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Julia Cluceru

A Ph.D. level bioengineer focused on deep learning applications in neuroimaging. I have a strong theoretical and applied background in machine learning and statistical analysis. I am seeking internship opportunities for 2019-20.

Education

University of California, San Francisco — *Ph.D. in Bioengineering/Pharmaceutical Sciences*
Fall 2015 - (exp.) Fall 2020 (San Francisco, CA)

University of North Carolina, Chapel Hill — *B.A., Mathematics; B.A. Chemistry*
Fall 2009 - Spring 2013 (Chapel Hill, NC) - Graduated with Distinction

Projects + Research

(prior projects/publications)

Machine learning in MRI to diagnose brain tumor patients — *University of California, San Francisco*
Spring 2017 – Present (San Francisco, CA)

Goal: Identify treatment injury that mimics the appearance of a recurrent tumor in order to help radiologists diagnose patients and plan treatment

- Distinguished between the recurrence of a brain tumor and the inflammatory response induced by treatment using magnetic resonance images (MRI) and convolutional neural networks (CNNs) (progress here)
- Discovered a novel MRI biomarker that can predict the outcome of tissue samples in recurrent tumor patients using generalized estimating equations and logistic regression *(publication pending)* (progress here)
- Programmed two end-to-end python-based MRI processing pipelines for both lesion-level patient images and tissue-sample patient data, including quality control visualization. Partial adoption of the pipeline saving ~2 hours of processing per cohort.

Stratifying brain tumor patients into genetic subtypes — *University of California, San Francisco*
Summer 2019 – Present (San Francisco, CA)

Goal: Group patients into one of three major genetic brain tumor subtypes in order to evaluate their candidacy for different chemotherapies and radiation treatments

- Classified patients into genetic subtypes with 91% accuracy (even class distribution) using CNNs (progress here)
- Visualized features highly related to each genetic subtype using saliency mapping *(in progress)*
- Successfully repurposed my MRI processing pipeline developed above for all images in this analysis

Comparing radiomics to CNN for MRI contrast detection — *University of California, San Francisco*
Fall 2018 – Present (San Francisco, CA)

Goal: Automate the retrieval and alignment of images with the same anatomy and contrast for longitudinal lesion analysis

- Successfully applied full radiomics pipelines to extract quantitative imaging features and MRI metadata as features to input for support vector classification of MRI anatomy and MRI contrast
- Classified MRI anatomy and MRI contrast resulting in 99% accuracy (anatomical classification; 2 classes); 96.4% accuracy (MRI contrast classification, 5 classes) using CNNs (progress here)
- Developed a command line tool to create reproducible stratified training and testing splits of brain MRI exam cohorts for seamless integration into the pytorch workflow
- Deployed algorithms into the UCSF Neurology clinic to display the correct images of patients' brains with other clinical metrics over time, serving 15 clinicians with ~1000 projected patient visits per year (~10k MRI exams/year)

Evaluating microfinance loan candidacy — *University of California, Berkeley*
Summer 2019 (Berkeley, CA) - (linked here)

Goal: Predict whether an individual would be suitable for microfinance loans based on financial history

- Explored 10 disparate datasets of human financial and personal data through encoding non-numeric data, clustering, correlating and visualizing to deeply understand our dataset
- Agglomerated over 400,000 disparate financial transactions into a score representing credit
- Predicted credit score with gradient boosting machines, providing insight into the most important features related to loan payer status

Skills

- Python data science stack, Pytorch, R, bash scripting, git, jupyter, LaTeX; Learning: Tensorflow, SQL

Publications + Posters

Papers

- Nesmith JE, Chappell JC, Cluceru JG, et al. Blood vessel anastomosis is spatially regulated by Flt1 during angiogenesis. *Development*. 2017:1445:889–96.
- Chappell JC, Cluceru JG, Nesmith JE, et al. Flt-1 (VEGFR-1) coordinates discrete stages of blood vessel formation. *Cardiovasc. Res.* 2016:1111:84–93.
- Walpole J, Chappell JC, Cluceru JG, et al. Agent-based model of angiogenesis simulates capillary sprout initiation in multicellular networks. *Integr Biol (Camb)*. 2015:79:987–97.

Selected Posters

- Cluceru J, Crane J. Automated longitudinal alignment and visualization of clinical neurological MRI exams. *American Society for Functional Neuro-Radiology.* San Francisco, CA. Nov. 2019.
- Cluceru J, Nelson SJ, Molinaro AM, Phillips JJ, Olson MP, Jakary A, Nair D, Cha S, Chang SM, Lupo, JM. MR imaging parameters are associated with the pathology of recurrent high-grade tumor in the context of treatment effect. *Society for Neuro-Oncology.* New Orleans, LA. Nov 2018.
- Cluceru J, Nelson SJ, Molinaro AM, Phillips JJ, Olson MP, Jakary A, Nair D, Cha S, Chang SM, Lupo, JM. Treatment effect and recurrent tumor have different MR signatures in the contrast-enhancing and nonenhancing regions. *International Society of Magnetic Resonance Imaging.* Paris, FR. Jun 2018.

Awards + Scholarships

- Ruth L. Kirschstein T32 NIH Training Grant, $49,140 total award — 2018-2019
- Diversity Scholarship, $5,000 total award, USF Deep Learning Part I & II — 2018-2019
- 1st place, Best Student Speaker at the AAPS Insight Symposium — Stockton CA, 2019
- 1st place, Best Poster at the UCSF Radiology Symposium — Santa Rosa, CA, Mar 2019
- Invited Speaker, Society for Neuro-Oncology Conference — Phoenix, AZ, Nov 2019

Selected Coursework

- **USF**: Deep Learning Pt. I, II (Howard), Introduction to Deep Learning (Interian)
- **Stanford**: CS231n (Li), Statistical Learning (Tibshirani, Hastie), Introduction to Machine Learning (Ng), Introduction to Deep Learning (Ng), Hyperparameter tuning, Regularization and Optimization (Ng), Convolutional Neural Networks (Ng)
- **École Polytechnique Fédérale de Lausanne**: Digital Signal Processing (Prandoni)
- **UCSF:** Pharmacokinetics (Kroetz, Giacomini, Benet), Computational Pharmacogenomics (Bandyopadhyay)