Manish Shankla

shankla2 [at] illinois.edu | www.linkedin.com/in/manishshankla | mshankla.com

EDUCATION

University of Illinois at Urbana-Champaign
PhD Computational Biophysics
2014-2019

University of Illinois at Urbana-Champaign
B.S. Physics,
Minor: Computer Science

SKILLS

Languages
Python, Bash, R, Tcl/Tk, C/C++ (in coursework), AWK

Machine Learning Frameworks
PyTorch, scikit-learn, XGBoost, LightGBM, OpenCV, OpenAI gym

Workflow
Linux, HPC clusters, MPI4PY, SLURM, TORQUE, Git, SVN

Misc.
NAMD, COMSOL, Photoshop, Illustrator, After Effects, FFMPEG

Select Coursework

Graduate:
Machine Learning (STAT 542), Deep Learning (CS 547), Computer Vision (CS 549), Smart Contracts (ECE 398), Applied Regression (STAT 425), Data Science (STAT 429), Standard Graduate Physics Coursework

Undergrad:
Data Structures (CS 225), Computer Architecture (CS 231/232), Complexity (CS 374), Standard Physics Coursework

EXPERIENCE

Aksimentiev Lab | PhD Student
Sep. 2014 – Dec. 2019 | Urbana, Illinois

- Developed an automated protein and DNA delivery system increasing biomolecule capture throughput by >10^5 times compared to current commercial nanopore sequencing devices. (Feature cover article in September 2019 issue of Nature Nanotechnology).
- Combined CPU-parallelized stochastic simulations (python) and mathematical models to calculate throughput and efficiency of a biomolecule delivery system.
- Created pipelines to run hundreds of time-domain molecular dynamics simulations on HPC machines, process data (10 – 100 GB scale), and extracted relevant information for physical models. (Bash + python)
- Developed a data-pipeline to process raw AFM images (~10 GB) using computer vision algorithms of median filtering and Fast-Fourier transforms for denoising and SIFT features to identify DNA molecules. (Bash+python)
- Independently maintained a remote collaboration with experimental research groups to develop theory and improve prediction of biological mutations increasing desalination 100x in membranes resulting in 2 publications.
- Personally acquired $350,000 worth of computer CPU/GPU hours on Bluewaters/XSEDE supercomputers as apart of larger co-written proposals.

University of Illinois Dept. of Physics | Teaching Assistant
Sep. 2014 – Dec. 2019 | Urbana, Illinois

- Taught students practical analog and digital circuits such building lock-in amplifiers or AM/FM de/modulators from scratch (Electronic Circuits, PHYS404), classical physics experiments such as determining the charge of an electron (Classical Physics, PHYS401), and foundational electromagnetism (PHYS212)

Select Journal Articles (3 out of 7)

- Shankla M, and Aleksei Aksimentiev. Step-defect guided delivery of DNA to a graphene nanopore. Nature Nanotechnology (2019) Featured Cover Article.
- Ratul Chowdhury…Shankla M (3rd), et. al. PoreDesigner for tuning solute selectivity in a robust and highly permeable outer membrane pore. Nature Com. (2018)
- Shankla M and Aksimentiev A. Conformational transitions and stop-and-go nanopore transport of single-stranded DNA on charged graphene. Nature Com. (2014).

Select Talks (1 out of 8)

- DNA delivery on the edge of graphene". Biophysics Graduate Student and Postdoc Symposium Nov. 2018 (Awarded Best Talk)

Select Projects

- Deep Learning Course Project: CycleGAN replication, architecture structure extension (Dec 2019) https://github.com/mns0/CS547-CycleGAN
- Computer Vision Course Project: Evolutionary algorithm hyperparameter optimization of a CycleGAN (May 2019) https://github.com/tacocat21/pytorch-CycleGAN-and-pix2pix