Nate Maulding

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Research Interests

- I am interested in biologic applications for deep generative modeling. As a computationalist my research has been focused on understanding human disease through transcriptomics. I have developed multiple tools using statistics and generative AI to uncover temporal gene regulatory networks important in the transition of single-cell towards new states. My aim is to continue using machine learning on biologic data with perturbation, temporal, or spatial information, specifically in single-cells and in transciptomic contexts.

Education

University of California, Santa Cruz 2019 – 2023
PhD Biomolecular Engineering and Bioinformatics *Santa Cruz, CA*

University of Illinois, Springfield 2012 – 2017
BS Chemistry *Springfield, IL*

Experience

Genentech, Oncology Bioinformatics Feb. 2023 – Present
RAAN Machine Learning Intern *South San Francisco, CA*

- Developed a partial least squares regression approach for finding baseline drug resistance signatures
- Made a dynamic generative AI model to predict evolving clonal resistance to treatment across time
- Developed interpretable approaches for temporal feature importance in the model's prediction

University of California, Santa Cruz Sept. 2019 – Dec. 2023
PhD graduate researcher *Santa Cruz, CA*

- Developed a tool for uncovering potential TF-to-target gene regulatory mechanisms associated with the cell transitions predicted by single-cell trajectory inference methods (DREAMIT)
- Built a multi-transcriptomic RNA-seq mapper and analysis tool (HOUSE). This method revealed to COVID-19 tissue specificity and a lipopolysaccharide response driving chemokine/cytokine activity
- Software developer and data scientist for the UCSC Genome and SARS-CoV-2 Browsers

IGM Biosciences, Immuno-Oncology Dec. 2019 – Jan. 2023
Bioinformatics Intern *Mountain View, CA*

- Predicted novel biomarkers of drug resistance with multi-omic data in cell line and mouse models
- Developed multiple omic pipelines utilizing AWS and interactive features into IGM infrastructure

Yale School of Medicine Aug. 2017 – Jul. 2019
Graduate Research Scholar *New Haven, CT*

- Developed multiple RNA-seq pipelines assessing differentially expressed genes and exons
- Performed tailored network analyses uncovering gene drivers of bone phenotypes and mechanics
- Discovered new therapeutic targets for various bone diseases
- Preformed quantitative experiments for RNA, DNA, and protein from tissue and culture samples
- Preformed cell culture and protein purification

Publications

- **ND Maulding** et al. Associating transcription factors to single-cell trajectories with dreamit. *Genome Biology, In review.*
- **ND Maulding** et al. Dual RNA-Seq analysis of SARS-CoV-2 correlates specific human transcriptional response pathways directly to viral expression. *Sci Rep 12, 1329, 2022.*
- **ND Maulding** et al. Dynamic deep learning and partial least squares regression reveal baseline and treatment induced signatures of resistance in a breast cancer trace-seq dataset. *Genome Biology, In preparation.*
- **ND Maulding** et al. Genetic pathways disrupted by enpp1 deficiency provide insight into mechanisms of osteoporosis, osteomalacia, and paradoxical mineralization. *Bone, 2020.*
- **ND Maulding** et al. Knockout of enpp1 catalytic activity reduces wnt activity and increases risk of bone disease. *Bone, In preparation.*
- Jairo Navarro Gonzalez, et al., **Nathan Maulding**, et al. The ucsc genome browser database: 2021 update. *Nucleic Acids Reasearch, 2021.*
- R Oheim, K Zimmerman, **ND Maulding**, et al. Human heterozygous enpp1 deficiency is associated with early onset osteoporosis, a phenotype recapitulated in a mouse model of enpp1 deficiency. *Bone, 2020.*
- Jason Fernandes, et al., **Nathan Maulding**, et al. The ucsc sars-cov-2 genome browser. *Nature Genetics, 2020.*

Conferences

- American Society for Bone and Mineral Research 2018 Annual Meeting. Montreal, Canada
- 2018 Mechanistic and Therapeutic Advances in Rare Skeletal Diseases. Montreal, Canada

Honors and Awards

- Served as the Academic Program Student Marshal at the University of Illinois at Springfield Commencement, 2018
- Served as the Chemistry Marshal for the Chemistry Department at the University of Illinois at Springfield Commencement, 2018
- Roche Advanced Analytics Network (RAAN) fully funded research internship and award

References

Josh Stuart Professor Biomolecular Engineering at UC Santa Cruz

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Marc Hafner Group leader in Oncology Bioinformatics/Discovery Oncology at Genentech

hafner.marc@gene.com

Demetrios Braddock Associate Professor, Yale University and Scientific Founder, Inozyme

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