Tianyu Lu

University of Toronto
Computer Science and
Computational Biology

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Courses

Enriched Data Structures and Algorithms, Machine Learning, Biochemistry, Mathematical Statistics, Molecular Biology

Work Experience

Research Intern

- Barua Lab, Toronto General Hospital
- Found 30 differentially expressed genes associated with kidney disease (Focal Segmental Glomerular Sclerosis)
- Discovered and resolved RNA sequencing pipeline bugs in shell scripts
- Designing integrative pathology, transcriptome and proteome approaches to predict steroid sensitivity in patients with kidney disease

iOS Developer

- Schlichting Lab, University of Toronto
- Vectorized code to save data processing time of dissimilarity matrices by over 95%
- Learned Swift and Objective-C on the job to develop three iPad apps used for neuro-science research
- Worked with all lab members to resolve technical issues

Awards

Hack the North 2019 Finalist – Innovape
National Biology Competition Top 1% ($3000)
University of Toronto Scholarship ($10000)

Projects

Machine Learning for Protein Design

- International Genetically Engineered Machines – University of Toronto
- Designed novel Rosetta-RNN pipeline to generate plastic-degrading proteins
- Combined transfer learning with variational autoencoders and Gaussian Processes to design mutations with 18 times higher activity than wildtype

Transcription Factor Inhibitor Design

- Donnelly Centre for Cellular and Bio-molecular Research – KimLab
- Found optimal solution of protein docking using HADDOCK, currently verifying stability with Molecular Dynamics

Innovape

- Hack the North Finalist
- Used Gaussian Processes to model Juul users' nicotine dependence and provide a personalized nicotine reduction algorithm

Talks

- Optimization of IsPETase – iGEM Jamboree, Boston, MA
- Machine Learning for Protein Design – University of Guelph

Interests

Reinforcement Learning, Biological Computation, Differential Geometry, Genetic Circuits