




Milena Rmus

 github.com/MilenaCCNlab |  milena_rmus@berkeley.edu |  Berkeley, California

EDUCATION

University of California, Berkeley

PhD, Cognitive Science

Aug. 2019 – May 2024 (Expected)

Berkeley, CA

Brown University

BS, Cognitive Neuroscience (Magna Cum Laude)

Aug. 2014 – May 2018

Providence, RI

EXPERIENCE

Lawrence Livermore National Laboratory

Data Science Intern

May 2022 – Aug. 2022

Livermore, CA

- Added multi-objective/pareto optimization capabilities to the Deep Symbolic Regression framework (designed to discover concise mathematical expressions underlying provided data sets) in TensorFlow; **pareto-optimized framework discovered simpler and more accurate mathematical expressions**. DSR has since been implemented for optimizing amino acid sequences.
- Trained random forest models in Python (Scikit-learn) to classify protein compound binding affinity based on molecular descriptors, **with an area under ROC curve of .88 - suggesting good classification performance**.

Princeton University

Research Specialist

Jun. 2018 – Jun. 2019

Princeton, NJ

- Collaborated with a principal investigator and postdoctoral researcher to **conceptualize, execute and write a research paper** on the project contrasting the impact of mental state dynamics (transitions between states) and static features (e.g. associated facial expressions) on mental state representation
- Developed a web app hosted on amazon mechanical turk in JavaScript** (jQuery, jsPsych) to run psychological experiments on mental state dynamics, and stored data on Firebase
- Utilized machine learning tools (SVM classifiers, PCA, clustering) in Python and R to analyze behavioral data from online experiments
- Ran fMRI multivoxel pattern analysis (MVPA) using classification algorithms (SVM) for decoding fMRI signals and representational similarity analysis in Matlab; **found that retrosplenial cortex showed most dissimilar functional activity when participants imagined likely vs unlikely events**

SKILLS

Languages: Python, Matlab, JavaScript, R, SQL, LaTeX

Frameworks and tools: Pandas, Keras, TensorFlow, NumPy, Scikit-Learn, jQuery, jsPsych, Matplotlib, Seaborn, ggplot2, Git, Notion, Trello, Adobe Illustrator, Adobe Photoshop

TRAINING

University of California, Berkeley

Graduate Certificate in Applied Data Science

Aug. 2021 – Dec 2022

Berkeley, CA

SELECTED PROJECTS

Using artificial neural networks for fitting cognitive models

- Simulated artificial agents based on generative cognitive models (reinforcement learning, Bayesian inference) in Python
- Estimated cognitive model parameters with traditional Maximum Likelihood Estimation and Approximate Bayesian Computation as benchmarks. Conducted model comparison using likelihood-based (AIC/BIC) metrics.
- Created and trained custom LSTM and GRU neural networks in Keras/TensorFlow for cognitive model parameter estimation and model identification. **Achieved 3x higher accuracy and 4x faster performance in parameter estimation, and nearly 2x better accuracy and at least 3x faster speed in model identification compared to traditional methods**

Exploring Hierarchical Reinforcement Learning: Subgoal Discovery and Seamless Transferability

- The project focused on exploring how individuals discover subgoals within the hierarchical reinforcement learning framework, which enhances generalization of learned skills by breaking complex tasks into manageable sub-components using pseudo-reinforcing subgoals
- Developed an interactive web app hosted on Jetstream2 that implemented an experiment on hierarchical reinforcement learning in JavaScript**
- Analyzed human behavior data using statistics and machine learning tools (regression, PCA) in Python and **created data visualizations using Matplotlib and Seaborn**
- Evaluated theoretical predictions about hierarchical reinforcement learning mechanisms by simulating data from various generative computational cognitive models with differing assumptions, and comparing simulated and observed data patterns