

Zirou Qiu | Curriculum Vitae

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🌐 Homepage

🐙 GitHub

Research Interests

Graph mining, network science, combinatorial optimization;

Research Experience

Clemson University - Algorithms and Computational Science Lab

Advisor: Prof. Ilya Safro

Graduate Research Assistant

○ MutualRank: A Network Centrality Measure for Bilateral Flow Processes

- Proposed *MutualRank*, a novel centrality measure for networks under bilateral flow models.
- Studied the existing centrality measures and Markov chain extensively.
- Collected real-world network datasets with ground-truth importance of vertices.
- Investigated the typologies of underlying flow processes for various centrality measures.

○ Knowledge Discovery in Microbiome Networks

- Collaborated with scientists at *Biophysical Sciences Department at the University of Chicago* and *Data Science Division at Argonne National Laboratory*
- Built a processing pipeline for analyzing biological networks (code on Github).
- Identified the patterns of change in the community structures of the microbiome networks.
- Discovered the node-level and cluster-level correspondences between microbiome networks.

Argonne National Laboratory

Host: Christopher Henry & Yuri Alexeev

Graduate Research Aide

Summer 2019

○ Elruna: A Network Alignment Algorithm based on Elimination Rules

- Developed *Elruna*, a topology-based network alignment algorithm that outperforms the state-of-the-art.
- Proposed a novel selection rule *Rawsem* for local search which increases the convergence rate.
- Studied existing network alignment algorithms and quadratic assignment problems extensively.
- Conducted experiments on real-world datasets.
- Submitted a **first-author paper** (see in-submission works below).

In-submission Works

Zirou Qiu, Ruslan Shaydulin, Xiaoyuan Liu, Yuri Alexeev, Christopher S. Henry, Ilya Safro, "ELRUNA: Elimination Rule-based Network Alignment", *submitted*, 2020, preprint at: <https://arxiv.org/abs/1911.05486>.

Education

Clemson University

Clemson, SC

Master of Science in Computer Science - Thesis

Aug 2018 - May 2020

Overall GPA: 3.75/4.0

Southeast Missouri State University

Cape Girardeau, MO

Bachelor of Science in Computer Science - Dean's List, Cum Laude

Aug 2013 - May 2018

Major GPA: 3.878/4.0; Overall GPA: 3.708/4.0

Teaching Experience

Graduate Teaching Assistant <i>Clemson University, CPSC 8630: Multimedia Systems and Applications</i>	Spring 2020
Graduate Teaching Assistant <i>Clemson University, CPSC 8490: Principles of Scientific Computing</i>	Spring 2020
Graduate Teaching Assistant <i>Clemson University, CPSC 4200/6200: Computer Security Principles</i>	Fall 2019
Undergraduate Laboratory Teaching Assistant <i>Southeast Missouri State University, CS265: Computer Science II (C++ Programming)</i>	Spring 2018
Undergraduate Laboratory Teaching Assistant <i>Southeast Missouri State University, CS380: Computer Operating System</i>	Fall 2017

Select Projects

Tanghulu: A Seed-based Network De-anonymization Algorithm <i>Clemson University</i>	Advisor: Prof. Long Cheng Fall 2018
<ul style="list-style-type: none">Designed <i>Tanghulu</i>, a network de-anonymization algorithm. Tanghulu can efficiently identify anonymized nodes by aligning the target network with the auxiliary network.Conducted experiments on Facebook network datasets.	
Enhancement of Algorithmic Efficiency <i>Southeast Missouri State University</i>	Advisor: Prof. Ziping Liu Spring 2017
<ul style="list-style-type: none">Designed and analyzed the enhanced heap sort. Achieved 20.85% performance improvement compared to the conventional implementation at the input size of 40,000,000.Designed and analyzed the enhanced Hierholzer's algorithm which starts with the vertex of the highest indegree, and uses the priority queue (Fibonacci heap) to keep track of vertices with unvisited edges.Preprint: https://zirouqiu.github.io/algorithmic_enhancement.pdf.	
Fraud Detection for Banks <i>Southeast Missouri State University</i>	Advisor: Prof. Suhair Amer Fall 2016
<ul style="list-style-type: none">Built a system that analyzes bank transactions and detects suspicious activities.Designed an algorithm that builds models based on users' previous spending patterns.Coauthored one paper: https://zirouqiu.github.io/fraud_detection.pdf	

Honors and Awards

- Recipient of the *UVA Computer Science Scholar Fellowship*.

Guest Lectures

Introduction to Web Security <i>Clemson University, CPSC 6200</i>	Fall 2019
Branch Prediction <i>Clemson University, CPSC 6200</i>	Fall 2019

Technical Skills

- Proficient Programming Languages:** C/C++, Python

- **Software and Tools:** Linux, Gephi, MySQL, Matlab, R studio

Related Courses

- **Math:** Combinatorial Optimization, Graph Theory, Discrete Structure, Linear Algebra, Calculus, Statistics,
- **Computer Science:** Network Science, Data Mining, Design and Analysis of Algorithms, Object-oriented Programming, Operating Systems, Computer Networks, Programming Languages & Compilers, Database, Software Engineering,