

Anuva Kulkarni

Contact Information

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Homepage: <https://anuva05.github.io>

Education

- **PhD**, Electrical and Computer Engineering
Advisors: Franz Franchetti and Jelena Kovačević
Carnegie Mellon University (2015 – 2020)
- **Masters**, Electrical and Computer Engineering
Advisor: Jelena Kovačević
Carnegie Mellon University (2013 - 2015)
- **B.E.(Hons)** Electrical and Electronics Engineering
Birla Institute of Technology and Science,
Pilani, India (2009-2013)

Relevant Work Experience

- **Summer Intern, IBM T. J. Watson Research Center, Yorktown Heights, NY** – Summer 2019
Project: Indexing for fast Nearest-Neighbor search in Artificial Intelligence (AI)-powered Databases
- **Research Assistant, Carnegie Mellon University** – Spring 2015
Project: Big Mechanism Design and Analysis Automation
- **Research Assistant, Indian Institute of Science** – Spring 2013
Project: Algorithms for locating non-defective items in a large population
- **Summer Intern, Canopus Instruments, India** – Summer 2011
Project: Internet based data acquisition and control of remote field devices using the MSP430 and the CS8900 Ethernet LAN controller.

Research Experience

Machine Learning Projects:

- **Indexing for fast Nearest-Neighbor search in Artificial Intelligence (AI)-powered Databases** (*IBM Research, Yorktown Heights, New York*) **Advised by: Dr. Rajesh Bordawekar, Summer 2019**
Developed an indexing algorithm to quickly identify candidates for querying an AI-powered database. This work resulted in submission of two patent applications.
- **Unsupervised image segmentation using Winner-Take-All Hash and Random Walks algorithm** (*MS Graduate Project, Center for Biomedical Imaging, Carnegie Mellon University*)
Advised by: Prof. Jelena Kovačević, January 2014 – December 2014
Developed an unsupervised segmentation algorithm for images, with a focus on biomedical images using the machine learning concept of comparative reasoning.
- **Near-fall detection in seniors using head-mounted accelerometers and gyrometer sensor** (*Graduate Research Assistant, Carnegie Mellon University*)
Advised by: Prof. Peter Gilgunn, Summer 2014
Designed a system using Multinomial Logistic Regression to predict the probability of instability in daily activities, particularly useful for senior citizens

High Performance Computing Projects:

- **Scaling large memory scientific workloads on CPU-GPU platforms** (*Carnegie Mellon University*) **Advised by: Prof. Franz Franchetti & Prof. Jelena Kovačević, PhD research**
Developing algorithms to port large-scale spectral differential equation solvers to CPU-GPU systems, using data-driven methods to reduce high memory requirement and bottlenecks due to high communication overhead.
- **Model design and analysis automation for big mechanisms** (*Carnegie Mellon University*)
Advised by: Prof. Natasa Miskov-Zivanov & Prof. Jelena Kovačević, March 2015 – December 2015
Implemented frameworks for automated development of executable models using information extracted from literature for cancer cell networks.

Skills

- **Operating systems:** Windows, Linux
- **High Level languages:** Python, MATLAB, C, C++, CUDA, Pytorch
- **Development platforms:** NVIDIA Tesla K80 and Quadro K2200, MSP430 processor, ARM Cortex M3

Related Coursework

Compressive Sensing, Computing for Biology, Machine Learning for Signal Processing, Machine Learning, Wavelets and Multiresolution techniques, Pattern Recognition theory, Image Video Multimedia, Cognitive Video

Publications

Papers

- **A. Kulkarni**, J. Kovačević, F. Franchetti, "Massive Scaling for MASSIF: Algorithm Design and Analysis for Simulations on GPUs", PASC 2020 (co-sponsored by ACM and Swiss National Supercomputing Center (CSCS)).
- F. Franchetti, D. Spampinato, **A. Kulkarni**, T. Popovici, T. Low, M. Franusich, P. McCorquodale, B. Van Straalen, P. Colella, "FFTX and SpectralPack: A First Look", Parallel Fast Fourier Transforms (PFFT) Workshop@IEEE HiPC, 2018.
- **A. Kulkarni**, F. Franchetti and J. Kovačević, "Large-Scale Algorithm Design for Parallel FFT-based Simulations on GPUs", IEEE Global Conference on Signal and Information Processing (GlobalSIP), 2018.
- K. Sayed, Y. Kuo, **A. Kulkarni** and N. Miskov-Zivanov, "DiSH simulator: Capturing dynamics of cellular signaling with heterogeneous knowledge," 2017 Winter Simulation Conference (WSC), Las Vegas, NV, 2017, pp. 896-907
- **A. Kulkarni**, F. Condessa and J. Kovačević, "Unsupervised image segmentation using comparative reasoning and random walks," 2015 IEEE Global Conference on Signal and Information Processing (GlobalSIP), Orlando, FL, 2015, pp. 338-342.

Posters and Extended Abstracts

- *Project: Algorithm Design at Scale: Porting Parallel FFT-based Fortran Simulations to GPUs.* Presented at: Supercomputing (**ACM SC 2017 & 2019**), SIAM Computational Science and Engineering Conference (**SIAM CSE 2018, SIAM PP 2020**), IEEE High Performance Extreme Computing Conference (**IEEE HPEC 2018 & 2019**), International Conference on Parallel Processing (**ACM ICPP 2018**)
- *Project: Big Mechanism Design and Analysis Automation.* Presented at: International Workshop on Bio-Design Automation (**IWBDA 2015**), Automation of Model Design and Analysis for Big Mechanisms", Quantitative Biology (**Q-Bio 2015**).

Leadership and Volunteering

- Graduate Student Member, **Society of Women Engineers (SWE)**, Carnegie Mellon University
- Member of service organization **CMU Juntos** working with **Bridges To Community, Nicaragua**
- Treasurer of **ECE Graduate student Organization (EGO)**, Carnegie Mellon University
- Core Member of the **IEEE Student Branch** at BITS-Pilani, Goa

Honors

- Member, **ECE Honor Society Eta Kappa Nu**, Carnegie Mellon University
- Graduated BE(Hons.) with **First Class with Distinction** (Year 2013)