Ning Zhang

zhangningnku@gmail.com https://nz917.github.io/nz/

Education

MASc in ECE, University of British Columbia **Sep 2019 – Current**
GPA: 94.4/100 *Vancouver, Canada*
Thesis: Attributed graph alignment: information theoretic limits and efficient algorithms

BSc in Physics, Nankai University **Sep 2015 – Jun 2019**
GPA: 90.8/100 Ranking: 3/92 (3/15 in Poling class) *Tianjin, China*

Research Interest

graph theory, probability theory, algorithms, spectral methods, statistical learning theory, combinatorial optimization, operations research, statistical physics

Publications

1 **Zhang, Ning**, Weina Wang, and Lele Wang. Attributed graph alignment. In *2021 IEEE International Symposium on Information Theory (ISIT)*, pages 1829–1834, 2021 [Conference paper] [Full version]

2 Xin Zhou, Sina Maloufi, Daniel C Louie, **Zhang, Ning**, Qihao Liu, Timk Lee, and Shuo Tang. Investigating depolarization property of skin tissue by degree of polarization uniformity contrast using polarization-sensitive optical coherence tomography. 2021

3 **Zhang, Ning**, Susan Francis, Rayaz A Malik, and Xin Chen. A spatially constrained deep convolutional neural network for nerve fiber segmentation in corneal confocal microscopic images using inaccurate annotations. In *2020 IEEE 17th International Symposium on Biomedical Imaging (ISBI)*, pages 456–460. IEEE, 2020[Conference paper] [Code]

Research Experience

Attributed graph alignment | *Advisor: Lele Wang, ECE department, UBC* **Sep 2020 – Current**

Part 1. Study on information theoretic limits

- Studied the exact alignment on graphs generated from our attributed Erdős–Rényi pair model as a statistical estimation problem and derived the corresponding Maximum a Posterior (MAP) estimator.
- Proved the regimes where exact alignment can be achieved by the MAP estimator with high probability using the method of generating function.
- Proved the regimes where no algorithm guarantees exact alignment by exploring the threshold phenomenon of indistinguishable vertex pairs.
- Extended our results to seeded graph alignment problem and aligning graphs generated from stochastic block model with known community label.

Part 2. Study on polynomial time algorithms

- Designed two polynomial time algorithms for aligning attributed Erdős–Rényi graph pair.
- Proved the feasible regimes where the two algorithms achieve exact alignment with high probability.

Biophotonics | *Advisor: Shuo Tang, ECE department, UBC* **Sep 2019 – Aug 2020**

- Performed wavelength calibration in the spectral-domain optical coherence tomography system and explored image analysis and enhancement methods for moving objects, e.g., spackle variance, image registration...

Undergraduate research projects (funded by Poling program) **Jun 2016 – Jun 2019**

Deep learning | *Advisor: Xin Chen, CS department, University of Nottingham* Oct 2018 – June 2019

- Proposed a dynamic kernel in convolutional neural network model to impose a local smoothness constraint on the output prediction.
- Implemented the proposed idea on the TensorFlow framework and executed the experiments on both real dataset and the synthesized dataset created using image inpainting technique.

He-Ne laser stabilization[Poster] |*Advisor: Ben Sauer, Physics, Imperial College London* Jun 2017 – Sep 2017

Topological photonics [Poster]| Poling class research project Mar 2017 – Mar 2018

Awards

2021	IEEE North American School of Information Theory Best Poster Award (second prize, **2/50**)
2020	Honorable Mention in Graph Attack and Defence Track of KDD Cup (Rank **14/106**)
2019	Outstanding Graduate in Nankai University (**top 3%**)
2018	The First Prize Scholarship for Outstanding Student (**top 5%**)
2017	Gong Neng Award
2016	The Second Prize Scholarship for Outstanding Student (**top 10%**)
2015-2019	Poling Scholarship

Teaching

Fall 2021	TA for STAT321 Stochastic Signals and Systems
Spring 2021	TA for STAT321 Stochastic Signals and Systems
Fall 2020	TA for STAT321 Stochastic Signals and Systems
Spring 2020	Lab TA for ELEC291 Electrical Engineering Design Studio I

Talks and Activities

2021	IEEE International Symposium on Information Theory (ISIT) [Slides] IEEE North American School of Information Theory (NASIT) [Poster] UBC statistical learning theory reading group [Note1][Note2] Existing graph alignment algorithm demos [Slides]
2020	IEEE International Symposium on Biomedical Imaging (ISBI)[Slides] UBC mathematical data science reading group [Note]

Relavent Skills

Language: TOEFL(iBT): Total 103 with reading 28, listening 27, speaking 24 and writing 24

Coding languages: MATLAB, Python, Mathematica, C++

Technologies/Frameworks: Linux, Github