

JUNZE LIU

(217) 305-1016 ◊ 6103 Palo Verde Rd, Irvine, CA 92617

junzell@uci.edu ◊ junzeliu.github.io

OBJECTIVE

PhD candidate specializing in Machine Learning, under supervision of Prof. Pierre Baldi. Research interests are in computer vision, deep learning, and its applications in science.

EDUCATION

University of California, Irvine Sept. 2019 - Present
Ph.D. in Computer Science GPA: 4.0/4.0

- Courses: Artificial Intelligence in Biology and Medicine, Introduction to Machine Learning, Statistical Natural Language Processing

University of Illinois at Urbana-Champaign Aug. 2016 - May. 2018
M.Eng. in Computer Engineering GPA: 3.7/4.0

- Courses: Computer Vision, Artificial Intelligence, Pattern Recognition, Parallel Programming, Distributed System, Interactive Computer Graphic, Virtual Reality

Shandong University Sept. 2012 - June 2016
B.E. in Communication Engineering GPA: 86.6/100

- Courses: Data Structure & Database Technologies, Digital Image Processing, Digital Signal Processing

SKILLS

Programming Languages Java, Python, C/C++, CUDA, C#, JavaScript, HTML5, CSS3
Tools & Platforms Tensorflow, PyTorch, Git, WebGL, Unity3D, Matlab, AWS S3

WORK EXPERIENCE

Applied Scientist Intern June 2023 - Sept 2023
Amazon Seattle, WA

- Explored causal discovery algorithms and applied them to enhance buyer risk prediction.
- Developed unsupervised causal discovery algorithms to uncover structural causal models within features, improving model explainability and feature selection.
- Implemented causal structure learning to improve cross-domain generalization of supervised classification, resulting in a significant 12% increase in AUC.

Research Assistant July 2018 - Dec 2018
Jcube Syosset, NY

- Developed an action understanding tool based on ConvLSTM related architectures, including human poses interaction recognition.
- Improved state-of-the-art accuracy of video scene recognition by introducing decision layers.
- Improved the cross-domain robustness by introducing weakly supervised classification of video scenes.

Technology Intern June 2017 - Aug. 2017
Ekistic Ventures Chicago, IL

- Implemented a Region CNN model for illegal items recognition, adjusted to variant surveillance videos.
- Decreased false positive rate by adding multi-phase architecture to predict body-item relations.
- Designed a region labelling interface, and built a real-time tool, which is an end-to-end pipeline accepting video streams and outputting recognition results.

RESEARCH EXPERIENCE

Deep-Learning-based Neutrino Kinematic Reconstruction

University of California, Irvine

Ongoing

Prof. Pierre Baldi

- Developed 2D and 3D CNN-based models for energy and direction regression of leptons (electron and muon) produced from neutrino interactions to reconstruct the neutrino momentum.
- Implemented Sub-manifold Sparse CNN models to improve the computation and memory efficiency when processing high-dimensional data.

3D Surgical Tool Dataset for Retinal Eye Surgeries

University of California, Irvine

Ongoing

Prof. Pierre Baldi

- Introduced the first dataset from videos recorded during eye surgeries for surgical tool detection and classification in eye surgeries in 3 dimensions.
- Developed two models based on YOLOv8 for the tool tip detection and tool depth classification to facilitate computer-assisted interventions and surgical skill assessment.

Geometry-aware Sparse Autoregressive Models for Multi-layer Calorimeter Shower Simulation

University of California, Irvine

Feb. 2022 - Nov. 2023

Prof. Pierre Baldi

- Built autoregressive models using machine learning algorithms to provide fast and high-quality calorimeter shower simulated data generation for high-energy physics.
- Designed a framework allowing the autoregressive model to adaptively generate multi-layer calorimeter data of different geometries.

SELECTED PUBLICATIONS

Machine Learning-Enhanced Prediction of Surface Smoothness for Inertial Confinement Fusion Target Polishing Using Limited Data

Antonios Alexos, **Junze Liu**, Akash Tiwari, Kshitij Bhardwaj, Sean Hayes, Pierre Baldi, Satish Bukkapatnam, Suhas Bhandarkar

AIM 2024: Machine Learning Simulations, Cleveland, OH, United States, June 20, 2024

Generalizing to new geometries with Geometry-Aware Autoregressive Models (GAAMs) for fast calorimeter simulation

