DEREK PISNER

NEUROSCIENTIST | SOFTWARE ENGINEER | BIOSTATISTICIAN

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ABOUT

I am an interdisciplinary data scientist tackling problems at the intersection of cognitive neuroscience, precision medicine, and AI. My current research integrates metaprogramming, high-powered computing, multimodal feature-engineering, and geometric deep learning in pursuit of deployable SaMD systems capable of psychiatric phenotyping, risk forecasting, and treatment matching for pervasive mood disorders like depression and PTSD.

COMPETENCIES

Backend Programming Python (expert), R (expert), BASH/TCSH Shells (expert), C (inter.), MATLAB (proficient)

Frontend Programming (r)markdown (expert), JS (inter.), LaTex (expert), HTML/CSS (inter.), Jupyter (expert)

Database Pandas (expert), Tidyverse (expert), Dask (proficient), Spark (inter.), RedCap (expert), SQL (proficient)

Version Control Git/Github (proficient), anaconda/aptitude/yum/homebrew/pypi (expert)

DevOps CircleCI/Travis (expert), MLOps (inter.), packaging (expert), unit/integration/smoke/fuzz testing (expert)

Supercomputing SLURM/PBS/SGE scheduler (expert), openMP/MPI (proficient), joblib (expert), GPU (inter.)

Cloud AWS (expert - S3, Batch, RDS, CloudWatch, EC2, ECR, ELB, IAM, Lambda, awscli)

Neuroimaging & Biometrics fMRI/dMRI (expert), EEG/ECG/HRV (proficient), Mobile Sensing (proficient)

ML Scikit-Learn (expert), TensorFlow (proficient), H2O (proficient), PyTorch (inter.), StellarGraph (proficient)

Visualization Photoshop, Illustrator, InDesign, Premiere Pro (proficient), D3.js (inter.), plotly (proficient), ggplot (expert), matplotlib/seaborn (expert)

Natural Language Processing OCR (expert), ASR (proficient), topic/sentiment models (proficient), GPT-3 (expert), preprocessing (expert), NLTK/Gensim/spACy

Containerization Docker/Singularity (expert)

Bayesian Analysis Stan (proficient), PyMC3 (inter.)

EXPERIENCE

VISITING SCHOLAR, ML ENGINEER, PROJECT MANAGER

Center for Imaging Science | Johns Hopkins University, January 2019 – August 2019

- Implement distributed ensemble tractography with custom 'inverse-native' image registration to facilitate normative structural brain network ('Connectome') analysis at the individual-level.
- Mentor and supervise team of interdisciplinary software engineers to repackage, test, document, and deploy reproducible and high-throughput connectome mining pipeline that upscales analytic capacity by 3x orders of magnitude on cloud and HPC servers, achieving unprecedented discriminability benchmarks and other analytic goals ahead of schedule.
- Innovate myriad graph statistical learning methods for connectomics, including multiplex embeddings, multiverse graphical inference, graphical ensembles, and multi-species 'connectome coding'.

RADIOLOGICAL TECHNICIAN, DATA ARCHITECT, GRADUATE MENTOR

Mood and CogNeuro Labs | University of Texas at Austin, July 2016 – August 2018

- Train and validate Bayesian, ensemble, and deep-generative transfer learning models to achieve 25% posterior predictive gain in AUC above classifiers-as-usual for prognosis of chronic depression.
- Acquire, preprocess, and analyze 100+ MRI, fMRI, and dMRI scans, and develop scan sequences.
- Invent suite of geographic web-scraping and census mining tools for high-precision, data-economical, and reproducible deep-feature synthesis that delivers 5-10% out-of-sample predictive gain for a stacked ensemble of classifiers used to match individuals to an internet intervention for depression.
- Independently devise, engineer, and deploy a cloud-based LAMP server on AWS using HIPAA-compliant EC2, ELB, and RDS-SQL to achieve scalable iOS / Android mobile sensing with HealthKit / Fit API's, activity monitoring, conversational audio analysis with ASR and NLP, real-time sentiment analysis, continuous learning, and closed-loop treatment prompts with personalized push-notifications.

