

Meghana Venkata Palukuri
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EDUCATION

PROGRAM	INSTITUTION	GPA	YEAR	RANK
MS & Ph.D. in Computational Science, Engineering & Mathematics	The University of Texas at Austin	3.76/4	2022	-
B.Tech (<i>Honors</i>) & M.Tech in Chemical Engineering	Indian Institute of Technology Madras	8.94/10	2017	2

RESEARCH INTERESTS

I am passionate about developing **machine learning algorithms** to solve the world's most challenging problems.

Areas: Machine Learning (**Deep Learning, Reinforcement Learning**), **Optimization, Graph theory**

CODING SKILLS

Python (scikit-learn, tensorflow, networkx, pandas), **C++** (GRVY, MASA, HDF5, PETSc), **R** (tidyverse), **Matlab** (Statistics & ML, Optimization, ODE Solvers), **Scala**, **Latex**, **Linux & HPC** (at TACC), [Github](#)
Exposure: Travis-CI, autotools, Valgrind, Docker, C, Java, Arduino-coding, HTML, CSS, Javascript, C#

SELECT GRADUATE COURSE WORK

- Statistical Models for Big Data
- Tools & Techniques in Computational Science
- Geometric Foundations of Data Science
- Reinforcement Learning
- Deep probabilistic modeling
- Pattern Recognition
- Bayesian Deep Learning
- Functional Analysis
- Graph Theory & Optimization

PROFESSIONAL EXPERIENCE

- **Applied Scientist, Amazon (Last Mile Science)**, *Project: Route Planning* Aug 2022 - present
 - Algorithm and code development for research initiatives in route planning, such as predicting road network communities.
- **Graduate Research Assistant, University of Texas at Austin** Jun 2018 - Aug 2022
(Supervisor: Prof. Edward Marcotte - Oden Institute for Computational Engineering and Sciences)
 - Working on *Ph.D.* thesis titled 'Machine Learning methods for community detection in networks using known information'.
 - Developed [Super.Complex](#), a supervised AutoML pipeline achieving **98% accuracy** in human protein community detection.
 - Developed a reinforcement-learning algorithm with graph embeddings for community search, an NP hard problem.
- **Concentration in Teaching and Mentoring**, Texas Institute for Discovery Education in Science Jun 2018 - present
- **Professional Memberships: Society for Industrial and Applied Mathematics**, SBE, AIChE 2017 - present
- **Applied Scientist Intern, Amazon (Last Mile Science)**, *Project: Route Planning* Jun - Aug 2021
 - Accurately estimated delivery route productivity using AutoML and detected road network communities for many use-cases.
- **Applied Scientist Intern, Amazon (Brands Experience)**, *Project: Substitute Product Recommender* Jun - Aug 2020
 - Built product embeddings using text information and performed nearest neighbor search for substitutes with **99% recall**.
- **Cloud Software Engineering Intern, Schlumberger**, *Project: Time-Series Operations* Jun - Aug 2019
 - Developed a Domain Specific Language in Scala for custom calculations on real-world time series data on Google Cloud.
- **Graduate Assistant, Indian Institute of Technology, Madras** 2016-17
 - Worked on Master's thesis titled 'Human bio-chemical reaction network analysis for treating autism'.
 - Developed two constrained pareto-optimization algorithms and two metrics for optimal network flow distribution.
- **Intern, Hindustan Unilever**, *Project: Autonomous Maintenance* May-Jul 2015
 - Improved process energy efficiency by 20% by eliminating an identified stream through modification of system logic.

