Shuo Liu

Last updated: April, 2021

EDUCATION

- **Georgetown University** — Washington, D.C.
  Doctor of Philosophy in Computer Science, Department of Computer Science — *Aug. 2019 – Present*
- **Georgetown University** — Washington, D.C.
  Master of Science in Computer Science, Department of Computer Science — *Aug. 2017 – May 2019*
  With thesis *Understanding Relational Background Knowledge Attacks on Social Media*. Advisor: Dr. Lisa Singh
- **Fudan University** — Shanghai, China
  Bachelor of Science in Information and Computing Science, School of Mathematical Sciences — *Aug. 2013 – June 2017*

RESEARCH EXPERIENCE

- **Graduate research assistant: Fault-tolerant distributed optimization**
  Advisor: Dr. Nitin Vaidya (Georgetown University) — *Sept. 2019 - Present*
  - Currently studying Byzantine fault-tolerant algorithms in distributed optimization tasks.
  - Implement a Byzantine fault-tolerant simulation application for experimental purpose using PyTorch. Conduct experiments that is contributed to a technical report.[2]
- **Master's Thesis: *Understanding Relational Background Knowledge Attacks on Social Media***
  Advisor: Dr. Lisa Singh (Georgetown University) — *Sept. 2018 - May 2019*
  - **Main work:** Propose possible privacy attacks on attribute values of social media accounts based on population information from target accounts' groups or communities on social medias. Analyze proposed methods.
- **Graduate research assistant: Massive Data Institute at Georgetown University**
  Advisor: Dr. Lisa Singh (Georgetown University) — *March 2018 - May 2019*
  - Working on *webfootprint*, a social media privacy project. The project intends to develop an application that simulates several methods of social media privacy attacks, helping users checking if they are leaking personal information across social medias.
  - **Main work:** Fix and implement new parts of the application using Java. Develop other possible privacy attacks.
- **Undergraduate Thesis: *Estimation of sparse graph with* lifecycle**
  Advisor: Dr. Yun Xiong (Fudan Univ.), Dr. Xiangnan Kong (Worcester Polytechnic Institute) — *Sept. 2016 – May 2017*
  - **Main work:** Proposed a new kind of sparse graph estimation problem, based on domain knowledge of periods of node activities. Addressed the estimation problem with altered pathway graphical lasso algorithm.

PUBLICATIONS

[1] **Shuo Liu**, Lisa Singh, and Kevin Tian. Information exposure from relationalbackground knowledge on social media. In *2020 IEEE International Conferenceon Data Science and Advanced Analytics (DSAA)*, 2020, doi: 10.1109/DSAA49011.2020.00041.

[2] Nirupam Gupta, **Shuo Liu**, and Nitin H Vaidya. Byzantine fault-tolerant distributed machine learning using stochastic gradient descent (SGD) and norm-based comparative gradient elimination (CGE). *arXiv preprint arXiv:2008.04699*, 2020.

[3] **Shuo Liu**, Nirupam Gupta, and Nitin H Vaidya. Approximate Byzantine fault-tolerance in distributed optimization. *arXiv preprint arXiv:2101.09337*, 2021.

[4] Nirupam Gupta, **Shuo Liu**, and Nitin H Vaidya. Byzantine fault-tolerant distributed machine learning with norm-based comparative gradient elimination. In *2021 51th Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN-W)*, 2021. (to appear)

Course Projects

- **Chatbot Using Reinforcement Learning and Movie Dialogs**
  Instructor: Dr. Grace Hui Yang (Georgetown University)   *April 2019 – May 2019*
  - **Main work:** Build and train reinforcement-learning-based chatbot using movie dialogs using Python. Analyze performance and compare with retrieval-based chatbots.
- **Streaming Algorithms: Study on Streaming Model of Entropy Approximation**
  Instructor: Dr. Justin Thayler (Georgetown University)   *Nov. 2018 – Dec. 2018*
  - **Main work:** Compare and contrast different methods of streaming algorithms for entropy approximation based on frequent items. Implement and analyze performance of methods. Write report on summary and analysis.
- **Data Privacy: Study on Locally Private Heavy Hitters**
  Instructor: Dr. Kobbi Nissim (Georgetown University)   *Nov. 2018 – Dec. 2018*
  - **Main work:** Summarize recent researches on locally private heavy hitters. Implement algorithms and analyze performance.
- **Text Mining: Emoji Prediction with Feature-Based Methods**
  Instructor: Dr. Nazli Goharian (Georgetown University)   *Sept. 2017 – Dec. 2017*
  - In group of 3. Studied performance of different feature-based methods on predicting emojis for social media texts.
  - **Main work:** Studied on possible methods for the task. Conducted experiments using Python and analyzed results. Finished the write-up.
- **Intro to Data Analysis: Prediction of Movie Box-office Performance**
  Instructor: Dr. Lisa Singh (Georgetown University)   *Sept. 2017 – Dec. 2017*
  - In group of 3. Data analytic project on possible factors that would infect box-office performance of movies. Present the results in report on interactive web pages.
  - **Main work:** Proposed possible indicators of box-office performance of movies. Conducted experiments and analyzed the results mainly using Python. Finished the write-up.
- **Numerical Methods on Integral Equation**
  Instructor: Dr. Yunxin Zhang (Fudan University)   *Sept. 2016 – Dec. 2016*
  - **Main work:** Implemented a general interface integrating multiple numerical methods solving integral equations using MATLAB. Made a report presenting the calculation results and analysis of performances of different methods.
- **Big Data Research on Scholar Cooperations in Academic Publications**
  Instructor: Dr. Yun Xiong (Fudan University)   *Sept. 2016 – Dec. 2016*
  - In group of 7.
  - **Main work:** Collected data of publications by Fudan University from academic resource websites and built a database with the data. Presented the cooperation changes through time via visualization methods using JavaScript and CSS.

Teaching experience

- **Department of Computer Science, Georgetown University**
  Teaching Assistant, COSC 282*: Big Data Analytics,* Undergraduate level   *Jan. 2019 – May 2019*

Internship

- **Data Analyst Intern, Operation Center**
  METEK Mobile Embedded Technology Co. Ltd., Shanghai, China   *Aug. 2016 – Nov. 2016*
  - **Data analysis:** Analyzed numerical growth model of a mobile game before launching using Excel and MATLAB.
  - **Application:** Developed a web-based operation data evaluation system for operation analysis and feedback for mobile games.
- **Lecturer in Olympiad in Informatics**
  Kaifeng High School, Henan, China   *March 2014 – Aug. 2014*
  - Organized a weekly lecture for high school students in competitive programming.