

# 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 GPA : 3.58/4.0	<b>Toyota Technological Institute at Chicago</b> Graduate Student at large in Data Science
Dec 2019 GPA : 3.64/4.0	<b>University of Michigan at Ann Arbor</b> Master of Science in Bioinformatics
May 2017 GPA : 3.24/4.0	<b>University of Illinois at Urbana-Champaign</b> Bachelor of Science in Chemical and Biomolecular Engineering Bachelor of Science in Molecular and Cellular Biology

## 🧰 RESEARCH EXPERIENCE

Current June 2020	<b>Research Student, JINBO XU'S LAB   TOYOTA TECHNOLOGICAL INSTITUTE AT CHICAGO, Chicago, IL, USA</b> <ul style="list-style-type: none"><li>➢ Predict contact for complex protein via sequence information.</li><li>➢ Generate multiple sequence alignment (MSA) for complex proteins.</li><li>➢ Incorporate genomic and phylogenetic information to MSA constructing.</li><li>➢ Build a server for submitting user requests and returning prediction results.</li></ul> <div>Python Django Bash C++ Numpy</div>
May 2020 Sept 2018	<b>Graduate Student, YANG ZHANG'S LAB   UNIVERSITY OF MICHIGAN AT ANN ARBOR, Ann Arbor, MI, USA</b> <ul style="list-style-type: none"><li>➢ Predict amino acids' side chain's torsion angles (Chi-1) via sequence information.</li><li>➢ Generate unique custom features from multiple sequence alignment (MSA).</li><li>➢ Utilize deep convolutional neural networks to model torsion angles from sequence features.</li></ul> <div>Pytorch Tensorflow Python Numpy</div>
June 2018 Sept 2017	<b>Research Intern, XINTRUM PHARMACEUTICAL LTD. BY KANION GROUP, Nanjing, Jiangsu, China</b> <ul style="list-style-type: none"><li>➢ Redesign GLP1-based diabetic drugs for extended drug potency period using in silico technique.</li><li>➢ Engineer cell to produce and isolate wanted molecules for drug efficacy verification.</li><li>➢ Design genetic circuit to the cell for industrial-level production of desired drug molecules.</li></ul> <div>Python Protein docking Monte-Carlo Simulation</div>
Aug 2016 July 2016	<b>Intern, NOVARTIS YOUNG RESEARCHER EXPLORER PROGRAM   CHINA NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH (CNIBR), Shanghai, China</b> <ul style="list-style-type: none"><li>➢ Drug discovery research of epigenetics and its effects on cell cycle, specifically mitotic phase.</li><li>➢ Detailed analysis of target protein and its interaction with other protein complexes.</li><li>➢ Propose innovative cancer treatment target linking epigenetics &amp; cell cycle.</li></ul> <div>Cell Culture Western Blot ELISA Cellular Imaging</div>
May 2016 May 2015	<b>Research Student/Intern, BLUE WATER INTERN AT DIWAKAR SHUKLA'S LAB   UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, Urbana, IL, USA</b> <ul style="list-style-type: none"><li>➢ Research on G-Protein Coupled Receptor (GPCR) signaling pathway with <math>\beta</math>-arrestin.</li><li>➢ Simulate a molecular system with Molecular Dynamics (MD) to study molecular behavior.</li><li>➢ Determine <math>\beta</math>-arrestin's reaction order of the possible reaction coordinate.</li><li>➢ Analyze the changes of <math>\beta</math>-arrestin with the presence of small molecules.</li></ul> <div>NAMD Amber VMD Pymol</div>

## PROJECTS

### DRUG-DRUG INTERACTION (DDI) PREDICTION FROM DRUG LABELS

JAN 2021 - MAR 2021

 [github.com/Chingfood/Drug\\_Drug\\_Interaction](https://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](https://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](https://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

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

## REFERENCES

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### **Prof. Jinbo Xu**

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### **Dr. Yi Zhang**

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