Tianxin Zhang

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SUMMARY

Accomplished data scientist with strong mathematical background and 6+ years' experience in algorithm development, machine learning, and statistical analysis to solve complex problems in pharmaceutical industry. Experienced in analyzing large datasets and developing predictive models that drive innovation and impact patient outcomes. I am proficient in Python/MATLAB/R and specialize in the GUI development and analysis and strategies for Pharmacokinetics / Pharmacodynamics (PK/PD) to build data-driven models.

SPECIALIZED SKILLS

- **Software**: Python, MATLAB, R, GitHub, SQL, C++, Latex, Tableau, Linux, Overleaf, Microsoft Office, Adobe, Aspen
- **Technical Skills**: Python data analysis, machine learning, algorithm development, biostatistics, data visualization
- **Laboratory Skills**: Mammalian cell culture, alternating tangential flow filtration (ATF), TFF, process development, perfusion process, western blot, bioreactor, HPLC, flow cytometry, bioluminescence, Capillary Electrophoresis, YSI Bioanalyzer, UV-VIS, ELISA, RT-PCR, LC, Column Chromatography, GC-MS, Osmometer
- **Languages**: Fluent in English and Mandarin, conversational in German and Norwegian

EDUCATION

JOHNS HOPKINS UNIVERSITY• Baltimore, MD
PhD, Chemical and Biomolecular Engineering: *Expected May 2023*
MSc, Chemical and Biomolecular Engineering: *Sep 2019*

TIANJIN MEDICAL UNIVERSITY • Tianjin, China
BSc, Pharmaceutical Sciences and Engineering: *Jun 2016*
Access Exchange Program, UNIVERSITY OF CALIFORNIA, SANTA BARBARA**,** Santa Barbara, CA

RESEARCH EXPERIENCE

JOHNS HOPKINS UNIVERSITY, Chemical and Biomolecular Engineering Department, Baltimore, MD

Doctoral Researcher in Algorithm Development & Data Science | PI: Marc Donohue *Sep 2019 – Present*
Research conducted in collaboration with over 30 major pharmaceutical companies in AMBIC (Advanced Mammalian Biomanufacturing Innovation Center) to develop pioneering computer program distinctively

Enhancing Media Solubility and Stability by Algorithm Development and Machine Learning Model

- Utilize expertise in Python and MATLAB to develop a groundbreaking GUI that was the first of its kind in pharmaceutical industry, provide fast and accurate CHO cell media predictions. This program is not currently available anywhere else and has strong impact for predicting extremely complex media solubility and stability
- Treat over 10,000 raw databases with unsupervised machine learning using clustering algorithm, apply anomaly detection to find unusual data points and generate supervised machine learning for regression algorithm for real-world pharmaceutical media development in comprehensive data analytics
- Apply the gradient descent approach to analyze large datasets and achieved mathematical algorithm convergence, resulting in 60% faster computational prediction output
- Prevent overfitting problem of large experimental dataset by regularization of size of parameters
- Construct mechanistic and statistical modeling and simulation in machine learning approach
- Leverage data analysis skills through logic-based programming and handling of complex databases
- Identify 3 major technological bottleneck areas in need of research, development, and demonstration

Optimizing Nutrient Concentrates: Modeling Media Formulations in Process Intensifications

- Develop GUI with newest version control monthly, test-driven optmization with high performance computing
- Design and implement various ML algorithm for data preprocessing, feature engineering and model selection

- Lead/Collaborate with 4 PhD students on algorithm development and 10 master students on protocol design
- Quantify and drive continuous improvement in methodology, processes, and formats in model development
- Develop scalable and efficient automated processes for model's validation, implementation, and monitoring
- Identify meaningful insights from diverse big data sources to generate actionable insights and solutions
- Analyze incomplete dataset and develop improved and robust algorithm for agile software development

PK-PD Modeling of Monoclonal Antibody Drug for Cancer Immune Therapy

- Apply PK and PD theory using MATLAB and Python to develop novel methods for diverse applications such as blocking CTLA-4 or PD-1 to upregulate T-cells, bispecific antibody, and multicompartment model
- Develop and optimize PK-PD model of two different antiviral drugs Abacavir and Atazanavir for combination therapy with 22 various rate parameters and 19 components for high-throughput calculations
- Integrate models into a physiological-based PK/PD (PBPK) framework for accurate dose prediction
- Collaborate with interdisciplinary teams to streamline and automate processes
- 3+ years serve as a Teaching Assistant (TA) in PK/PD modeling class with theory and code optimization

Masters Research in Upstream Process Development | PI: Michael Betenbaugh & Marc Donohue
Collaborator: **AMBIC**, **NIIMBL** *Sep 2017 – Sep 2019*

Upstream Cell Culture Process Development in CHO cell

- Implemented fed-batch processes with various feeds and feeding strategies to maximize productivity
- Corroborated with experimental group to evaluate the performance characteristics in monoclonal antibody
- Designed computational simulations to evaluate efficiency of thermodynamic/mathematic model

PROFESSIONAL EXPERIENCE

Upstream Development Research Intern, AstraZeneca • Gaithersburg, MD *Feb 2019 – Sep 2019*

- Established perfusion and fed-batch culture with ATF / TFF in a 3L stirred-tank bioreactor to analyze molecular mechanisms in mitochondria contributing to improved productivity, developed amino acid: glucose ratio algorithm in media formulation for CHO cell culture growth, analyzed media formulation using MATLAB
- Characterized cell apoptosis process and reactive oxygen species (ROS) in continuous perfusion process
- Consulted with 6 cross-partisan and non-partisan supervisors to solicit diverse perspectives and expertise

Director of Case Competition, Johns Hopkins University • Baltimore, MD *Aug 2022 – Present*

- Liaise with clients for case competition and develop case packet, assisted with logistics of the events
- Recruit judges for case competition from top consulting firms and sponsors for case competition
- Promote case competition among JHU graduate students

PUBLICATIONS **(† Equal Contribution)**

- **Tianxin Z**., Liu L., Dexin K (2014). *Investigation of geographic presence of Diabetes in 2014 (ISSN1002-3763 Medicine & People).*
- **Tianxin Z.**, Reddy, J, Donohue, M. *Overview of UNIFAC and chemical complexation on solubilities and stability of pharmaceutical media formulation*. [In Submission]
- **Tianxin Z.**, Donohue, M. *Solubility effect binary amino acid as a function of pH and temperature*. [In Submission]
- **Tianxin Z.**, Donohue, M. *Predictions of multi-solute amino acids solubilities with a new mathematical algorithm.*

CONFERENCES AND PRESENTATIONS

American Institute of Chemical Engineers (AICHE) Conference *Nov 2022*
International Symposium on Solubility Phenomena (ISSP 20), Virtual Participation *Sep 2022*
Advanced Mammalian Biomanufacturing Innovation Center (AMBIC) Conference *2018 – 2023*

HONORS AND AWARDS

AMBIC Best Poster Award	AMBIC	*2022 and 2023*
ChemBE Graduate Excellent Academic Scholarship	JHU	*2018*
Undergraduate Student Best Research Award	TMU	*2015*