Branton DeMoss

Summary Interested in the intersection of classical planning with deep-learning based world modeling to build autonomous agents that can think ahead to act in the world.

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Education

DPhil Candidate in Artificial Intelligence 2021-
University of Oxford

BA Mathematics and Physics 2014-18
University of Colorado Boulder

Experience

Oxford Robotics Institute 2021-
Graduate Student Researcher
- Research in reinforcement learning, world modeling, and planning.

The Collaboratory 2020-
Co-founder; Chief Science Officer
- Developed deep-learning based document embedder based on language and graph structure, and related algorithms for knowledge curation.
- Led product strategy, ML R&D, and customer-informed design.
- Admitted to Techstars class of 2021 ($< 1\%$ applicants admitted).

Comma.ai 2020
ML Research Intern
- Extended vision module architecture and ported recurrent neural network for driving policy from Tensorflow to PyTorch.
- Studied effects of new stochastic dynamics model on driving policy quality.

Front Range Geosciences 2017-20
Research Scientist
- Developed convolutional neural network (CNN) to detect seismic first break events. System in production at multinational seismic exploration corporations.
- Incorporated differentiable Gaussian mixture models in deep learning system to model energy-time uncertainty in wavelet arrival.
- Developed Generative Adversarial Network (GAN) to pre-train CNN when supervisory targets unavailable.
- Wrote eikonal wave equation propagator (C++) for psuedo-structured 3D meshes for tomographic seismic imaging.

Center for Theory of Quantum Matter 2017
Research Assistant
- Studied quantum many-body localization (MBL) under Floquet conditions.

Mathematics Department, CU Boulder 2016
Research Assistant
- Investigated knot-theoretic properties of topological quantum field theories.

High Enery Particle Physics Group, Physics Department, CU Boulder 2014-15
Research Assistant

- Characterized effects of beamline material geometry on particle correlation statistics for the Deep Underground Neutrino Experiment (DUNE).

Publications

Combining physics and deep learning to automatically pick first breaks in the Permian Basin 2021
First International Meeting for Applied Geoscience & Energy

Ein Liebesbrief an KataGo 2020
Deutsche Go Zeitung, Ausgabe 4/2020

Love Letter to KataGo, or: Go AI Past, Present, and Future 2020
American Go E-Journal

DeepTrace: A breakthrough application of deep learning to automate first break picking 2019
SEG 2019 Lenovo Thought Leadership Series

Topology and Knot Theory 2016
Course notes for CU Boulder special topics course:
"Topology, Knot Theory, and their applications in Physics and Chemistry"

Secondary Particle Showers from Hadron Absorber Interactions 2016
Deep Underground Neutrino Experiment (DUNE) Collaboration Documents

Awards

Research Studentship Oxford, 2021
Stribic-Martin Scholarship Boulder, 2017
UROP Fellowship Boulder, 2017
Dawkins Fund Award Oxford, 2016
Gilman Scholarship Oxford, 2016
Esteemed Scholar Award Boulder, 2014