

# KELVIN LIU-HUANG

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Looking for part-time, intern, or contractual **software engineer**, **data/research scientist**, or **teaching** position pertaining to **AI**, specifically **robot/structure/machine learning**, **natural language processing**, **Bayesian inference**, **modeling**, **simulation**, **optimization**, **computer vision**, **computational biology**; **linguistics**; **computational ethics**; and **game design**. Particularly interested in theoretical **knowledge representation/transfer** to facilitate interdisciplinary dialogue and avoid duplication of scientific effort.

## EDUCATION

**Carnegie Mellon University (CMU), Pittsburgh, PA** **2018**

*M.S. Computational Biology*

**University of California, San Diego (UCSD), CA** **2013**

*B.S. Computer Science: Bioinformatics*

## EXPERIENCE

**Graduate Researcher**, Murphy Lab, Dept. of Computational Biology, CMU **2014–Now**

- Formulated image-based generative model (motivated by communicability and generalizability) of endoplasmic reticulum structure as an embedded random graph, parameterized by graph spectral properties learned through curve estimation, joint densities learned through conditional KDE, et al.
- Developed an asymptotic hybrid sampling method to handle intractable dependencies in model
- Constructed panel of discriminative classifier models (neural networks, support vector classifiers, boosters, random forest, ridge regressor, LDA, naïve Bayes) to predict gastric cancer drug effectiveness from microtubules images in single-cell biopsies in Matlab
- Explored the relevance, redundance, and dependence of the classifier's features through LASSO, MRMR, and cross-validation
- Constructed agent-based dynamics model of endoplasmic reticulum structure consisting of 5 object types interacting through 11 dynamics rules, stored in novel R-tree optimized for moving object insertion, query, and update in Matlab

**Cofounder and Mobile Applications Developer**, Muse Prime, Pittsburgh, PA **2013–Now**

- Engineered backend; unique features include behavior governed by keyworded type system and units and settings modularly editable
- Working with another programmer, implemented prototype (supported on desktop and phone) in JavaScript and HTML5, utilizing Google Sheets as database
- Conducted consumer research and developed hypothesis-driven market strategy

**Research Intern**, Stoica Group, NASA JPL **2017**

- Constructed HOM, a machine-readable pictorial writing system for expressing humanoid movement based on Mealy machines, purposed for compact storage, transfer, and communication of movement tasks

- Conducted and designed experiment to translate video of human movement into HOM through pose estimation, causal inference, and compression in Python
- Designed editor visualizing animated and spatially optimized representation of HOM diagrams

**Teaching Assistant** (Programming for Scientists), CMU **2017**

- Developed and graded assignments and exams implemented in Golang
- Taught weekly recitation sections and twice weekly office hours to 20 students

**Teaching Assistant** (Introduction to Computational Biology), CMU **2015**

- Guest lectured (2018) on approaches and usage of cell simulation software and databases
- Developed assignments with guided demos
- Taught twice weekly recitation sections and weekly office hours to 30 students

**Intramural Sports Coach**, CMU **2014–Now**

**Senator**, CPCB Graduate Student Assembly, CMU **2015–2016**

**Founder and President**, Undergraduate Bioinformatics Club (UBIC), UCSD **2012–2013**

- Recruited board of officers, delegated tasks, and designed club infrastructure <[ubic.ucsd.edu](http://ubic.ucsd.edu)>
- Found sponsors to help organize 11 events in first year including talks/socials/workshops
- Worked with Corporate Affiliates Program to secure jobs/internships for students
- Worked with faculty (esp. Vineet Bafna) to provide resources/research to students

**Private Tutor** (Machine Learning, Statistical Methods, Swimming x8, Java, SPARC Architecture) **Various**

## SKILLS

### Engineering

*Programming*     Fluent in Matlab, Python, Golang, Java, HTML5; familiar with Scikit-Learn, Keras, Tensorflow, Pandas, Django, JavaScript, C, SPARC Assembly; some C++, PHP, CSS3

*Software*        Matlab, Git, MySQL, PostgreSQL, Microsoft Excel (+VBA)/Word/Powerpoint/Publisher, Photoshop CS5, LaTeX, PyCharm, Atom, Visual Studio, Eclipse, SSH clients, Audacity, macro softwares

*Design*            Websites, mobile applications, linguistics, video/card/board games

### Laboratory

*Genetics*         PCR, gel electrophoresis, bacterial & viral transformation, DNA/RNA extraction

*Microbiology*    Sterilization, media preparation, bacterial techniques

*Chemistry*        Dilution, mixing, centrifuge, titration, calorimetry, spectrophotometry

*General*          Animal handling/safety/surgery, lab safety training, equipment handling

### Other

*Teaching*         Machine learning, statistics, biology, Python, Golang, Java, C, HTML, swimming

*Scientific Knowledge*    Metabolic biochemistry, computational genomics, molecular biology, structural biochemistry, computational structural biology, cell & systems modeling, cell biology, physical biochemistry, organic chemistry

*Technical Knowledge* Machine learning (incl. active/online/deep learning), data science, natural language processing, image processing, computer vision, Bayesian inference, agent-based modeling, stochastic modeling, optimization, algorithms, data structures, knowledge representation, statistics, graph theory, set theory

*Spoken Langs.* English (native), Mandarin Chinese (functional), Spanish (functional)

## **PUBLICATIONS/PRESENTATIONS**

- K. M. Liu-Huang, T. H. Lee, R. F. Murphy. "Learning a Generative Model of Endoplasmic Reticulum Structure from Fluorescence Microscope Images." Manuscript in revision. **2019**
- K. M. Liu-Huang. "Complexlang: a COMPact Logical EXperimental LANGuage." *A Record of the Proceedings of SIGBOVIK 2019*. Paper presented at SIGBOVIK 2019, Carnegie Mellon University, Pittsburgh (pp. 144-149). <[kelvinliu.org/complexlang.pdf](http://kelvinliu.org/complexlang.pdf)>. **2019**
- A. Stoica, K. M. Liu-Huang, H. J. Suh, S. Martin, S. M. Hewitt, S. Bechtel. "Mealy Machine Implementation of a Humanoid-Oriented Movement Writing." Manuscript in revision. **2017**
- K. M. Liu-Huang, T. H. Lee, G. K. Rohde, and R. F. Murphy. "Direct Learning of a Generative Model for Endoplasmic Reticulum Distribution from Fluorescence Microscopy Images." Invited Speaker for *CYTO 2016*, Seattle, WA, USA **2016**
- K. M. Liu, G. Galletti, K. Cleveland, M. Shah, P. Giannakakou, and R. F. Murphy. "Predicting docetaxel-sensitivity in gastric cancer by automated image analysis." Poster session presented at: *MMBioS External Advisory Board Meeting for NIH Biomedical Technology & Research Resource (BTRR)*; Pittsburgh, PA **2015**
- K. Liu, S. Navlakha, S. Chandrasekaran, A. L. Barth, and Z. Bar-Joseph. "Synapse detection and characterization with electron microscope." Poster session presented at: *RECOMB 2014. 18th Annual International Conference on Research in Computational Molecular Biology*; Pittsburgh, PA **2014**