

JONATHAN KING

Education

Carnegie Mellon - University of Pittsburgh

Joint PhD Program in Computational Biology

Expected 2022

University of California, Berkeley

B.A. Computer Science, B.S. Bioengineering

May 2017

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Skills and Coursework

- Python, Tensorflow, Keras, Pytorch, Spark, C, Java, SQL, R, Docker
- Deep Learning, Scalable Machine Learning, Neural Machine Translation
- Algorithms for Computational Biology
- Discrete Math, Probability, Linear Algebra, Operating Systems, Databases, Networks
- Biophysical Chemistry, Molecular & Systems Biology

Research Experience

Graduate Student Researcher

Aug 2017 - Present

Carnegie Mellon - University of Pittsburgh

Advisor: David Koes

- Developed novel and large-scale machine learning methods for protein structure prediction using generative & attention-based sequence models (Recurrent Neural Networks, Transformers).
- Explored analogous methods in RNA structure prediction, sequence generation, & property prediction.
- Identified structure activity relationships inhibitors of CYP4F2, an enzyme targeted for treating stroke.

Research Assistant

Dec 2016 - Aug 2017

UCSF Dept. of Physiological Nursing, San Francisco CA

Mentor: Xiao Hu

- Contributed to UCSF's "SuperAlarm" projects to combat alarm fatigue in hospitals with machine learning.
- Developed sequence forecasting methods to predict cardiac arrest from hospital alarms with AUROC=0.85.

Bioinformatics Intern

May 2015 - Dec 2016

Plexxikon Inc., Berkeley CA

Mentor: Paul Severson

- Developed novel string-based algorithms to detect structural variants in acute myeloid leukemia patients.
- Published program on Illumina's BaseSpace cloud-computing platform with Amazon Web Services.
- Improved specificity and reporting methods of algorithms for target genes to outperform existing software.
- Engineered scripts for parallel analysis of biological experiments using Next Generation Sequencing data.

Research Assistant

Apr 2014 - Sep 2014

University of California, Berkeley

Mentors: Assaf Zemach, Daniel Zilberman

- Studied epigenetic role of DNA methylation in the *Arabidopsis thaliana* plant via computational analysis.
- Identified phenotypic responses of 40 previously uncharacterized chromatin remodeler protein mutants.

Other Projects

instaGAN: De Novo Food Blogging with Generative Models

Apr 2019

- Combined Generative Adversarial Networks & Recurrent Neural Networks to generate & caption instagram-style food photos. Report with examples available on personal website.

RNA Secondary Structure Prediction via Neural Machine Translation

Apr 2018

- Created Recurrent Neural Network method to predict RNA structure and terminator strength from sequence.
- Utilized multi-task learning to develop a shared latent space, improving the model by ~ 0.1 AUROC.

An Agent-Based Approach to Modeling Ebola Outbreak

Dec 2017

- Modeled Ebola outbreak under spatial & temporal constraints with self-developed agent method.

Leadership

Summer Research Mentor

2018, 2019

University of Pittsburgh, TECBio Research Experience for Undergraduates

- Acted as primary research mentor for 2 students completing graduate-level research projects in machine learning and drug discovery.
- Advised projects to completion; final work presented at university & minority student research symposiums.

Research Ethics Forum Mentor

2018, 2019

University of Pittsburgh, TECBio Research Experience for Undergraduates

- Moderated student break-out groups in preparation for a cross-university forum on research ethics.

Leadership cont.

Tutor – Computer Science, Math, Chemistry, Physics

Dec 2014 - Present

InstaEdu.com, Online Tutoring Service

- Coached over 40 high school and college students in STEM curriculum.
- Developed weekly lesson plans for video conferencing students.

Berkeley Biomedical Engineering Society

2013 - 2017

- Planned monthly events for Bioengineering community including a research fair, outreach, & career events.

Publications

“DREAMing of big data and scalable machine learning: Predicting kinase binding with matrix factorization”.

Koes, D., **King, J. E.**, Francoeur, P. G., Kowalczyk, A., Rajashekar, S., Chennubhotla, C.

Abstracts of Papers of the American Chemical Society (2019).

“Convolutional neural network scoring and minimization in the D3R 2017 community challenge”.

Sunseri, J., **King, J. E.**, Francoeur, P. G., Koes, D.

Journal of Computational Aided Molecular Design (2018).

“Predict In-Hospital Code Blue Events using Monitor Alarms through Deep Learning Approach”.

Xiao, R., **King, J. E.**, Villaroman, A., Do, D. H., Boyle, N. G., Hu, X.

IEEE Engineering in Medicine and Biology Conference (2018).

Presentations

“Exploring sequence-to-sequence learning methods for end-to-end, complete protein structure prediction”

American Chemical Society National Conference, Computational Chemistry Division

Aug 2019

Canadian Chemistry Conference, Machine Learning Division

Jun 2019

University of Pittsburgh Advanced Research in Computing Symposium

Mar 2019

“A Novel Algorithm for Detecting FLT3 Internal Tandem Duplications in Acute Myeloid Leukemia Patients”

Northern California Computational Biology Student Symposium

Oct 2016

Presentations (Advised)

“Screening and Simulating Potential Inhibitors for the CYP4F2 Enzyme”

Presenter: Jackelyne Garcia Cruz

Annual Biomedical Research Conference for Minority Students

Nov 2019

Summer Undergraduate Research Symposium, Duquesne University

Jul 2019

“Developing a Latent Space Representation for Prediction of both RNA Terminator Strength and Structure”

Presenter: Alex Ludwig

Summer Undergraduate Research Symposium, Duquesne University

Jul 2018

Awards

Natl. Inst. of Biomed. Imaging and Bioeng. T32 Training Grant

Sep 2019 - Sep 2020

Stipend, tuition, and travel awards.

Biomedical Graduate Student Association, Travel Award

Aug 2019

Google Cloud Platform Research Credits, \$1000 award

Jun 2019

Best Talk, Northern California Computational Biology Student Symposium

Oct 2016