STUDY COORDINATOR, SOFTWARE ENGINEER, SYSTEMS ADMINISTRATOR

Social Cognitive Affective Neuroscience Lab | University of Arizona, July 2014 – July 2016

- Manage team of a dozen research scientists while coordinating two DARPA-funded studies that investigate novel sleep-entrainment interventions for Traumatic Brain Injury and PTSD.
- Forge relationships with over 73 institutions and community organizations, while deploying reinforcement-learned recruitment campaign based on targeted social media ads and SEO.
- In the processing of establishing a new research lab, automate systems of multimodal data capture, entry, export, transfer, storage, preprocessing, and quality control to streamline standard operating procedures, minimize data loss, and maximize efficiency of research team.
- Independently construct a 14-node, quad-GPU Beowulf cluster, configure and administer its scheduler and ACL's for a diverse team of users, implement custom SSHFS NFS and remote access protocols, write and maintain library of dozens of custom shell scripts to minimize maintainence overhead, and compile dozens of bleeding-edge neuroimaging applications for HPC analytics.

EDUCATION

PhD, COGNITIVE NEUROSCIENCE AND APPLIED STATISTICAL MODELING
University of Texas Austin | Austin, Texas, 2021
Dissertation: "*Predicting Depression Persistence with Connectome Statistical Learning*"

MA, CLINICAL PSYCHOLOGY
University of Texas Austin | Austin, Texas, 2018

PBACC, PSYCHOLOGY
University of California Berkeley | Berkeley, California, 2013

BA, PHILOSOPHY AND MATHEMATICS
University of Virginia | Charlottesville, Virginia, 2011

IB, VALEDICTORIAN
Robinson Secondary School | Fairfax, Virginia, 2007

FEATURED SOFTWARE AND OPEN-SOURCE CONTRIBUTIONS

- Creator and principal developer of **PyNets** (github.com/dPys/PyNets 40 108), a reproducible workflow for connectome ensemble learning.

- Co-creator and core developer of **dMRIprep** (github.com/nipreps/dmriprep 19 48), an open source platform for reproducible preprocessing of diffusion MRI, and its primary dependency -- **EddyMotion** (github.com/nipreps/eddymotion) eddy-current correction for multiple diffusion models.

- Core developer of NeuroData's MRI-to-Graphs (NDM2G) (github.com/neurodata/m2g 31 56), a reliable and scalable structural connectome estimation.

- Regular contributor to Dipy (github.com/dipy/dipy), Nilearn (github.com/nilearn/nilearn), and Scikit-Learn (github.com/scikit-learn/scikit-learn).

PATENTS

Automated Feature Engineering of Hierarchical Ensemble Connectomes, 11,188,850, (US & PCT, 2018 - Issued)
Generative Connectome Sentiment Modeling, 63/251,723 (US - Provisional)

COLLOQUIUM, TEACHING, AND INVITED LECTURES

- **Hosted PyNets 1.0 code sprint.** University of Texas at Austin.. Austin, TX. 2021.
- **Keynote Speaker. "Ensemble Connectomics."** Statistical and Data Sciences Colloqium, University of Texas at Austin, TX. 2020.
- **Invited developer dMRIprep code sprint**. University of Washington eScience Institute. Seattle, WA. 2019.
- **Co-hosted full-day workshop on structural connectomics.** Johns Hopkins University (JHU). Baltimore, MD. 2019.
- **Invited developer Nipype 2.0 code sprint**. Massachusetts Institute of Technology (MIT). Boston, MA. 2018.
- **Featured developer at Neurohackacademy**. University of Washington eScience Institute. Seattle, WA. 2017.
- **Invited developer at Brainhack Global**. Organization for Human Brain Mapping (OHBM). 2017-2021.
- **Guest Lecturer. "Automated Global Probabilistic Tractography."** Brain Mapping Workshop (BMW). Arizona, 2016.
- **Guest Lecturer. "Parallel Computing and Neuroimaging."** Brain Mapping Workshop (BMW). Arizona, 2015.

