Searidang Pa

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Education

2020–Present **PhD in Computer Science**, *Northeastern University* *GPA – 4.0*,
Advisor: Rajmohan Rajaraman,
Selected Courses: Machine Learning, Advanced Algorithm, Distributed System.

2016–2020 **BA in Computer Science and Mathematics**, *Middlebury College*, Phi Beta Kappa.

Technical Skills

Languages Python, C/C++, MATLAB
Frameworks PyTorch, Keras

Selected Course Projects

Fall 2021 **Implementing Raft from Scratch**.

- Working on implementing a highly available and fault-tolerant State Machine Replication System based on Raft protocol from scratch. Aiming to experiment with various low-level designs to obtain low overhead while still providing the fault tolerant guarantee. Codes on Github in C++11.

Fall 2020 **Predicting Full Spectrum of Peptides using Deep Learning**.

- Implemented the paper *Full-Spectrum Prediction of Peptides Tandem Mass Spectra using Deep Neural Network* and experimented with various shallow network designs to see if a deep network is necessary. Traditional methods are limited to only predicting the intensities of expected ion types. The ability to predict full spectra from peptides sequences would significantly enhance and speed up the peptide identification process in proteomics. Codes are in Pytorch framework.

Fall 2019 **Multi-Column CNN Crowd Counter**.

- Trained an ensemble of CNN with different configurations and combine them to estimate crowd sizes from various overhead perspectives. Used adaptive Gaussian kernel to adjust perspective distortion when generate the density map for training. Achieved a MAE below 200 in the *ShanghaiTech dataset* where there can be thousands of people in an image. Codes on Github in Pytorch.

Research Experience

Sept 2020 - Aug 2021. **Improved Bounds for Scheduling Flows under Endpoint Capacity Constraints**.

- With motivation from the rising impact of Software-defined networking technology, we worked on a flow scheduling problem where given a set of capacitated nodes with dynamically reconfigurable topology, an online sequence of requests, with a release time and a demand, needs to be routed between two nodes. We focus on two objectives: minimizing the average and the maximum response time. We showed a fundamental limitation that without resource augmentation, the best competitive ratio for the maximum response time objective grows unbounded. A surprising result we found was that given a little bit of resource augmentation, we obtained an algorithm that has good performance guarantee. Paper to appear in APOCS 2022.

Summer 2019 **Quantum Algorithm Research**, *Shelby Kimmel's Lab*.

- Analyzed the change in the probability distribution of finding the period in a modified Quantum Period Finding problem where there are random insertions or deletions (glitches) of points in the periodic function.
- Developed a robust and efficient algorithm to deal with the glitches. Proved performance guarantee for the simple case of a few glitches. Worked on finding ways to extend the analysis for arbitrary number of glitches.
- Wrote a numerical simulation using python to analyze the behaviors corresponding to the places of glitches (insertions/deletions), and to test out the predictions of the our algorithm and analysis. Link to poster.

Teaching Assistant Experiences

Held weekly office hours to explain complex concepts, helped debug code, and graded homework.

- **Algorithms and Data** Northeastern University, Fall 2020, Spring 2021
- **Algorithms and Complexity** Middlebury College, Fall 2018
- **Data Structure** Middlebury College, Fall 2017, Spring 2018