

Yiming Shen, Ph.D.

Applied ML Scientist

Time-Series Modeling | Model Evaluation | Distribution Shift

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I develop methods and research software for evaluating and adapting models when data changes. My Ph.D. work used EEG time series to study transfer across sessions and participants, source selection, and adaptation versus retraining. I build reproducible Python/R tools and leakage-controlled evaluations; my first-author research is published in *Frontiers in Human Neuroscience*. Earlier industry work covered sensor data, MySQL performance, and operational reporting.

Core Expertise

- **ML and statistics:** Time-series classification; distribution shift; transfer learning and domain adaptation; model selection; mixed-effects models; nested cross-validation; accuracy-cost tradeoffs.
- **Programming:** Python (NumPy, SciPy, pandas, scikit-learn, PyTorch, statsmodels, Streamlit); R and R package development; SQL; Bash.
- **Research software:** CLI/Python APIs, reproducible experiments, Git/GitHub Actions CI, Linux, Docker, AWS; MNE-Python, MOABB, and pyRiemann for EEG analysis.

Research and Industry Experience

Doctoral Researcher

Sep 2019 - Aug 2026

University of Massachusetts Boston

Boston, MA

- Designed matched leave-one-session-out benchmarks for cross-session EEG classification using Stieger2021 (62 participants) and BNCI2014-004. Compared feature, classifier, and adaptation configurations while keeping final-test labels out of model selection and recording each session's role.
- Developed a confidence-gated method for selecting historical training sessions. On Stieger2021, it achieved selected accuracy in the range of full and distance-weighted pooling, using approximately **37% of full pooling's complete benchmark-search runtime**.
- Built reusable Python/R tools for feature extraction, adaptation, drift measurement, experiment execution, and statistical reporting, connecting research methods to inspectable software.

Data Engineer

Jul 2014 - Aug 2016

China Mobile IoT Company Limited

Chongqing, China

- Managed GB-scale sensor time series in MySQL; improved heavy aggregation queries through indexing and partitioning to keep reporting within SLA limits. Built network-health dashboards and automated operational reports.

Featured Project: ShiftDx

Separating model degradation, adaptation benefit, and retraining gaps

[Code](#) | [Demo](#)

- Built an **offline analysis dashboard** comparing an initial-session model with domain-adapted and target-session-retrained alternatives on later EEG sessions. Used a fixed reference and five shift metrics to inspect subject trajectories, adaptation gains or harms, and remaining retraining gaps.
- Implemented interactive statistical summaries with Python, Streamlit, Plotly, pandas, statsmodels, and scikit-learn, making evaluation results inspectable beyond aggregate accuracy.

Selected ML and Scientific Software

CrossDA

GitHub

Reproducible transfer-learning experiments | Python, MOABB, MNE-Python, pyRiemann

- Built a CLI and Python API for four cross-session pipeline families (MAP, DWP, MMP, and BDP). Configurable feature, classifier, adaptation, source-utilization, and distance-method banks support reproducible matched experiments.
- Produced per-subject summaries, detailed run records, and auditable session-role outputs so source use, configuration choices, and evaluation results can be traced.

NeuroStream

GitHub

EEG replay and progressive evaluation | Python, MOABB, MNE-Python, pyRiemann

- Built a **sample-paced pseudo-online replay** application with CSP, filter-bank CSP, tangent-space LDA/SVM, Euclidean alignment, background inference, and progressive confidence and performance visualization.

Scientific Software Ecosystem

Portfolio

- Developed **10+ open-source R/Python libraries and applications**, including DA4BCI, DA4BCI-Python, BCIFeatR, eegwhiten, MSDA-Bench, TensorEEG, and ShiftLens. Contributions cover train/test-separated feature extraction, whitening, domain adaptation, shift metrics, synthetic-data fidelity auditing, and benchmark inspection.

Kaggle HMS: Biomedical EEG Classification

2024

- Built a six-class harmful brain-activity classifier using log-mel spectrograms and EfficientNet B0–B2 ensembles in PyTorch. Earned a **Silver Medal: 98 of 2,767 teams (top 4%)**.

Selected Research

- **Shen Y** and Degras D (2026). A confidence-gated source selection strategy for cross-session transfer in brain-computer interfaces. *Front. Hum. Neurosci.* 20:1895016. doi: 10.3389/fnhum.2026.1895016. **Published.**
- **Shen, Y.** Small Calibration Cohorts Do Not Reliably Select Motor-Imagery EEG Systems for New Participants. *Manuscript under review.* Compares CSP+LDA, Riemannian tangent-space, and EEGNet systems for new participants using final accuracy and execution cost.

Education

University of Massachusetts Boston

Aug 2026

Ph.D. in Computational Sciences

Boston, MA

Valparaiso University

May 2018

M.S. in Analytics and Modeling

Valparaiso, IN

Chongqing University

Jun 2014

B.S. in Electronic Information Engineering

Chongqing, China

Selected Presentations

- **Poster:** Cross-Session BCI Transfer: A Matched Comparison of Global and Selective Pooling. ENAR 2026 Spring Meeting, Indianapolis, IN, Mar 2026.
- **Invited talk:** Benchmarking Classification Pipelines Within and Across Sessions on the PhysioNet EEG Dataset. MIND Seminar, Inria, France, Jun 2025.