FEATURED PUBLICATIONS

Pisner D., Shumake, J., (2021). Predicting Depression Persistence with Connectome Ensemble Transfer Learning. *In review.*
Pisner D., Shumake, J. (2021). Mining the Multiverse of the Ensemble Connectome. *In review.*
Pisner D., Schnyer D. (2019). Chapter 6: Support Vector Machine. In A. Machelli, S. Vieira (Eds.), Machine Learning: Methods and Applications to Brain Disorders (pp. 101-122). London, UK: Elsevier Science.
Pisner D., Shumake J., Beevers, C, Schnyer D. (2019). The Superior Longitudinal Fasciculus and its Functional Triple-Network Mechanisms in Brooding. Neuroimage: Clinical, 24, 101935.
Pisner, D., Smith, R., Klimova, A., Alkozei, A., Killgore, W. D. (2016). Highways of the Emotional Intellect: White Matter Correlates of an Ability-Based Measure of Emotional Intelligence. Social Neuroscience, 11, 1-15.
Pearson, R., **Pisner, D.,** Meyer, B., Shumake, J., Beevers, C. (2019). A Machine Learning Ensemble to Predict Treatment Outcomes Following an Internet Intervention for Depression. Psychological medicine 49 (14), 2330-2341.
Papini, S., **Pisner, D.** ... (2018). Ensemble Machine Learning Prediction of PTSD Screening Status After Emergency Room Hospitalization.
Alexander, C., **Pisner, D.,** Jacova, C. (2019). Predementia Brain Changes in Progranulin Mutation: A Systematic Review of Neuroimaging Evidence. Dementia and Geriatric Cognitive Disorders 47 (1-2), 1-18.
Pearson, R., **Pisner, D.,** Beevers, C.. Translational Research in Mental Health: Challenges and Opportunities. The Behavior Therapist.
Alkozei, A. **Pisner, D.**, Rauch, S., Killgore, W. D. (2015) Emotional Intelligence and Subliminal Presentations of Social Threat. Biological Psychiatry 77(9).

FEATURED CONFERENCE PRESENTATIONS

Pisner, D., Joseph M., Richie-Halford A., Lerma-Usabiag, G., Mansour S., Kent JD, Keshavan A., Cieslak M., Dickie, E., Tourbier, S., Voineskos, A., Satterthwaite, T., Poldrack, RA., Veraart, J., Rokem A., and Esteban, O... dMRIPrep: A Robust Preprocessing Pipeline for Diffusion MRI. ISMRM 2021 Annual Meeting.
Pisner, D., Hammonds, R. PyNets: A Reproducible Workflow for Structural and Functional Connectome Ensemble Learning. Organization for Human Brain Mapping (OHBM) 2020 Annual Meeting. Montreal, CA.
Pisner, D., Shumake J., Beevers, C., Schnyer D. Measuring Negative Attention Bias in Depression Using Differential Brain Decoding. Organization for Human Brain Mapping (OHBM) 2019 Annual Meeting. Rome, IT.
Pisner, D., Shumake J., Beevers, C., Schnyer D. Depressive Rumination as a Microstructural-Functional Failure of Network of Networks. Organization for Human Brain Mapping (OHBM) 2018 Annual Meeting. Singapore, SG.
Pisner, D., Beevers, C., Schnyer D. Resting-state functional connectivity of the Cognitive Control Network in Major Depressive Disorder. Organization for Human Brain Mapping (OHBM) 2017 Annual Meeting. Vancouver, BC.
Pisner, D., Singh, P., Fridman, A., Killgore. W. D. Resilience Following Mild Traumatic Brain Injury is associated with Gray Matter Volume in the Left Precentral Gyrus. International Neuropsychological Society's 44th Annual Meeting, Boston, MA.
Pisner, D., Alkozei, A., Killgore. W. D. (2015, May) Trait Emotional Suppression is Associated with Decreased Activation of the Insula and Thalamus in Response to Masked Angry Faces. Society of Biological Psychiatry's 70th Annual Meeting.. Toronto, ON.
Pisner, D., Alkozei, A., Killgore. W. D. (2015, February) Visuospatial Reasoning Mediates the Relationship Between Emotion Recognition and Emotional Intelligence. International Neuropsychological Society's 43rd Annual Meeting, Denver, CO.
Pisner, D., Bickford D., Crothers R., Kivowitz A., Mackin R., Nelson, J., Tegenkamp K. (2014, May). Self-Reported Sleep Disturbance as a Risk Factor for Memory Deficits in Late Life Depression. American Psychiatric Association's 167th Annual Meeting. New York, NY.