Daniel Breen

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http://danielbreen.net/projects/

Physics PhD with focus on optimization, modeling, and data analysis. Analyzed real world neural system data obtained from collaborators. Applied parameter estimation techniques. 3 years experience and proficiency using python and in core collaborative roles with other research groups.

Experience

UC San Diego — **La Jolla, CA**
Graduate Research Assistant — *August 2014– 2017*

- Scraped recipes from foodnetwork.com, discovered ingredients characterizing ethnicity of cuisines using wordclouds, lda topic modeling, and deployed app online using flask and heroku.
- Developed combined optimal estimation and data mining method to discover low dimensional feature spaces separating strains of neurons and underlying biophysical mechanisms. Discovered a low dimensional feature space separating Alzheimer's diseased and healthy neurons consistent with the Alzheimer's literature.
- Developed a two step procedure characterizing transistor mismatch to establish a mapping between configurable and true parameter values, leading to emulation of a biological neuron on neuromorphic silicon VLSI chip.
- Developed and applied methods of optimal estimation to characterize input-output relationship of neurons from patch-clamp data. Balanced competing tradeoffs between incorporating biophysical model mechanisms and complexity and characterized optimal patch-clamp protocols.
- Core roles in two collaborations with experimentalists. These collaborations resulted in a conference paper and poster at bioCAS 2016, an invitation to publish in TBioCAS (only 1% from bioCAS are invited), an oral presentation at SIAM (DS17), and posters at SfN and an MBI workshop. Python 'scratch' notebook available at my website.

Education

- **UC San Diego** — **La Jolla, CA**
  PhD in Physics, GPA:3.6 — *2011–2017*
- **UC San Diego** — **La Jolla, CA**
  MS in Physics, GPA:3.6 — *2011–2013*
- **New Mexico Tech** — **Socorro, NM**
  BS in Physics — *2007–2011*

Technical Skills

- **Machine Learning:** random forests, decision trees, neural networks, feature engineering
- **Statistical Methods:** linear and logistic regression, hypothesis testing, confidence intervals, bootstrap
- **Programming:** python (pandas, scikit-learn, matplotlib, numpy, scipy, gensim), linux, R, SQL, git
- **Mathematics:** differential equations, stochastic processes, linear algebra, probability, statistics, time series