

Zonghao Huang

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RESEARCH INTEREST

My current research focuses on information privacy and security in data analytics techniques including machine learning and geo-statistics. I am especially interested in the theoretical aspects on applying differential privacy in machine learning.

EDUCATION

Oklahoma State University, USA

Master in Electrical Engineering (by thesis); GPA: 3.76/4.0

January 2017 - December 2019 (Expected)

Nanyang Technological University, Singapore

Master of Science in Electronics (by coursework)

July 2015 - June 2016

Xiamen University, China

Bachelor of Engineering in Electronics & Information Engineering: GPA: 3.51/4.0 (top 10%)

September 2011 - July 2015

WORK EXPERIENCE

Graduate Research Assistant

School of Electrical and Computer Engineering, Oklahoma State University, USA

January 2017 - July 2019

Graduate Teaching Assistant

School of Electrical and Computer Engineering, Oklahoma State University, USA

August 2019 - present

PROJECTS

- **Task Allocation in Crowdsourced Spectrum Sensing with Location Privacy Protection**
 - Identify the challenges of using crowdsourced mobile users for spectrum sensing and propose an approach for allocating tasks to mobile users without access to their individual locations.
 - Propose to use private spatial decomposition to represent mobile users' location data and design an approach to add differentially private noise that provides a good trade-off between privacy and utility.
 - Use MATLAB to conduct simulation on real-world datasets to show the effectiveness of the proposed approach.
- **Distributed Machine Learning with Data Privacy Guarantee**
 - Design a novel differentially private ADMM-based distributed learning algorithm called DP-ADMM, which combines an approximate augmented Lagrangian function with time-varying Gaussian noise addition in the iterative process to achieve higher utility for more general objective functions than prior works under the same differential privacy guarantee.
 - Use the moments accountant method to analyze the total privacy loss and provide a tight end-to-end differential privacy guarantee for DP-ADMM.
 - Provide rigorous convergence and utility analysis of the proposed DP-ADMM.
 - Conduct extensive simulations by MATLAB based on real-world datasets to validate the effectiveness of DP-ADMM in distributed learning settings.
- **Discovering Truth from Conflicting Sensory Data in Mobile Sensing in the Presence of Data Poisoning**
 - Design an optimal data poisoning attack strategy in truth discovery system, which is formulated as a bi-level optimization problem.
 - Propose a robust truth discovery algorithm, which integrates source evaluation and source filtering process into the CRH method. The source evaluation estimates the error bias and variance of the sources, and the source filtering process uses the estimated bias and variance as the criteria to remove unreliable sources.
 - Conduct experiments by MATLAB on real-world data to show that our approach could provide accurate and reliable results in the presence of data poisoning attacks.
- **Radio Environment Map Construction with Location Privacy Protection**
 - Investigate location privacy in crowdsourced-based radio environment map construction and adopt perturbation mechanism in Ordinary Kriging to provide differential privacy.
 - Use MATLAB to simulate our approach on real-world data to show the privacy-utility trade-off.

PUBLICATIONS

- **Zonghao Huang**, Yanmin Gong, “Differential Location Privacy for Crowdsourced Spectrum Sensing”, *IEEE Conference on Communications and Network Security (CNS)*, Las Vegas, USA, October 9-11 (pp. 1-9), 2017. (acceptance rate: 29.9%)
- **Zonghao Huang**, Rui Hu, Yuanxiong Guo, Eric Chan-Tin, Yanmin Gong, “DP-ADMM: ADMM-based Distributed Learning with Differential Privacy”, *accepted for publication in IEEE Transactions on Information Forensics and Security (TIFS)*, August, 2019.
- **Zonghao Huang**, Miao Pan, Yanmin Gong, “Robust Truth Discovery Against Data Poisoning in Mobile Crowdsensing”, *IEEE Global Communications Conference (GLOBECOM)*, Waikoloa, HI, USA, 9-13 December, 2019.

AWARDS AND HONORS

- **Graduate Teaching Assistantship**, School of Electrical and Computer Engineering, Oklahoma State University, USA, 2019
- **Student Travel Grant for IEEE CNS 2017**, National Science Foundation and Army Research Office, USA, 2017
- **Graduate Research Assistantship**, School of Electrical and Computer Engineering, Oklahoma State University, USA, 2017, 2018, 2019
- **First-Class Scholarship of Academic Excellence**, Department of Electronic Engineering, Xiamen University, China, 2015, 2013, 2012
- **Scholarship of Recreation and Sports**, Department of Electronic Engineering, Xiamen University, China, 2015
- **Second-Class Scholarship of Academic Excellence**, Department of Electronic Engineering, Xiamen University, China, 2014
- **Merit Student Award**, Department of Electronic Engineering, Xiamen University, China, 2012

ACADEMIC ACTIVITIES

- **Reviewer for Conference Manuscript Submissions** : IEEE INFOCOM 2018, IEEE ICC 2018, IEEE CNS 2018
- **IEEE Student Member**: Communication Society

UNIVERSITY ACTIVITIES

Oklahoma State University National Lab Day

Our lab hosted Guthrie High School students and demonstrated our research projects to the students.

May 2018

Oklahoma State University International Student Organization International Olympics 2018

Badminton men single silver medal winner.

September 2018

Oklahoma State University International Student Organization International Olympics 2019

Badminton men single bronze medal winner.

September 2019

TECHNICAL SKILLS AND LANGUAGES

- **Programming Languages**: MATLAB, C, Latex, Verilog
- **Languages**: English (proficient), Chinese (native), Cantonese (native)

REFERENCES

Dr. Subhash Kak: subhash.kak@okstate.edu

Regents Professor, School of Electrical and Computer Engineering, Oklahoma State University, USA

Dr. Ye Liang: ye.liang@okstate.edu

Associate Professor, Department of Statistics, Oklahoma State University, USA

Dr. Chaoyue Zhao: chaoyue.zhao@okstate.edu

Assistant Professor, University of Washington, USA