Junze Liu, Aishik Ghosh, Dylan Smith, Pierre Baldi, Daniel Whiteson

Journal of Instrumentation, 2023

Vitreoretinal surgical instrument tracking in 3-Dimensions using Deep Learning

(* indicates equal contribution)

Sherif Abdelkarim*, Marialejandra Diaz Ibarra*, **Junze Liu***, Josiah K. To*, Pierre F. Baldi, Anjali Herekar, Baruch D. Kuppermann, Andrew W. Browne

Translational Vision Science & Technology, 2023

Automated detection of the spatial location of vitreoretinal instruments from retinal images using Deep Learning methods

Marialejandra Diaz Ibarra, Josiah K To, **Junze Liu**, Sherif Abdelkarim, Anjali Herekar, Baruch D Kuppermann, Pierre Baldi, Andrew Browne

Investigative Ophthalmology & Visual Science

Deep-Learning-Based Kinematic Reconstruction for DUNE

Junze Liu, Jordan Ott, Julian Collado, Benjamin Jargowsky, Wenjie Wu, Jianming Bian, Pierre Baldi

NeurIPS Workshop on Machine Learning and the Physical Sciences, Vancouver, Canada, Dec 11, 2020

Calorimetry with deep learning: particle simulation and reconstruction for collider physics
(Primary contribution - authors are listed in alphabetical order as per the standard in particle physics)
Dawit Belayneh, Federico Carminati, Amir Farbin, Benjamin Hooberman, Gulrukh Khattak, Miaoyuan Liu, **Junze Liu**, Dominick Olivito, Vitória Barin Pacela, Maurizio Pierini, Alexander Schwing, Maria Spiropulu, Sofia Vallecorsa, Jean-Roch Vlimant, Wei Wei, Matt Zhang
The European Physical Journal C, 2020

High-Salt Diet-Induced Gastritis in C57BL/6 Mice is Associated with Microbial Dysbiosis and Alleviated by a Buckwheat Diet
Ya Li, Wen Li, Xiao Wang, Chao Ding, **Junze Liu**, Yan Li, Wenjuan Li, Yundong Sun
Molecular Nutrition Food Research, 2020

Hydrogen sulfide-mediated resistance against water avoidance stress-induced gastritis by maintenance of gastric microbial homeostasis
Yingnan Han, Ya Li, Zhekai Hu, Xiao Wang, **Junze Liu**, Xue Ren, Yanbo Yu, Yan Li, Wenjuan Li, Yundong Sun
MicrobiologyOpen, 2019

PUBLICATIONS AFFILIATED WITH FERMILAB

Doping liquid argon with xenon in ProtoDUNE Single-Phase: effects on scintillation light
A. Abed Abud, et al. (DUNE Collaboration)
arXiv, 2024

The DUNE Far Detector Vertical Drift Technology, Technical Design Report
A. Abed Abud, et al. (DUNE Collaboration)
arXiv, 2024

Reconstruction of interactions in the ProtoDUNE-SP detector with Pandora
A. Abed Abud, et al. (DUNE Collaboration)
European Physical Journal C, 2023

Impact of cross-section uncertainties on supernova neutrino spectral parameter fitting in the Deep Underground Neutrino Experiment
A. Abed Abud, et al. (DUNE Collaboration)
Physical Review D, 2023

Highly-parallelized simulation of a pixelated LArTPC on a GPU
A. Abed Abud, et al. (DUNE Collaboration)
Journal of Instrumentation, 2023

DUNE Offline Computing Conceptual Design Report
A. Abed Abud, et al. (DUNE Collaboration)
arXiv, 2022

Separation of track-and shower-like energy deposits in ProtoDUNE-SP using a convolutional neural network
A. Abed Abud, et al. (DUNE Collaboration)
The European Physical Journal C, 2022

Scintillation light detection in the 6-m drift-length ProtoDUNE Dual Phase liquid argon TPC
A. Abed Abud, et al. (DUNE Collaboration)
The European Physical Journal C, 2022

Design, construction and operation of the ProtoDUNE-SP Liquid Argon TPC
A. Abed Abud, et al. (DUNE Collaboration)
Journal of Instrumentation, 2022

Low exposure long-baseline neutrino oscillation sensitivity of the DUNE experiment

