Winston Chen

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Research Interests

- Developing reliable ML for high-precision biomedical applications.
- Automating biological hypothesis generation with ML interpretation.

Education

University of Washington   *Seattle, WA*

B.S. in Electrical Engineering, with a minor in Entrepreneurship   *Sept. 2018 - June 2022*

- GPA: 3.8/4.0; *Cum Laude*

Research Experience

Noble Research Lab, Genome Science, University of Washington   *Seattle, WA*

Confidence Estimation for Network Propagation   *July 2019 - Present*

- Developed a framework to estimate statistical confidence (q-value) for a class of ML algorithm called network propagation.
- Implemented the framework on Rankprop, a network propagation-based protein homology detection algorithm.
- Applied Rankprop with confidence estimation on a large-scale protein database (SCOP) to demonstrate its ability of identifying protein homologies with high-precision.
- Presented research work at University of Washington's annual undergraduate research symposium. Talk available here.

Error-controlled Interaction Detection in Neural Network   *Apr. 2021 - Present*

- Developed a neural network interpretation method that discovers learned feature interactions at desired error rate.
- Designed and implemented a compute module that debiases the raw interaction interpretation results.
- Applied the interpretation method on neural networks trained with fruit flies (Drosophila) genomics data and identified meaningful transcription factor (TF) interactions.

UW ECE ENGINE Capstone/RealNetworks   *Seattle, WA*

Real-Time SDR to HDR Up Conversion   *Jan. 2022 - June 2022*

- Conducted research on a SDR to HDR video up-conversion algorithm called inverse tone mapping (ITM).
- Improved existing ITM algorithm with dynamic parameter estimation based on input image.
- Built a webpage for interactively tuning ITM parameter for given images.
- Proposed a novel evaluation metric that focus on color saturation difference.
- Summarized the research result in a poster and presented at UW's 2022 ENGINE show case.

Scholarships

Mary Gates Research Scholarship   *2021*

- Scholarship supporting outstanding undergraduate research.

Lawrence & Lucille Frey Endowed ECE Scholarship   *2020*

- Scholarship awarded to ECE students with academic excellence.

Herschel & Caryl Roman Scholarship   *2020*

- Scholarship awarded to undergraduate students working in genetics research.

Teaching Experience

Department of ECE, University of Washington   *Seattle, WA*
Teaching Assistant   *Dec. 2020 - June 2022*

- Programming For Signal and Information Processing Applications (Spring 2022)
- Fundamentals of Electrical Engineering (Winter 2021, Winter 2022)
- Digital Circuit and System (Autumn 2021)

Industry Experience

RealNetworks   *Seattle, WA*
Software Engineering Intern   *Aug. 2022 - Present*

- Built a FIDO2 roaming authenticator prototype that allows passwordless authentication on web services supporting Webauthn.
- Integrated the authenticator with SAFR facial recognition technology to enable biometric verification.
- Demonstrated the authenticator in collaboration with StrongKey at the flagship FIDO conference, Authenticate 2022.

NVIDIA   *Santa Clara, CA*
Python Engineering Intern   *June 2021 - Sept. 2021*

- Built and deployed a testing infrastructure for analyzing and visualizing NVIDIA's genomics computing software logs.
- Drove discussions with core developers regarding testing infrastructure's feature requirements.
- Presented the final project results through a slide deck, confluence page, and detailed README.

Leadership Experience

Housing & Food Services, University of Washington   *Seattle, WA*
Assistant Resident Director   *Sept. 2021 - June 2022*

- Facilitated moving 500+ residents into Elm Resident Hall in the course of four days.
- Advised Elm Hall council in organizing 20+ building-wide events during the 2022-2023 academic year.
- Assisted the Elm Hall resident director in managing 10 resident advisors through performing administrative tasks such as scheduling on-calls.

IEEE-HKN Honor Society, University of Washington   *Seattle, WA*
Corporate Relations Officer   *Sept. 2020 - June 2022*

- Attended weekly meetings to provide updates on current corporate relationship projects.
- Collaborated with industry recruiters (e.g. TI, Tesla, Wyze) to organize 10+ industry networking events.
- Maintained positive relationship with industry sponsors through emails and check-in meetings.

Housing & Food Services, University of Washington   *Seattle, WA*
Resident Advisor   *Sept. 2019 - June 2022*

- Collaboratively planned and executed 30+ events every year to engage 150+ residents.
- Created and maintained floor decorations to form a welcoming residential environment.
- Regularly on-call 5PM-8AM to provide residents with emergency assistance and secure the safety of the entire residence hall.

Skills

Programming Languages	Python, JavaScript, Java, C/C++, System Verilog
Frameworks	PyTorch, TensorFlow, Numpy, NetworkX, React, React Native
Tools	Git, Latex

Projects

KiwiLink   *June 2020 - Oct. 2021*

- KiwiLink is an Android/iOS mobile app for online study buddy finding in college setting.
- Rapidly built the prorotype app using JavaScript, React Native, and Firebase (Summer 2020).
- Led a team of 10 engineers maintaining app operation and developing new features to serve 1500+ users at the University of Washington. (Sept 2020 - Oct. 2021)
- More details about KiwiLink can be found here KiwiLink is currently available on Google Play Store and iOS App Store.

Fasr   *Jan. 2021 - June 2021*

- Fasr is a portable facemask sanitizer device that allows user to efficiently clean their mask using heat and disinfectant.
- Led a team of 6 people developed the hardware prototype and a business plan.
- Participated in the UW Dempsey Startup Competition (2021).
- Open sourced all the technical and business documentations, available here.

Posters & Presentations

2022 ENGINE Showcase   *Seattle, WA*

Real-Time SDR to HDR Up Conversion   *June 1, 2022*

- Motivation of this work: developed a real-time SDR to HDR conversion algorithm that can be applied to perform video conversion on the fly.
- Discussed the two existing approach to perform SDR to HDR and their limitations: 1) Inverse tone mapping(ITM)-based approach (low conversion quality). 2) Deep learning-based approach (too slow for real-time application)
- Explained our approach: an improved ITM method that can dynamically estimate the optimal conversion parameters using ML techniques.
- Poster available here.

NVIDIA Internal Meeting   *Santa Clara, CA*

A Log-based Testing Tool for NVIDIA's Genomics Computing Software   *Sept. 10, 2021*

- Introduced a web tool that performs parsing, analysis, and visualization for the entire suite of NVIDIA's genomics computing softwares (Clara Parabricks)
- Demostated the usage of the web Tool
- Explained web tool's internal architecture and the role of each components.
- Summarized the technologies used to build and deploy the web application: JavaScript, Python, React, FastAPI, Nginx, Gunicorn.

University of Washington's 24th Annual undergraduate research   *Seattle, WA*

Confidence Estimation for Network Propagation-based Biological Studies   *May. 18, 2021*

- Intuitively explained the network propagation algorithm: a method that mimic diffusion process to make inference from network data.
- Limitation of network propagation: no confidence estimation for its inference results, which can be limiting for biological discovery.
- Our method: integrating network propagation with the knockoff framework to efficiently estimate confidence level (q-value).
- Showcased experiment results of applying network propagation with confidence estimation on protein homology discovery.
- Recording available here.