RESEARCH PROJECTS (ML, HPC & OPTIMIZATION)

- **Laplacian finite difference solver application** Aug-Dec 2018
 - Developed from scratch a C++ application leveraging solvers for the 2D heat equation, achieving high convergence rates.
 - **Features:** performance - 0.4s (100x100 mesh), 100% code coverage (lcov), 0 memory errors (Valgrind), HPC environment.
- **Hyperspectral image denoising and classification** Mar-May 2018
 - Applied a framework with one-against-one and one-against-all SVMs for multi-class classification with 90% accuracy.
- **Re-ranking molecule docking poses with RankSVM** Oct-Dec 2017
 - Formulated and implemented a novel SVM classifier for re-ranking docking poses from F2-dock with 75% accuracy.
- **Implementation of ML algorithms for image and speech data classification** Aug-Dec 2016
 - Developed from scratch and compared neural networks (MLP), GMM, HMM, Bayes, k-means and k-nn classifiers for speaker identification and image recognition.
- **Kinetic modeling of anti-cancer drug action** Jul 2016-May 2017
 - Simulated experimental circadian rhythms with a robust data-tuned parametric model using a genetic algorithm.
- **Design of microfluidic networks performing floating point operations** Jul 2015-Jun 2016
 - Employed genetic algorithms and MINLP to design optimal micro-fluidic networks for combinatorial sequence sorting.

PUBLICATIONS & INTERNATIONAL CONFERENCES

I have published 5 papers including 3 peer-reviewed journal papers, and presented at 8 conferences with 7 citations and h-index 2.

- Mohammad FK, Palukuri MV, Shivakumar S, Rengaswamy R and Sahoo S (2022) A Computational Framework for Studying Gut-Brain Axis in Autism Spectrum Disorder. *Front. Physiol.* 13:760753. [\[Paper\]](#)
- Palukuri MV, Marcotte EM (2021) Super.Complex: A supervised machine learning pipeline for molecular complex detection in protein-interaction networks. *PLoS ONE* 16(12): e0262056. [\[Paper\]](#)
- Palukuri M, Marcotte EM (2021) "Super.Complex v3.0: A Supervised Machine Learning Pipeline for Molecular Complex Detection in Protein-interaction Networks", *US HUPO (Human Proteome Organization Conference)* [\[Poster\]](#)
- Palukuri M, Marcotte EM (2020) "Super.Complex: Intelligent subgraph search for communities with deep reinforcement learning", *SIAM MDS: Conference on Mathematics of Data Science*, Cincinnati [\[Invited Talk\]](#)
- Palukuri M, Marcotte EM (2019) "Super.Complex: A Computational Pipeline for Supervised Community Detection in Graphs", *TACCSTER 2019: TACC Symposium for Texas Researchers*, Austin [\[Invited Talk, Poster\]](#)
- Palukuri M, Marcotte EM (2019) "Supervised community detection in protein-interaction networks", *The 2nd Annual Meeting of the SIAM Texas Louisiana Section*, Dallas [\[Best Poster Award\]](#)
- Palukuri M, Marcotte EM (2019) "Supervised community detection", *Workshop on Recent Developments on Mathematical Statistical approaches in Data Science (MSDAS)*, Dallas [\[Poster\]](#)
- Kizhuveetil U, Palukuri M, Karunagaran D, Rengaswamy R, Suraishkumar GK. (2019) "Entrainment of superoxide rhythm by menadione in HCT116 colon cancer cells", *Scientific Reports, Nature Publishing Group* 9.1: 3347 [\[Paper\]](#)
- Palukuri M, Shivakumar S, Sahoo S, Rengaswamy R. (2018) "Computational framework for exploring the interplay of diet and gut microbiota in autism." *bioRxiv*: 422931 [\[Paper\]](#)
- Palukuri M, et al. (2018) "An integrated COBRA-PBPK model to study interactions between gut and brain in autism", *5th Conference, Constraint-Based Reconstruction and Analysis*, Seattle [\[Poster\]](#)
- Kizhuveetil U, Palukuri M, Rengaswamy R, Suraishkumar GK. (2017) "Menadione induced reset of circadian superoxide rhythms in human colon cancer cells", *Free Radical Biology and Medicine*, 112, 91-92, Baltimore [\[Poster\]](#)
- Palukuri M, et al. (2017) "Predicting the role of gut microbiota and diet in autism", *11th Copenhagen Bioscience Conference: "Data-Driven Biotechnology: Bench, Bioreactor, Bedside"*, Hillerød [\[Poster\]](#)
- Palukuri M, Shivakumar S, Sahoo S, Rengaswamy R. (2016) "Predicting the role of gut microbiota and diet in autism", *Interdisciplinary Laboratory for Data Sciences Workshop*, Chennai [\[Poster\]](#)

