



SKILLS

- **Object oriented:** C++, Python, Javascript, C#
- **Script:** Python, R, Javascript
- **Web:** nodeJS, electronJS, reactJS
- **Database:** PostgreSQL, MSSql, MySql
- **Visualization:** D3, iGraph
- **IDE:** Xcode, VS Code, R Studio, Jupyter notebook, Netbeans
- **OSs:** Windows, MacOSX, Linux
- **Tools:** MS Office, xFig, Gnu-Plot

EXTRACURRICULAR ACTIVITIES

- Volunteered in research on COVID-19 to generate narrative using subgraph mining (Aug-Sep' 2020).
- Web content management of ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB'2020).
- Volunteered to develop a "Feed The Hungry" programs associated with Community Action Center in Pullman WA.
- Participated regularly in environmental clean up and beautification projects around Pullman and with various interfaith groups.
- Volunteered in assisting learning disabled students in usage and computer skills.

ACADEMIC PROJECT EXPERIENCE

- Utilized machine learning methods to detect highly productive soybean varieties (using **svm**, **random forest** model).
- Spectrum analysis to detect contagion node in large disease epidemic network (using **R**).
- Developed a software to map more than **900k** pear/peach reads to the (Cherry) reference genome (more than **300k** long).
- Detected cancer genes from gene expression dataset using Persistent homology of the Mapper framework.

EDUCATION

Ph.D. | Computer Science

Washington State University | GPA: 3.82 | 2020

- Advisors: Ananth Kalyanaraman (CS), Bala Krishnamoorthy (Math)
- Dissertation: *Topological Data Analysis for Computational Phenomics: Algorithms and Applications*

B.Sc. | Computer Science & Engineering

Bangladesh University of Engineering & Technology, Bangladesh | GPA: 3.66 | 2009

EXPERIENCE

Biocomplexity in UVA | Postdoctoral researcher | October, 2020-Current

- Tensorflow probability and Tensorflow federated learning with Differential Privacy helped to understand the clients' behavior more precisely.
- Agent based simulation with mixed model helped to identify missing infections.

Washington State University | Research assistant | Fall 2015 - Summer 2020

- Developed a Data Exploratory framework in **C++** (named **Hyppo-X**) based on Topological Data Analysis (**TDA**) with interactive visualization capability (using **electronJS** and **D3**) that reveals the high order structure of high dimensional complex dataset.
- Developed theories and algorithms based on the structural properties (flares and paths) of the graph that help domain scientists to extract plausible hypotheses.
- My framework discovered new patterns in maize phenomics data (sensitivity to location (KS/NE)) and also in patient trajectories in hospitals.
- My subgraph mining method helps domain scientist to generate narrative.
- Statistical modeling to reveal the genotypic diversity on environmental stress.

Amazon Inc. | Machine Learning intern | Summer 2019

- My exploratory data analysis (using **SQL** and **R**) has revealed more than 10 issues on database and 4 of them were considered during data lake design.
- Designed forecasting model (using **ARIMA**, **LSTM**) on sales and customer data using **keras** and **scikit-learn** library.
- My forecasting model produced 3% more accuracy compared to existing model.
- Training on leadership principles in order to take ownership of the project.

Pacific Northwest National Laboratory | Research intern | Summer 2018

- Developed a prototype in **C++** for benchmark analysis of an existing open source framework named SHAD which runs in a distributed cluster.
- For benchmark analysis, I used another open source software named SPDLOG and embed it with SHAD.
- My analysis (using **Python Pandas**) identified a performance issue of an asynchronous function call (process-2 calls the method 5x more compared to process-1) when running the framework for triangle count in a dense graph with trillion nodes.

KBGroup | Software Development Engineer | 2010 - 2015

- Developed one of the **E-Commerce** websites from start to finish (**ASP**, **HTML**, **CSS**, **JS**). New website increased in ticket sales by more than 13%.
- Led a 6 person development team (2013-15). Company revenue increased 5% YoY.

Nazimcorp Resource Gateway | Software Development Engineer | 2009 - 2010

- iOS app embedded with localized and optimized marketing content, to markets globally. Cost efficiency as well as the use of creativity and reduced time to market.

PUBLICATIONS

- Privacy-first health research with federated learning. [medrxiv: <https://doi.org/10.1101/2020.12.22.20245407>]
- **Hyppo-X**: A Scalable Exploratory Framework for Analyzing Complex Phenomics Data. [TCBB'19: <https://ieeexplore.ieee.org/document/8880514>]
- Interesting Paths in the Mapper Complex. [JOCG'19: <https://doi.org/10.20382/jocg.v10i1a17>]
- A Visual Analytics Framework for Analysis of Patient Trajectories. [ACM-BCB'19: <https://dl.acm.org/citation.cfm?doid=3307339.3342143>]
- Detecting Divergent Subpopulations in Phenomics Data using Interesting Flares. [ACM-BCB'18: <https://dl.acm.org/citation.cfm?doid=3233547.3233593>]