DEREK PISNER

NEUROSCIENTIST | SOFTWARE ENGINEER | BIOSTATISTICIAN

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Dear Hiring Team,

I am writing to express my interest in the position of Bioinformatics Data Scientist for the Dry Lab Operations group at Invitae. Please find my CV enclosed for your consideration. Given my diverse background in software engineering, statistical learning, project management, business strategy, and intellectual property, and precision medicine, I have accrued exactly the kinds of experiences that would make me a perfect fit to help innovate and drive your team forward at Invitae.

I first became interested in intelligence science (cognitive, affective, and artificial) as an undergraduate at the University of Virginia, where I studied philosophy and mathematics. These disciplines would give me the opportunity to begin thinking broadly about AI and its implications while further equipping me with a diverse theoretical and technical foundation to eventually develop intelligence technology of my own. Fascinated by the reciprocal power of minds to learn through machines and machines to learn through minds, I therefore embarked on a decade-long quest to translate that preparation into multimodal data-capture tools and computational models capable of disrupting a long-outdated mental healthcare sector. Towards that objective, I next spent five years at the University of California and the University of Arizona teaching myself a variety of new programming languages (particularly shell scripting, R, and python), as well as adopting diverse knowledge spanning clinical psychology, statistical learning, and neuroimaging. Last year, I finished my doctorate in cognitive neuroscience with a minor in applied statistical modeling from the University of Texas at Austin, where I triple-replicated my master thesis, and wrote a first-of-its-kind "computationally reproducible" dissertation entitled "Predicting Depression Persistence with Connectome Statistical Learning." After a brief post-doctoral hiatus, I have since transitioned away from a traditional academic track, opting to instead explore the more impactful possibility of translating scalable biomedical AI into clinically actionable insights for both patients and providers.

My qualifications based on your requested skills and experience:

* I am an expert in both Python and R with over 10 years experience using the languages for a variety of applications, both in and outside of academic research. I also have a working knowledge of SQL and other database frameworks (pandas, tidyverse, Dask, RedCap, VBA). I am familiar with Biopython, and have used it together with other bioinformatics libraries to manipulate NGS data, and draw upon that data to make predictive inferences.

* A large majority of my experience as a predoctoral student was spent munging, harmonizing, organizing, and developing systems for automatically updating heterogeneous datasets. This background also includes considerable experience with multiple forms of reproducibility analysis to improve data reliability and validity, but also the robustness of data-capture and analysis methods.

* I have nearly a decade of experience in multiple statistical modeling methods. I am well-verse in both frequentist and Bayesian inferential methods. I have a strong background in structural equation modeling using tools in R like SEM, Lavaan, and particularly OpenMX. I am also intimately familiar with the latest trends in predictive inference, with a specialized knowledge of transfer, reinforcement, ensemble, and multi-view learning. I have trained and deployed a variety of deep-learning models such as DGM's, CNN's, MLP's, and DNN's. Recent areas of interest that were central to my dissertation include stacked autoML, penalized SEM, graph-based feature-engineering, and comparative classifier evaluation.

* I have a basic understanding of NGS, high-throughput sequencing, and gene regulatory network analysis.

* I pride myself on my ability to quickly identify, troubleshoot, and solve complex problems, both technical and managerial/ business strategic.

* Excellent data science communication skills. I am an effective communicator, both orally and in writing. I have experience presenting my research at both national and international conferences, as well as publishing in peer-reviewed journals. I am also highly proficient in the use of reproducible scientific writing tools such as Rmarkdown/knitr/inline, Jupyter, and Overleaf/LaTex.

* I have nearly 8+ years of experience in advanced data visualization, including plotly, ggplot, matplotlib/seaborn, fury/mayavi, and D3.js.

* I have a long history of thriving in interdisciplinary research, and have a knack for seeing beyond departmental boundaries to successfully forge collaborations among diverse groups with diverse goals and skillsets.

* I have a strong background in conducting literature review, as well as with drafting, maintaining, and enforcing IRB protocols, standard operating procedures, grants, and manuscripts for publication.

I consider myself a highly motivated, diligent, passionate, creative, and ambitious person, but I am also an easygoing and friendly person that values listening and good workplace communication. I know that my unique combination of skills and experience would be a great asset to Invitae and I look forward to meeting with you to discuss my application further.

