Qingyuan **LIU**

M.S. Bioinformatics | B.S. Chemical Engineering | B.S. Molecular Biology

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A comprehensive background of **Chemical Engineering**, **Molecular Biology**, **Bioinformatics**, **Computer Science** and **Data Science**. My research interests include but not limited to : Structural Biology, Protein, Pharmaceutical Science (Drug Design and Interactions) and other problems that could apply data science and computer science techniques on.

Education

Aug 2021 | **Toyota Technological Institute at Chicago**
GPA : 3.58/4.0 | Graduate Student at large in Data Science

Dec 2019 | **University of Michigan at Ann Arbor**
GPA : 3.64/4.0 | Master of Science in Bioinformatics

May 2017 | **University of Illinois at Urbana-Champaign**
GPA : 3.24/4.0 | Bachelor of Science in Chemical and Biomolecular Engineering
Bachelor of Science in Molecular and Cellular Biology

Research Experience

Current – June 2020 | **Research Student, Jinbo Xu's Lab | Toyota Technological Institute at Chicago, Chicago, IL, USA**
- Predict contact for complex protein via sequence information.
- Generate multiple sequence alignment (MSA) for complex proteins.
- Incorporate genomic and phylogenetic information to MSA constructing.
- Build a server for submitting user requests and returning prediction results.

Python | Django | Bash | C++ | Numpy

May 2020 – Sept 2018 | **Graduate Student, Yang Zhang's Lab | University of Michigan at Ann Arbor, Ann Arbor, MI, USA**
- Predict amino acids' side chain's torsion angles (Chi-1) via sequence information.
- Generate unique custom features from multiple sequence alignment (MSA).
- Utilize deep convolutional neural networks to model torsion angles from sequence features.

Pytorch | Tensorflow | Python | Numpy

June 2018 – Sept 2017 | **Research Intern, Xintrum Pharmaceutical Ltd. by Kanion Group, Nanjing, Jiangsu, China**
- Redesign GLP1-based diabetic drugs for extended drug potency period using in silico technique.
- Engineer cell to produce and isolate wanted molecules for drug efficacy verification.
- Design genetic circuit to the cell for industrial-level production of desired drug molecules.

Python | Protein docking | Monte-Carlo Simulation

Aug 2016 – July 2016 | **Intern, Novartis Young Researcher Explorer Program | China Novartis Institutes For Biomedical Research (CNIBR), Shanghai, China**
- Drug discovery research of epigenetics and its effects on cell cycle, specifically mitotic phase.
- Detailed analysis of target protein and its interaction with other protein complexes.
- Propose innovative cancer treatment target linking epigenetics & cell cycle.

Cell Culture | Western Blot | ELISA | Cellular Imaging

May 2016 – May 2015 | **Research Student/Intern, Blue Water Intern at Diwakar Shukla's lab | University of Illinois at Urbana-Champaign, Urbana, IL, USA**
- Research on G-Protein Coupled Receptor (GPCR) signaling pathway with β-arrestin.
- Simulate a molecular system with Molecular Dynamics (MD) to study molecular behavior.
- Determine β-arrestin's reaction order of the possible reaction coordinate.
- Analyze the changes of β-arrestin with the presence of small molecules.

NAMD | Amber | VMD | Pymol

Projects

Drug-Drug Interaction (DDI) Prediction from drug labels Jan 2021 - Mar 2021

github.com/Chingfood/Drug_Drug_Interaction Project Report

- Predict potential drug drug interaction by reading drug labels text.
- A transformer-based natural language processing (NLP) model–**PharmBert** is trained to embed pharmaceutical text.
- A distance matrix hand designed to identify drug interactions.

Python | Pytorch | Numpy

Texture Classification by Computer Vision technique Mar 2021 - June 2021

github.com/Chingfood/texture_detection Project Report

- Build a classifier to classify 47 different texture classes out of the texture image dataset.
- A linear classifier is constructed to identify texture classes.

Python | Numpy

Epileptic EEG signal detection Jan 2019 - May 2019

github.com/Chingfood/epileptic_detection_EEG_project

- Testing and finding good entropy function to detect Epileptic EEG signal.
- A classifier model to differentiate signals

Matlab

Proposal : Better Multiple Sequence Alignment by Non-Homogeneous Hidden Markov Model(HMM) Jan 2017 - May 2017

Project Proposal Report

- Applying non-homogeneous HMM for phylogeny estimation and multiple sequence alignment.

HMM | EM algorithm | Viterbi algorithm

On-the-Skin Glucose Sensing and Drug Delivery Jan 2016 - May 2016

Project Report

- Product targets diabetic disease patients for better drug delivery and glucose sensing using sweat.
- Device consists of microneedles, glucose sensor, hydrogel, and flexible and stretchable battery.
- Via glucose sensor feedback, a hydrogel with battery charged piezoelectric control insulin diffusion.

Hydrogel | Piezoelectric

Green Production of Terephthalic Acid for the Synthesis of PETE Jan 2016 - May 2016

Project Report Project Presentation

- A full scale industrial level manufacturing process from isobutanol to polyethylene terephthalate.
- Targeting using biomass instead fossil fuel for producing polyethylene terephthalate.

Matlab | ChemCAD

Proposal : "Hydro-Bandaid" manufacturing May 2015 - Dec 2015

Project Proposal Report Project Proposal Presentation

- Manufacture a drug delivery device made of hydrogel and micro-needle array to deliver drugs via epidermis or dermis layer.
- Manipulate the structure and composite of the hydrogel for desired drug diffusion rate.

Hydrogel

Publications

Dec 2021 In Prep : *Nucleic Acids Research* An updated server for complex protein contact prediction

Skills

Programming Language	**Python** (**Numpy**, **Pytorch**, **Tensorflow**, Django), **C++**, **Bash**, **Matlab**, SQL, Julia, Java
Computation Techniques	**Data Modeling**, **Sequence Analysis**, **Simulation**
Simulation Package	**Amber**, **NAMD**, **VMD**, **ChemCAD**, PyMOL
Lab Techniques	**Cell Culturing**, **PCR**, **Gel Electrophoresis**, **Western Blot**, **ELISA**, **NMR**, **IR**, **HPLC**

Courses

Data Science	Machine Learning, Computer Vision, Unsupervised Learning
Computer Science	Data Structure, System Programming, Parallel Programming, Numerical Analysis
Bioinformatics	Probability and Distribution Theory, Biostat Inference, Signal Processing, Structural Bioinformatics, Graph/Network Theory, Biology Data Modeling
Chemical Engineering	Thermodynamics, Momentum Transfer, Process Control, Chemical Reaction Engineering, Unit Operation Lab, Tissue Engineering, Process Design, Biotransport, Crystallization
Molecular Biology and Chemistry	Organic Chemistry, Biochemistry, Physical Chemistry, Genetics, Cancer Biology, Endocrinology
Maths and Physics	Calculus, Differential Equation, Linear Algebra, Quantum Physics
miscellaneous	Principles of Pharmacology, Nanotechnology, Biomaterial, Biosecurity

References

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