

Sankaran Vaidyanathan

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📄 sankaranv.github.io

Education

- Sep '21–present **Ph.D., Computer Science**, University of Massachusetts Amherst
- Sep '19–present **M.S., Computer Science**, University of Massachusetts Amherst
- Aug '13–May '17 **B.E., Electrical and Electronics Engineering**, SSN College of Engineering, Anna University

Research Experience

- Jan '20–present **Research Assistant**, Knowledge Discovery Lab, University of Massachusetts Amherst
Advisor: David Jensen
- Jul '17–Jun '19 **Project Associate**, RISE-IIL Lab, Indian Institute of Technology Madras
Advisor: Balaraman Ravindran

Publications

- Applied Network Science '20 **Hypergraph Clustering by Iteratively Reweighted Modularity Maximization**
Tarun Kumar, **Sankaran Vaidyanathan**, Harini Ananthapadmanabhan, Srinivasan Parthasarathy, Balaraman Ravindran
- Complex Networks '19 **A New Measure of Modularity in Hypergraphs: Theoretical Insights and Implications for Effective Clustering**
Tarun Kumar*, **Sankaran Vaidyanathan***, Harini Ananthapadmanabhan, Srinivasan Parthasarathy, Balaraman Ravindran (* denotes equal contribution)

Projects

- May '20–present **Competence-Aware Machine Learning**
Joint work with David Jensen (UMass Amherst), Joydeep Biswas (UT Austin) and Charles River Analytics
- Determined the causes of failure for a pre-trained reinforcement learning agent navigating in the AirSim driving environment, by estimating causal effects of various environmental conditions on mission failure.
 - Learned causal models that estimated the agent's competence (probability of mission success) for a route with pre-specified environmental conditions.
 - Developed a system that allowed a human operator to specify environmental conditions for a new episode prior to deployment, and returned an upper and lower bound on the agent's estimated competence.
- Feb – May '22 **Dorian: a Reflection on our Digital Footprints**
- Designed a web app that intends to provoke reflection over how one's online persona, as represented by their Twitter usage data, aligns with their intentions and expectations.
 - Built a UX prototype in Figma, collected aggregate statistics from an example Twitter account, and used the data to write introspective questions, minigames, and writing prompts.
- Jul '17–Jun '19 **Hypergraph Clustering by Iteratively Reweighted Modularity Maximization**
Supervised by Balaraman Ravindran (IIT Madras) and Srinivasan Parthasarathy (Ohio State)
- Discovered clusters in bibliographic and social networks modeled as hypergraphs.
 - Extended the modularity maximization framework for graph clustering to the task of hypergraph clustering.
 - Developed a method for eliminating redundant cluster assignments by reweighting hyperedges that cut across clusters.
- Jan-May '17 **Control of Autonomous Quadrotor for Real-Time Object Tracking**
- Built a quadcopter with an Arduino-based flight controller that tracked and followed selected objects in its field of view.
 - Implemented video stabilization on the camera feed using Kalman filtering, and Lucas-Kanade optical flow for object tracking.

Teaching Experience

Dec '21 **MATH 605: Probability Theory**, University of Massachusetts Amherst

- Gave a guest lecture on sampling methods, Markov Chain Monte Carlo, and Hamiltonian Monte Carlo.

Jan–May '19 **Introduction to Machine Learning**, Indian Institute of Technology Madras

- Developed iPython-based interactive demos and gave supplementary video lectures, designed exams and programming assignments, and led in-person discussion sessions.
- The course was intended for a business professional audience, as part of a Certificate in Technology and Management offered in collaboration with the Indian Institute of Management Bangalore

Technical Skills

- **Programming Languages:** Python, C++, R
- **Frameworks:** PyTorch, PyMC, sklearn, numpy, OpenCV
- **Tools and Platforms:** Figma, Linux, Kubernetes, Arduino

Relevant Coursework

Bayesian Statistics, Machine Learning, Intro to Causal Inference, Research Methods in Empirical CS, Probabilistic Graphical Models, Artificial Intelligence, Probability Theory, Reinforcement Learning, Distributed and Operating Systems, Fixing Social Media