A. Abed Abud, et al. (DUNE Collaboration)

Physical Review D, 2022

A Gaseous Argon-Based Near Detector to Enhance the Physics Capabilities of DUNE

B. Abi, et al. (DUNE Collaboration)

arXiv, 2022

Snowmass Neutrino Frontier: DUNE Physics Summary

B. Abi, et al. (DUNE Collaboration)

arXiv, 2022

Design, construction and operation of the ProtoDUNE-SP Liquid Argon TPC

B. Abi, et al. (DUNE Collaboration)

Journal of instrumentation, 2022

Searching for solar KDAR with DUNE

A. Abed Abud, et al. (DUNE Collaboration)

Journal of Cosmology and Astroparticle Physics, 2021

Deep underground neutrino experiment (DUNE) near detector conceptual design report

A. Abed Abud, et al. (DUNE Collaboration)

Instruments, 2021

Supernova neutrino burst detection with the Deep Underground Neutrino Experiment

B. Abi, et al. (DUNE Collaboration)

The European Physical Journal C, 2021

Prospects for beyond the Standard Model physics searches at the Deep Underground Neutrino Experiment

B. Abi, et al. (DUNE Collaboration)

The European Physical Journal C, 2021

Experiment simulation configurations approximating DUNE TDR

B. Abi, et al. (DUNE Collaboration)

arXiv, 2021

Searching for solar KDAR with DUNE

B. Abi, et al. (DUNE Collaboration)

Journal of Cosmology and Astroparticle Physics, 2021

First results on ProtoDUNE-SP liquid argon time projection chamber performance from a beam test at the CERN Neutrino Platform

B. Abi, et al. (DUNE Collaboration)

Journal of Instrumentation, 2020

Neutrino interaction classification with a convolutional neural network in the DUNE far detector

B. Abi, et al. (DUNE Collaboration)

Physical Review D, 2020

Long-baseline neutrino oscillation physics potential of the DUNE experiment

B. Abi, et al. (DUNE Collaboration)

The European Physical Journal C, 2020

Volume IV. The DUNE far detector single-phase technology

B. Abi, et al. (DUNE Collaboration)

Journal of Instrumentation, 2020

Volume III. The DUNE far detector single-phase technology

B. Abi, et al. (DUNE Collaboration)

Journal of Instrumentation, 2020

Volume I. The DUNE far detector single-phase technology

B. Abi, et al. (DUNE Collaboration)

Journal of Instrumentation, 2020

PUBLICATIONS AFFILIATED WITH ARIANNA

Triboelectric backgrounds to radio-based UHE neutrino experiments

B. Abi, et al. (ARIANNA Collaboration)

Astroparticle Physics, 2023

Measuring the polarization reconstruction resolution of the ARIANNA neutrino detector with cosmic rays

A. Anker, et al. (ARIANNA Collaboration)

Journal of Cosmology and Astroparticle Physics, 2022

Polarization Reconstruction of Cosmic Rays with the ARIANNA Neutrino Radio Detector

A. Anker, et al. (ARIANNA Collaboration)

International Cosmic Ray Conference, 2022

A novel trigger based on neural networks for radio neutrino detectors A. Anker, et al. (ARIANNA Collaboration)

International Cosmic Ray Conference, 2022

Capabilities of ARIANNA: Neutrino pointing resolution and implications for future ultra-high energy neutrino astronomy

A. Anker, et al. (ARIANNA Collaboration)

International Cosmic Ray Conference, 2022

Improving sensitivity of the ARIANNA detector by rejecting thermal noise with deep learning

A. Anker, et al. (ARIANNA Collaboration)

Journal of Instrumentation, 2022

SELECTED TALKS

Deep-learning Event Reconstruction in DUNE Far Detector

12th April 2024

The Second Wire-Cell Reconstruction Summit at Brookhaven National Laboratory

Upton, NY

AI in Ophthalmology

7th February 2024

Vision Research Mixer at University of California, Irvine

Irvine, CA

Deep-learning-based Kinematic Reconstruction for DUNE

16th March 2021

CFPU SMLI Seminar at Brown University

Providence, RI

ACADEMIC SERVICES

Program Committee

· ECML-PKDD: The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases

2024

· Machine Learning and the Physical Sciences Workshop at NeurIPS

2021, 2022, 2023

Reviewer

- Synthetic Data for Computer Vision Workshop at CVPR 2024
- ECML-PKDD: The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases 2024
- KDD: ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2023

SELECTED AWARDS / SCHOLARSHIPS

- CS Travel Grants from Donald Bren School of Information and Computer Sciences 2022 2023
- Dean's Awards from Donald Bren School of Information and Computer Sciences 2019
- The Second Prize Scholarship, Shandong University 2013 2014
- Outstanding Overseas Student with Scholarship, Shandong University Dec 2013