AWARDS & HONOURS

- Passed **Ph.D candidacy exam & Ph.D preliminary exam** (applicable math, scientific computing, math modeling).
- **O'Donnell Fellowship** and **General ISSS Financial Aid** award (\$34k) by UT Austin towards research. (2017-19)
- **Two-time \$500 Professional Development Award** and **25% discount** given to present at two conferences. (2018-20)
- Selected for admission to graduate studies at **UT Austin, CMU** and the **University of Delaware**. (2017)
- Received the **C.A. Sastri Endowment Award** for best graduating chemical engineering student. (2017)
- Selected for the **KVPY Fellowship** awarded by the Department of Science and Technology, Govt. of India. (2012)
- **1 out of 6** students from 90 chemical engineering students to be awarded a **B.Tech Honours** degree (2017)
- Qualified for nationals (**top 5%**) of **International Chemistry Olympiad** hosted by HBCSE (TIFR). (2012)
- Secured undergrad admission at IITM, the **best engineering college** in India (**top 0.5%** of 500k applicants) (2012)
- Secured All India Rank of **34** in **National Science Olympiad**, **64** in **International Math Olympiad**. (2006,2012)

CO-CURRICULAR ACTIVITIES

Coding	Windows App(C#): Wardrobe Assistant- outfit suggestions <i>2016 Microsoft-24hr Code.Fun.Do Hackathon</i>
Robotics	Coded locomotion for autonomous transwheel robot <i>2013 Asia-Pacific Robot Contest - Robocon</i>
VR	Designed spatial augmented reality at Envisage, India's largest student tech show: 2000+ people (2014)
Table Tennis	UT Austin TT Team Member: Participated in USA nationals by NCTTA, securing 7th place. (2018-19)
	IITM TT Team Captain: Won Gold Medal- Sportsfest, Silver Medal-48th Inter-IIT Meet . (2012-16)
Chess	Placed 1st in Intra-hostel Chess Competition, 4th in Dean's Trophy. (2013,2015)
Classical Arts	Learnt Carnatic music for 7 years , classical dance forms Bharatnatyam and Kuchipudi for 3 years
	Selected for the Guinness World Record event, ' Laksha Gala Sankeertanarchana '. (2009)

VOLUNTEERING

- **Two-time Captain Judge** at the Dallas Regional **Science and Engineering Fair** for middle-class students. 2019-20
- Information desk volunteer at **Explore UT** - campus wide event to promote learning attended by 1000+ people. 2019
- **Organized IITM** campus engineering facilities **tours and workshops** for middle **school kids**. 2015-16
- **Organized Run for a Cause**, event for **Chennai flood relief**, with proceeds going to **school repairs**. 2015-16

LEADERSHIP POSITIONS

- **Vice President, SIAM Chapter of UT Austin** (2020-2021)
- **Founder, Literary Fest 'Saahitya'** *(a self-driven initiative, commended by the Director, Dean and Alumni)* (Feb - Apr 2016)
 - Formed & lead a **team of 60** across 6 divisions to **organize a literary fest with 30 events** and a **footfall of over 1000** in IITM.
- **Secretary, Chemical Engineering Society** *(Nominated by Dept. Faculty)* (2015 - 2016)
 - **Lead a team of 120 people** across 9 divisions to organize '**ChemClave**' (dept fest), with a footfall of around **1000** students.
- **Convener, Word Games Club** *(Head of 1 out of 9 institute cultural clubs)* (2015 - 2016)
 - **Raised club participation by 100%** through 25+ new events and 2 flagship events, with a budget of **INR 2 lakh**.