the training of weight prediction module.
- Trained the BART module and weight prediction module individually, then combined two modules as pipeline and trained the weight prediction module with completeness score and evaluation metric score.

#### ■ Evaluation metric design for factual consistency

- Ran OpenIE tool on the generated summary and the reference summary to get the subject-predicate-object tuple set.
- Computed Rouge score or BERTScore of each tuple in the generated tuple set and reference tuple set and averaged the generated tuple scores and reference tuple scores to get precision score and recall score.

#### ■ Results

- Improved the baseline on test set by 0.002 on Rouge-1, Rouge-2 and Rouge-L score.

### Differential privacy version of GCN

July 2020 – Aug 2020

*Research Assistant* Advisor: Prof. Bo Li, University of Illinois at Urbana-Champaign

- Proved that using exponential or Laplacian mechanism directly on adjacency matrix will result in data inefficiency.
- Generated adjacency matrix from a differential private Hierarchical Agglomerative graph Clustering dendrogram based on MCMC sampling with further reduction of noise scale and edge reconstruction error.
- Improved accuracy by 1.5% on the Cora dataset applying the newly designed utility function for MCMC dendrogram sampling.

### Pressure control mechanism design for pressure tubing system

Sep 2019

*Research Leader* Advisor: Prof. Zhiyi Tan, Zhejiang University

#### ■ Establishment of mathematical models

- Fitted the functional relationship between variables using polynomial fitting, trigonometric function fitting and spline interpolation.
- Constructed a set of partial differential equations to describe the relationship between multiple variables in tubing operation under different settings.
- Designed the work mode of two nozzles and pressure reducing value to help increase the time overlap of oil pumping and spraying to the most extent and successfully reduced the variance of the oil pressure

#### ■ Simulation and conclusion

- Simulated the operation of the system using Euler method and modified Euler method.
- Computed the parameters by dichotomy using the monotone correlation between the parameters and indexes.
- Successfully controlled the pressure in the tubing at any level and significantly reduced the variance of the pressure from 0.53 to 0.026.

### PDE-based image denoising

Jul 2019 – Aug 2019

*Research Leader* Advisor: Prof. Xiaoliang Cheng, Zhejiang University

- Summarized PDE denoising algorithms, and created several new combinations of them.
- Effectively prevented over-diffusion and edge blurring in image denoising by stopping denoising when SNR start falling.
- Improved the results of selected algorithms on several types of pictures by automatic stop denoising.

## ACADEMIC AWARDS

- Hailiang First Class Scholarship (2%) Oct 2020
- Zhejiang University Second-class Scholarship (8%) Sep 2020
- Honorable Mention in Mathematical Contest In Modeling Mar 2020
- First Prize in China Undergraduate Mathematical Contest in Modeling (0.75%) Sep 2019
- Zhejiang Provincial Government Scholarship Oct 2019
- Zhejiang University Second-class Scholarship (8%) Sep 2019
- Third Prize in Zhejiang Undergraduate Advanced Mathematics (Calculus) Competition May 2018

## SKILLS & LANGUAGES

**Computer skills:** Python, C/C++, Matlab, R, Stata, SQL

**Languages:** Chinese (Native), English (Proficient)