Nicholas **Ketz**, PhD

Applied Research Scientist: Machine Learning, Data Analysis, Human Studies

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Summary | Applied scientist developing machine learning solutions to advanced research problems. Interests in: understanding and developing intelligent systems (human and artificial); analysis and visualization of complex, high-dimensional data; quantitative approaches to art, music and aesthetics. Experience in academic and industrial approaches to research, product development and human studies.

EDUCATION/EMPLOYMENT

HRL Laboratories | Research Scientist: Information and Systems Sciences 09/2016 - Present

University Colorado, Boulder | PhD: Computational Cognitive Neuroscience 09/2010 - 09/2016

New York University | Research Assistant: Davachi Human Memory Lab 09/2007 - 07/2010

University Minnesota, Twin Cities | BA:Physics, minor:Psychology 09/2003 - 06/2007

McNally Smith College of Music | AAS:Music Recording/Production Engineer 09/2000 - 05/2002

RELEVANT EXPERIENCE

Model Based Reinforcement Learning | Agent based domain adaptation 01/2020 - Present

Lifelong Deep Learning | Sequential multi-task learning in deep neural networks 09/2018 - Present

Closed-loop Neural Stimulation | Device/algorithm development in humans 09/2016 - 06/2018

Cognitive Neuroimaging | Experimental design/analysis of EEG and fMRI 09/2007 - 09/2018

Biologically Inspired Neural Networks | Vision, Memory and Attention 09/2006 - 09/2016

TECHNICAL SKILLS

Deep Learning | Convolutional, Recurrent, and Generative Neural Networks. Deep Reinforcement Learning (model-free and model-based). Unsupervised learning (auxiliary tasks, semi-supervised)

Machine Learning | Non-differentiable Optimization (CMA-ES, MCMC), Probabilistic Inference (Clustering, Gaussian Process, Bayesian Optimization), Unsupervised Learning (KNN, PCA, ICA, t-SNE, UMAP)

Statistics | Parametric and non-parametric inference in linear and non-linear models: GLM, Random Effects, Bayesian, A/B (hypothesis) testing, time-series analysis, experimental design

Programming/Computing Packages | Python (PyTorch, Tensorflow, Numpy, Scipy, Scikit-Learn, OpenCV, Jupyter/Collab), MATLAB, R, bash, CUDA GPU, Git, Docker, Kubernettes, AWS, Azure

SELECT PUBLICATIONS/PATENTS

US Patent 2020 | System and method for optimized independent component selection for automated signal artifact removal to generate a clean signal

Nicholas Ketz, Matthew E Phillips, Praveen K Pilly; Scalable solution for removal of nuisance components in time-series data

ICLR 2019 | Sliced cramer synaptic consolidation for preserving deeply learned representations

Soheil Kolouri, **Nicholas Ketz**, Andrea Soltoggio, Praveen K. Pilly; A novel framework for overcoming catastrophic forgetting by preserving the distribution of the network's output at an arbitrary layer

Journal of Neruoscience 2018 | Closed-Loop Slow-Wave tACS Improves Sleep-Dependent Long-Term Memory Generalization by Modulating Endogenous Oscillations

Nicholas Ketz, Aaron P. Jones, Natalie B. Bryant, Vincent P. Clark and Praveen K. Pilly; Brain-computer-interface for improving learning and memory using non-invasive neural stimulation during sleep