Neil Kuehnle

PhD, Biomedical Science

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Education

PhD. in Biomedical Science, **Northwestern University** (2023)
BSc. in Molecular Biology, **Loyola University Chicago** (2014)

Select Coursework: Bioinformatics, Quantitative Biology, Biostatistics I/II (Statistical Survey/Regression Analysis), Mathematical Statistics I/II (Probability Theory/Statistical Inference), Machine Learning, Information Management for Data Science,
Bootcamps/Workshops: Programming Concepts & Fundamentals, R Programming, R Tidyverse, Python Programming, Python Data Wrangling and Visualization, Biopython

Experience

Northwestern University—Graduate Research Assistant January 2017 – Present (Chicago, IL)

- Studied the role of KSHV in HIV-associated cancers using high-throughput technologies, such as genome -wide CRISPR screening & single-cell sequencing
- Served as the primary data scientist/informatician in support of 3 research grants, including on the largest single-cell genomics dataset generated at Northwestern University to-date

Skills

- **Python:** NumPy, Pandas, Scikit-learn, PyTorch, SciPy, Statsmodels, Matplotlib, Biopython, and more
- **Other Languages:** R (Tidyverse, ggplot), SQL (SQLite), Unix/Linux shell scripting (bash)
- **Tools/Miscellaneous:** Git, GitHub actions, AWS, Slurm, NextFlow, Tableau, Excel

Projects

See more at nkuehnle.github.io/portfolio

Dissertation: The Role of FLICE-Inhibitory Proteins in Primary Effusion Lymphoma

- Identified novel regulators of ligand-independent, TRAIL-R1-mediated cell death and cFLIP dependence in KSHV-associated lymphoma using genome-wide synthetic CRISPR rescue screens
- Published in the prestigious Cell Death & Differentiation & selected as a monthly reader's choice paper

Transcriptomic Analysis of KSHV Infection

- Deployed multiple supervised (KNN, linear regression) and unsupervised (deep count autoencoder, PCA, UMAP, and Leiden clustering) machine learning techniques alongside traditional statistical inference methods (Chi-square, NB-GLM, and Kolmogorov-Smirnov) on single cell data for QA, cleaning, and hypothesis formation & testing
- Estimated sample sizes necessary for stable algorithm performance via bootstrapping of single-cell pilot experiment samples, leading to a 33% reduction in research expenditures
- Developed a fast Cython-based tool for analysis of miRNA/k-mer enrichment in bulk RNA samples (rolling hash algorithm + hypergeometric testing)

Natural Language Processing on RPG Content

- Scraped and cleaned 3K+ pieces of fan-generated RPG content scraped from Reddit
- Predicted multiclass labels using both TF-IFD bag of words (one-vs-rest SVM/SVC) and sequence based (RoBERTA- based transformer), achieving a macro- F1 score of .88 and AUC of .99

Predicting Used Car Values

- Performed ordinal (random forest) regression on the 2023 CarMax dataset to predict vehicle value on a heavily obfuscated and incomplete dataset, achieved an R^2 of .91 and concordance index of .95

PiPy-AWC

- Automated water level controller for home aquaria using a Raspberry Pi
- I developed this in part to practice software design patterns like factories, observer/callback, etc.

Publications

1. **Kuehnle N**, et al. CRISPR screens identify novel regulators of cFLIP dependency and ligand-independent, TRAIL-R1-mediated cell death. *Cell Death Differ*. 2023 May; 30(5):1221-1234. doi: 10.1038/s41418-023-01133-0.
2. **Kuehnle N**, Gottwein E. Druggable host gene dependencies in primary effusion lymphoma. *Curr Opin Virol*. 2022 Sep; 56:101270. doi: 10.1016/j.coviro.2022.101270.
3. Watkins S, **Kuehnle N**, et al. Assessment of a Metaviromic Dataset Generated from Nearshore Lake Michigan Lake Michigan. *Marine and Freshwater Research*. 2022 Nov; 67(11). doi: 10.1071/MF15172

Grants and Awards

- National Institutes of Health/National Cancer Institute Diversity Research Supplement · Jun 2020
- Northwestern University Immunology and Molecular Pathogenesis Training Grant · Sep 2017
- Outstanding Undergraduate Researcher Award · Issued by Loyola University Chicago · May 2014
    - Recognized for the 2013-14 year and granted a small personal monetary award for achievement in undergraduate research
- Loyola University Chicago Biology Department Summer Research Fellowship · Apr 2013
- Loyola University Mulcahy Scholar/Fellowship · Apr 2013
- 2010-2014 George M. Pullman Foundation Scholar
    - Mixed need and merit-based scholarship granted to full-time college students from Cook County, IL.