

Connor E. Duncan

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EDUCATION

- The University of Sydney**, Faculty of Engineering - Sydney, NSW, Australia Fall 2019
- Graduate Certificate in Data Science
- Cornell University**, College of Arts and Sciences - Ithaca, NY 2014-2018
- B.A. in Biology, Concentration in Cell and Molecular Biology

PROJECTS

Forecasting the 2020 US Presidential Election (connorduncan.net/politics/uspres2020)

- Project to predict the outcome of the Electoral College vote using polling data and demographic data from the US Census Bureau
- Used Bayesian linear model, Dynamic Linear Model, Monte Carlo simulation
- Correctly called 53/56 states/Congressional districts, Brier score = .035

Tracking COVID-19 in the United States (connorduncan.net/science/covid)

- Project to better quantify which regions of the country were responsible for each of the primary “spikes” in cases, using JHU’s daily confirmed cases data
- Used PCA and clustering

B. Burgdorferi OspC Epitope Profiling (connorduncan.net/science/lyme)

- Project to determine which regions of ospC protein are clinically relevant in Lyme Disease, using Amino Acid sequence and antibody cross-reactivity data
- Built on existing approach involving high-dimensional correlation matrices
- Identified additional putative epitope not identified in original study, which was also validated by a different study

PRIMARY WORK EXPERIENCE

- Research Assistant** – Dr. Richard Horowitz, Hyde Park, NY Summer 2018
- Data-mined 130 patient medical records for lab results and other information, in contribution to a wide-ranging clinical study on Lyme disease
- Research Intern** – Karen Maegley Lab, Pfizer, La Jolla, CA Summer 2017
- Assisted in developing a filter binding assay for a histone acetyltransferase cancer drug target; optimized assay conditions and determined basic enzyme kinetics properties
 - Underwent training to work with radiolabeled substrates
 - Conducted side-by-side experiments with an existing RapidFire mass spectrometry assay for troubleshooting
- Research Assistant** – Brian VanderVen Lab, Cornell College of Veterinary Medicine Spring 2016 -
Fall 2016
- Worked on the characterization of the *M. tuberculosis* glutamate dehydrogenase (GDH) enzyme, including molecular cloning of the gene, expression of the protein, and purification via nickel-affinity chromatography
 - Assisted in determining protein-protein interactions among proteins associated with the *M. tuberculosis* mce complex, using Protein-fragment Complementation Assays on the model organism *M. smegmatis* (BSL-2)

TECHNICAL SKILLS

Data Science Technologies

- R (ggplot, R Shiny, dplyr, tidyr, sf)
- Python (numpy, pandas, sklearn, keras)
- SQL (postgres)
- AWS (EC2)
- Git
- D3.js
- QGIS

Data Science Techniques

Classification & Regression

- Logistic regression, random forest, decision tree, KNN, SVM
- Ensemble methods (XGBoost, balanced bagging)
- Neural networks
- Bayesian linear regression
- Dynamic Linear Models / HMM's (R: MARSS)
- Hyperparameter tuning

Data visualization

- Interactive visuals (R Shiny, D3.js)
- Choropleth maps, GIS (QGIS, R: sf)
- Manipulating geojson files

Unsupervised ML

- Principal Component Analysis
- Clustering, silhouettes

Molecular Biology / Biochemistry Techniques

- PCR, RT-qPCR
- SDS-PAGE
- Western blotting
- Molecular cloning
- Nickel affinity chromatography
- Gel electrophoresis
- Assay development
- Enzyme kinetics
- Protein purification
- Protein-fragment Complementation Assays
- Experience with BSL-2

OTHER WORK EXPERIENCE

Customer Service Associate – IKEA, New Haven, CT

Spring 2021

- Primarily worked as a cashier, assisted with filling “full-serve” customer orders, and oversaw self-checkout area
- Occasionally tasked with managing the break schedule for the Customer Service Department

Legislative Intern – U.S. Congressman Jim Himes (CT-04), Washington, DC

Spring 2019

- Drafted form letters and bill cosponsorship recommendations for various issue areas and conducted relevant policy research

Human Resource Summer Worker – Pfizer, New York, NY

Summer 2018

- Analyzed employee feedback survey results and prepared presentations for two company divisions; presented team-specific survey results to team members and developed an action plan for critical improvements
- Prepared materials for division Leadership Team talent reviews
- Planned and helped lead an interviewing workshop for employees

PUBLICATIONS

Acknowledgement of contributions

- Horowitz RI, Freeman PR. Precision Medicine: The Role of the MSIDS Model in Defining, Diagnosing, and Treating Chronic Lyme Disease/Post Treatment Lyme Disease Syndrome and Other Chronic Illness: Part 2. *Healthcare*. 2018; 6(4):129. <https://doi.org/10.3390/healthcare6040129>