Thank you for your time and consideration.

Kind regards,
Derek Pisner

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ABOUT

I am a multidisciplinary data scientist tackling problems at the intersection of network neuroscience, precision medicine, and AI. My previous research involved backend development and HPC deployment of multimodal geometric deep learning methods that leverage omnibus neural connectivity data to phenotype and personalize care for heterogeneous psychiatric disorders.

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 (expert), PyMC3 (proficient)

EXPERIENCE

VISITING SCHOLAR, ML ENGINEER, PROJECT MANAGER
Center for Imaging Science | Johns Hopkins University, January 2019 – August 2019
- Invent and implement ensemble tractography and native-space registration routines to facilitate reproducible connectome analytics at the individual level for the first time.
- Orchestrate, train, and supervise team of interdisciplinary software engineers to repackage, test, document, and deploy high-throughput brain network ('Connectome') mining pipeline, upscaling analytic capacity by 3x orders of magnitude on cloud and HPC servers, achieving beta release 2 months ahead of schedule, and attaining unprecedented feature discriminability benchmarks.
- Innovate myriad geometric learning methods for connectomics, including multiplex embeddings, multiverse graphical inference, and multi-species connectal 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 ROC-AUC gain over classifiers-as-usual for prognosing chronic depression risk.
- Independently administer and clinically supervise acquisition of >50 clinical and phantom MRI scans.
- Invent suite of geographic web-scraping and census mining tools for high-precision, data-economical, and reproducible deep-feature synthesis that delivering a remarkable 5-10% gain in out-of-sample R^2 for a stacked ensemble model of depression treatment outcome.
- 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, along with real-time sentiment analysis, continuous learning, and closed-loop push notifications as an intervention for mood disorders.

STUDY COORDINATOR, SOFTWARE ENGINEER, SYSTEMS ADMINISTRATOR
Social Cognitive Affective Neuroscience Lab | University of Arizona, July 2014 – July 2016
- Forge recruitment relationships with over 73 clinical organizations, and deploy targeted digital analytics -- enriched with reinforcement learning -- to build and coordinate two DARPA studies of a novel sleep-entrainment intervention for TBI and PTSD in a newly established lab.
- Automate lab systems of multimodal data capture, entry, export, network transfer, storage, preprocessing, and quality control to streamline standard operating procedures, maximize lab efficiency by eliminating overhead, and minimizing data loss by maximizing research consistency and compliance.
- Independently construct a 14-node / quad-GPU Beowulf cluster, configure and administer the cluster with a legacy SGE scheduler, custom SSHFS-based network file system, offsite remote access, an comprehensive library of 150+ custom shell maintenance scripts, compilation/installation of 20+ bleeding-edge neuroimaging applications, and ACL's for a diverse team of users.

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**), a reproducible workflow for connectome ensemble learning.
  ⑂Fork 40 ⭐Star 108
- Co-creator and core developer of **dMRIprep** (**github.com/nipreps/dmriprep**), 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.
  ⑂Fork 19 ⭐Star 48
- Core developer of NeuroData's MRI-to-Graphs (ND-M2G) (**github.com/neurodata/m2g**), a reliable and scalable structural connectome estimation.
  ⑂Fork 31 ⭐Star 56
- 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 Colloquium, University of Texas at Austin, TX. 2020.
- **Teaching assistant for Introduction to Cognitive Neuroscience**. Austin, TX. 2020.
- **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.
R. Pearson, **D. Pisner**, B. Meyer, J. Shumake, C. Beevers (2019). A Machine Learning Ensemble to Predict Treatment Outcomes Following an Internet Intervention for Depression. Psychological medicine 49 (14), 2330-2341.
S. Papini, **D. Pisner**, ... (2018). Ensemble Machine Learning Prediction of PTSD Screening Status After Emergency Room Hospitalization.
C. Alexander, **D. Pisner**, C. Jacova (2019). Predementia Brain Changes in Progranulin Mutation: A Systematic Review of Neuroimaging Evidence. Dementia and Geriatric Cognitive Disorders 47 (1-2), 1-18
R. Pearson, **D. Pisner**, CG Beevers. 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.