





RAJAGOPAL VENKATESARAMANI

Ph.D. Candidate, Computer Science

CONTACT

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SUMMARY

My research interests are in genomic data privacy, optimization, adversarial machine learning, deep learning, complex network analysis and natural language processing. I am committed to excellence in Computer Science Education, and a proponent of a learner-centric classroom model, coupled with innovation in the design of course materials.

EDUCATION

Ph.D., COMPUTER SCIENCE
Washington University in St. Louis
GPA: 3.93
Expected May 2023

M.S., COMPUTER SCIENCE
Washington University in St. Louis
GPA 3.89
Jan 2021

B.TECH, COMPUTER SCIENCE
Minor in Mathematics
Shiv Nadar University
GPA: 8.18/10
May 2017

SKILLS

ML & DEEP LEARNING
PyTorch, Keras, CUDA, Sklearn

NETWORK ANALYSIS
Graphtool, NetworkX

NLP
Gensim, NLTK

OPTIMIZATION
IBM CPLEX

GIT, LINUX/UNIX, SHELL

C/C++

R, MATLAB

WORK EXPERIENCE

GRADUATE RESEARCH ASSISTANT
Washington University in St. Louis | 2018-present
Vanderbilt University | 2017-2018

- Conducted research and published papers on privacy preserving genomic data sharing, defending against probabilistic genome-photograph linkage using adversarial examples, topic modeling for short texts, and consensus games.
- International [press coverage](#), including New Scientist, GenomeWeb.

ASSISTANT TO THE INSTRUCTOR (HEAD TA)
Analysis of Network Data
Washington University in St. Louis | Fall 2019 and Spring 2022

INSTRUCTOR
Data Structures, Introduction to Computing and Programming
Learning and Academic Support Center | Shiv Nadar University | Fall 2016, Spring 2016

- Instructor of record, taught core CS courses to classes of ~20 students.
- Developed course materials, assignments and sample tests.

SOFTWARE ENGINEERING INTERN
Dell International Services, Hyderabad, India | Summer 2016

- Developed a SOA domain audit tool, to automate the monitoring of Oracle Weblogic servers using Python and Java. Deployed on Linux VM.
- Eliminated need for manual audit of servers, resulting in over 99% reduction in time taken per audit.
- Best Intern award.

TEACHING ASSISTANT
Data Structures
Shiv Nadar University | Fall 2015

SOFTWARE ENGINEERING INTERN
HCL Technologies, Noida, India | Summer 2015

- Trained in C#, ASP and the .NET framework.
- Prototyped an airline reservations dashboard.

PUBLICATIONS

Re-identification of Individuals in Genomic Datasets Using Public Face Images
[Science Advances, 2021](#)

A Semantic Cover Approach to Topic Modeling
[*SEM, 2019](#)

PREPRINTS

Defending Against Membership Inference on Beacon Services
[Under Review, ArXiv, 2018](#)

Community Detection by Flow Simulation
[ArXiv, 2018](#)

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SERVICE

REVIEWER

Artificial Intelligence Review (AIRE)

REVIEWER

Machine Learning, Springer (MACH)

REVIEWER

Transactions on Knowledge and Data Engineering (TKDE)

LEADERSHIP

PRESIDENT

WUSTL Ballroom | 2020-2021

PRESIDENT

UMANG – The Indian Graduate Student Association | 2019-2020

FOUNDING CHAIR

ACM Shiv Nadar University Chapter | 2016

TALKS & GUEST LECTURES

RE-IDENTIFICATION FROM FACE IMAGES IS HARDER THAN YOU THINK

CEER Annual Meeting 2021

DATA PRIVACY

CSE_{411A}: AI & Society
Washington Univ. in St. Louis | 2020

NETWORKS IN AI

CSE_{416A}: Analysis of Network Data
Washington Univ. in St. Louis | 2019, 2022

THE TLDR VERSION – TOPIC MODELING FOR SHORT TEXTS

Doctoral Student Seminar
Washington Univ. in St. Louis | 2019

REIDENTIFICATION IN GENOMIC DATASETS USING PUBLIC FACE IMAGES

Doctoral Student Seminar
Washington Univ. in St. Louis | 2020

DJANGO UNCHAINED

Dell Intl. Services, Hyderabad, India | 2016

RESEARCH

PRIVACY PRESERVING GENOMIC DATA SHARING

2020-Present

- Developed highly-scalable optimization techniques to mitigate membership-inference attacks on genomic data beacons and summary statistics, with problem instances involving over 1.3 million variables.
- Proposed a state-of-the-art attacker model which relies on separation of statistical likelihood-ratio-test scores *after* defense is implemented.
- Proposed defenses against SOTA attacks, with the goal of minimizing impact to utility while providing formal privacy guarantees.
- Working on game-theoretic framework where attacker and defender are modeled using generative deep neural networks with complementary loss functions.

GENOMIC RE-IDENTIFICATION USING PUBLIC FACE IMAGES

2018-2020

- Evaluated the risk of re-identification in genomic datasets by probabilistically linking genotypes to publicly posted face images using VGGFace deep convolutional neural networks. Used transfer learning by training on CelebA data.
- Proposed a method to defend against re-identification using adversarial examples created using gradient-based methods.
- Research featured on 10+ global news outlets.

TOPIC MODELING FOR SHORT TEXTS

2017-2018

- Proposed a novel topic modeling method tailored to short texts such as Tweets.
- Deterministic approach based on greedy solution to the set-cover problem, applied to word-embeddings learnt using Word2Vec.

NETWORK CONSENSUS GAMES

2017-2018

- Studied the effect of network structure on global consensus between two groups with opposing incentives, with adversarial actors.
- Mentored a Masters student, extended prior codebase to allow arbitrary graph input and deployed on Heroku.
- Performed human-subjects experiments with Amazon Mechanical Turk workers.

SELECT ACADEMIC PROJECTS

A TWENTY QUESTIONS PLAYER USING CONCEPT-NET

2017

- Implemented a twenty-questions AI agent, optimized traversal of the ConceptNet knowledge graph to frame questions from relational edges.
- Algorithm can be repurposed into a game-with-a-purpose to identify missing or spurious edges in the crowdsourced graph.

LUMOS - SMART HOME GESTURE CONTROL WAND

2020-2021

- Prototyped a handheld gesture-control device for smart home appliances.
- Device functions using either accelerometer data, streamed to AWS from an Arduino nano, or gestures recognized by an infrared camera connected to a Raspberry Pi, running a trained neural network locally.
- Camera based gestures recognized using OpenCV, compared to MNIST digits using a custom shallow neural network.

COMMUNITY DETECTION BY FLOW SIMULATION

2017

- Proposed a fast (runtime and memory linear in number of edges) and fully parallelizable algorithm for information-flow based community detection in large complex networks.
- Method naturally handles graphs with or without directionality and weights.
- Demonstrated scalability to networks with over 28.5 million edges.