Nathaniel Budijono

Curriculum Vitae

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I am an interdisciplinary computational researcher with a strong math and software engineering background. I have demonstrated passion for STEM communication, mentorship, and self-learning natural sciences.

Education

Sep 2018 – May 2022 **Bachelor of Science**, *University of Minnesota*, Computer Science and Mathematics.
Advisor: Prof. Stefano Martiniani
Thesis: *Dynamic nested sampling for developable protein search*
Expected *summa cum laude* honors
Selected coursework:
- **Data science**: Data mining, machine learning, deep learning
- **Computational biology**: Computational genomics, systems biology, biochemistry, genetics
- **Quantum**: Quantum mechanics, computational chemistry, quantum computing
- **Math**: Cryptography, error-correcting codes, dynamical systems, topology

Industry Experience

Sep 2021 – **Intern**, *Loyal Cellular Longevity*.
Computational biology.

May 2021 – Aug 2021 **AI Research Intern**, *Smart Information Flow Technologies (SIFT)*.
- Developed decoding scheme for BERT-based language model to improve joint entity-relation classification. *Huggingface, PyTorch*.
- Statistically analyzed sentiment and word embeddings of online groups of interest. *spaCy*.

May 2020 – Aug 2020 **Machine Learning Intern**, *CH Robinson*.
Internship canceled due to COVID-19.

May 2019 – Aug 2019 **Software Engineer Intern**, *Rally Health*, Data engineering team.
- Created a utility for data pipeline to gauge data throughput, monitor job duration, and track which rows failed which data validation. *Scala, Datadog API, Databricks*.
- Created a comprehensive and responsive web dashboard with pipeline health and performance metrics for data pipeline. *Airflow, Flask, SQLAlchemy, nvd3.js*.
- Created an extract-transform-load (ETL) job to process ledger data from incentives program and performed end-to-end testing. *Apache Spark, SQL*.

Research Experience

Jan 2019 – May 2022 **Research Assistant**, *University of Minnesota*, Department of Computer Science.
Advisor: Prof. Chad Myers
- Created a pipeline for visualizing genetic interaction networks. *Networkx, Scipy*.
- Investigated machine learning algorithms for predicting gene function from genetic interaction networks. *PyTorch*.

Publications

Conference *Ludus: An Optimization Framework to Balance Auto Battler Cards*. **Nathaniel Budijono**, Phoebe Goldman, Jack Maloney, Joseph Mueller, Phillip Walker, Jack Ladwig, and Richard Freedman. AAAI Symposium on Educational Advances in Artificial Intelligence, 2021. *In review.*

Workshop *Linguistic Factors in Incel Messaging*. Sonja Schmer-Galunder, Ruta Wheelock, Joan Zheng, Claire Yang, Ian Magnusson, Jeremy Gottlieb, Scott Friedman, and **Nathaniel Budijono**. Special Issue for the Workshop on Online Abuse and Harms, 2021. *In review.*

Honors and Awards

Sep 2021 **Finalist**, *3blue1brown*, Summer of Math Exposition.
Placed in top 100/1300+ entries in math communication contest with blog post on Lenstra's elliptic curve factorization algorithm. To be featured as honorable mention outside of the top 5 entries. *Manim*.

Oct 2020 **Finalist**, *Wells Fargo*, Campus Analytics Challenge.
Developed novel supervised learning classification algorithm and statistically analyzed its performance. Earned $1000 prize as a solo team against teams of students from Stanford, UCBerkeley, GeorgiaTech, and UMN. *Scikit-learn*.

Mar 2020 **Best hack awards**, *CalTech*, HackTech 2020.
Best artificial intelligence hack, best social good hack, and best machine learning hack awarded by Citadel LLC out of 73 teams.
Team scraped PubMed, compared chemical structure to build and deploy web app for predicting efficacy and side effects of drugs for neurological disorders. *RDKit, BeautifulSoup, Selenium*.

Mar 2020 **Honors**, *MNSU*, Midwest Undergraduate Data Analytics Competition.
Led team to achieve 2nd/32 highest F1 score of classifying civil rights legal cases in Kaggle competition. *XGBoost*.

Mar 2019 **Third place**, *ACM UMN*, Cybersecurity competition.
Led team to 3rd/14 place finish in developing scripts for automated capture-the-flag attacks. *Bash, JavaScript, SQL*.

Scholarships
- Olseth family scholarship
- Cyrus and Mary Field scholarship
- Chani and Wendy Sra scholarship
- Computer Science and Engineering scholarship
- St Martins scholarship for honors science and engineering students
- Maximillian Lando scholarship for computer science students
- College of Science and Engineering Alumni Society scholarship

Fellowships
- Multicultural Summer Research Opportunities Program fellowship (declined)
- D E Shaw Research Science and Engineering Undergraduate fellowship

Leadership

Jan 2020 – May 2021 **Lab Director**, *Society of Asian Scientists and Engineers at University of Minnesota*.
- Led as project manager, architect, and lead developer of web and mobile app to navigate campus tunnel system. *React, React Native*.
- Wrote programming tutorials and presented workshops on version control, JavaScript, React to team members with no prior programming knowledge. Organized interest groups and presented machine learning, swarm intelligence, and control systems workshops. *Manim, Keras, matter-js*.
- Led as project manager, architect of web app to recommend local restaurants. *React, Flask, Firebase*.
- Mentored four students on getting involved in research, job search. Developed presentations to educate high school students on college admissions process, financial aid.

Jan 2020 – May 2021 **Education Director**, *App Developers Club at University of Minnesota*.
- Created workshops and online tutorials for multiplayer trivia game, mobile to-do list. *Flask, SocketIO, React Native*.
- Created website and served as webmaster. Connected students with research labs, local start-ups, and companies for internships.

Sep 2019 – May 2020 **Mentor**, *University of Minnesota*, Honors program.
Mentored two freshman honors students on getting involved in research, job search.

Projects

Reinforcement learning Implemented an advantage-actor-critic (A2C) agent to improve performance of LSTM trained on user inputs in the NES game *Punch-Out!!*

Talks

Apr 2021 **Math Directed Reading Program**: presented ideas from *Nonlinear Dynamics and Chaos* by Steven Strogatz using Manim animations

Oct 2020 **Bioinformatics and Computational Biology Symposium**: presented preliminary results of spatial analysis of functional enrichment research