ANIRBAN NANDI, PH.D.

Research Scientist, Allen Institute for Brain Science

PROFESSIONAL PROFILE

Research scientist with Ph.D. in Electrical Engineering. Over 5 years of experience in large-scale biological data analysis, simulation, machine/deep learning, statistical modeling and optimization with several publications in high-impact peer-reviewed journals.

WORK EXPERIENCE

RESEARCH SCIENTIST, ALLEN INSTITUTE, SEATTLE, JAN 2018 - PRESENT

- End to end model deployment: Introduced a configurable, automated computational pipeline to fit single neuron models at scale and deployed it across HPC clusters, AWS. Achieved an order of magnitude improvement in compute time. **(Code | Publication | Web Product)**
- Derive Cell-types from multimodal datasets: Established causal links between high-dimensional genomic (RNA-sequencing), morphology and physiology data using unsupervised learning algorithms and sensitivity analysis methods. **(Code | Publication)**
- Prototype biological networks: Through large-scale network simulation on HPC clusters, identified biomarkers for neurodegenerative diseases and revealed functional implications for structural connectivity patterns observed in Electron Microscopy (EM) volumes of brain tissue. **(Publication 1, 2)**
- Developed a deep neural network approach to compare computational complexity of biophysical models.

GRADUATE RESEARCH ASSISTANT, WASHINGTON UNIVERSITY, 2013 - 2017

- Developed a novel data driven model inference and control framework for neural circuits.
- With theoretical validation proposed a generative model of decision making which explained bimodal neural response characteristics for sensory detection tasks in locust olfactory circuits.

SOFTWARE SKILLS

- Languages: Python, R, C++, MATLAB, NEURON Simulator
- ML Libs: PyTorch, TensorFlow, scikit-learn, spaCy, NLTK, OpenCV
- Database Manipulation: SQL, Postgres, pandas, sqlalchemy, dplyr
- Big Data Technologies: Hadoop ecosystem, Spark, MLlib
- Cloud Deployment: AWS EC2, S3, Lambda, SageMaker, Flask
- Containerization and Automation: Docker, Ansible, AirFlow
- Visualization: Matplotlib, seaborn, ggplot2, Plot.ly, Qt
- DevOps: Git, Github, TravisCI, Codecov, unit testing - pytest
- Misc: Jupyter Notebook, REST api, shell scripting, PBS, SLURM
- Operating System: Unix (CentOS, Ubuntu, macOS), Windows

Open-source contribution: **AllenSDK**, **eFEL**

Python, R, scikit-learn

SQL, PyTorch, TensorFlow

C++, Spark

EDUCATION

- Ph.D., Electrical Engineering, Washington University, St. Louis, MO, USA, 2012-2017, GPA: 3.95/4
- B.E., Electrical Engineering, Jadavpur University, Kolkata, India, 2008-2012, GPA: 4/4

SELECTED PUBLICATIONS

- A. Nandi et al, Control analysis and design for statistical models of spiking networks; IEEE TCNS.

PERSONAL INFO

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Google Scholar: www.tinyurl.com/anandischolar

TECHNICAL SKILLS

- Deep/Machine Learning
- Data Analysis, Visualization
- Statistical Modeling, Optimization
- Computational Neuroscience
- Algorithms, Software Development
- High Performance Computing (HPC)
- Cloud Computing & Deployment

ML EXPERIENCE

• Supervised: Generalized Linear Models, SVM, Decision Trees, Random Forest, XGBoost, Naive Bayes
• Unsupervised: k-Means, Mixture Models, Dendrograms, t-SNE, UMAP, Anomaly detection, Recommender Systems
• Computer Vision: ResNet, Object Detection: FCNN, YOLO, Semantic segmentation: U-net, DeepLabv3
• NLP: LDA, RNN, LSTM, GloVe, BERT

AWARDS

• Student travel award for presentation at IEEE Conference on Decision and Control (CDC), 2014.
• Scholarship for College and University Students, Government of India (2008-2012).

TALKS

• *"Enlightening the Chandelier"* at Allen Institute Showcase, Seattle, USA, November 2019 (**YouTube**)
• Invited Talk at SIU Mathematics Conference, Southern Illinois University, Carbondale, USA, May 2017 **(Link)**