Teddy Koker

CONTACT

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https://teddykoker.com
https://github.com/teddykoker

EDUCATION

Worcester Polytechnic Institute, Worcester, MA — Sep. 2016 – Dec. 2019
Bachelor of Science in Computer Science

PROFESSIONAL EXPERIENCE

Massachusetts Institute of Technology, Lincoln Laboratory — Apr. 2021 – Present
Associate Staff, AI Technology Group
Developed methods for contrastive representation learning of crystalline materials with graph neural networks. Researched domain adaptation for neural networks in collaboration with Harvard Medical School. Created a deep learning model to detect early infection of SARS-CoV-2 from wearable device data.

Lightning AI — Aug. 2020 – Feb. 2021
Machine Learning Research Engineer
Co-created `torchmetrics` package, complete with efficient and scalable implementations of popular evaluation metrics. Led project on model interpretability, introducing a new way of generating pixel level saliency maps. Assisted with research focusing on self-supervised learning of image representations through Variational Autoencoders.

Harvard Medical School — Dec. 2019 – Aug. 2020
Machine Learning Research Associate
Conducted research within the Image and Data Analysis Core. Created deep learning model to detect manipulation of microscopy images. Proposed a novel approach to biomedical image retrieval.

SELECT PUBLICATIONS

Encoding Time-Series Explanations through Self-Supervised Model Behavior Consistency.
Owen Queen, Thomas Hartvigsen, **Teddy Koker**, Huan He, Theodoros Tsiligkaridis, Marinka Zitnik.
NeurIPS, 2023 (spotlight)

Domain Adaptation for Time Series Under Feature and Label Shifts.
Huan He, Owen Queen, **Teddy Koker**, Consuelo Cuevas, Theodoros Tsiligkaridis, Marinka Zitnik.
International Conference on Machine Learning (ICML), 2023

Graph Contrastive Learning for Materials.
Teddy Koker, Keegan Quigley, Will Spaeth, Nathan Frey, and Lin Li.
NeurIPS AI for Accelerated Materials Design Workshop, 2022.

AAVAE: Augmentation-Augmented Variational Autoencoders.
William Falcon, Ananya Harsh Jha, **Teddy Koker**, and Kyunghyun Cho.
arXiv preprint.

U-Noise: Learnable Noise Masks for Interpretable Image Segmentation.
T. Koker, F. Mireshghallah, T. Titcombe, and G. Kaissis.
International Conference on Image Processing (ICIP), 2021.

On Identification and Retrieval of Near-Duplicate Biological Images: A New Dataset and Protocol.
T. Koker*, S.S. Chintapalli*, S. Wang, B.A. Talbot, D. Wainstock, M. Cicconet, M.C. Walsh.
International Conference on Pattern Recognition (ICPR), 2020.

TALKS

Deep Learning for Detection of COVID-19 with Commercial Wearables
MIT Lincoln Laboratory, Recent Advances in AI for National Security — Nov. 2021
DTRA Chemical and Biological Defense Science & Technology Conference — Dec. 2022

Higher Order Equivariant Graph Neural Networks for Charge Density Prediction
MIT GraphEx Symposium — Aug. 2023

Personal Writing

Learning to Learn with JAX	Apr. 2022
Performers: The Kernel Trick, Fourier Features, and Attention	Dec. 2020
Deep Learning for Guitar Effect Emulation	May. 2020
NLP from Scratch: Annotated Attention	Feb. 2020

Select Code

Torchsort, `https://github.com/teddykoker/torchsort`, 700+ stars
PyTorch library implementing the *Fast Differentiable Sorting and Ranking* algorithm, optimized with custom C++ and CUDA extensions.

Torchmetrics, `https://github.com/lightning-ai/metrics`, 1.6k+ stars
Machine learning metrics for distributed and scalable PyTorch applications.

Image GPT, `https://github.com/teddykoker/image-gpt`, 200+ stars
PyTorch implementation of *Generative Pretraining from Pixels*, including additional experiments on MNIST and CIFAR datasets. Early example demonstrating the usability of *Transformers* on images in a compute-limited setting.