

Jhoan Keider Hoyos-Osorio

Machine Learning Research Scientist

8599674355 | keider.hoyos@uky.edu | [linkedin.com/in/jkhoyos/](https://www.linkedin.com/in/jkhoyos/) | <https://github.com/KeiderHoyos>

Career Summary

I am a Ph.D. candidate and dedicated Machine Learning Scientist with 8 years of experience in developing and deploying advanced machine learning models. Specializing in information theory, signal processing, deep learning, and Computer Vision, I excel in creating innovative algorithms that significantly boost model performance. Published and presented research at leading conferences such as ICASSP and NeurIPS. Highly skilled in Python and major machine learning frameworks such as Pytorch, with a strong focus on innovative research and practical deployment of AI technologies.

Education

Ph.D. Electrical Engineering , <i>University of Kentucky</i>	Lexington, KY Expected: 09/2024
M.Sc. Electrical Engineering , <i>Technological University of Pereira</i>	Pereira, Colombia 12/2019
B.S. Physics Engineering , <i>Technological University of Pereira</i>	Pereira, Colombia 10/2016

Experience

Research Scientist , <i>University of Kentucky</i>	Lexington, KY , 01/2021 - Present
<ul style="list-style-type: none">Researched and developed an information-theoretic framework to boost <i>representation learning</i> in deep neural networks using novel entropy, mutual information, and divergences estimators based on <i>kernel methods</i>.Enhanced image classification accuracy and robustness on datasets over 10 million images, by developing advanced self-supervised learning, transfer learning, and domain adaptation algorithms.Researched and implemented novel algorithms for synthetic image generation using Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs), increasing image diversity and improving clustering accuracy to 98%.Authored 3 research articles and presented research findings at top-tier conferences such as ICASSP, 2022 and NeurIPS, 2023.	
Data Scientist , <i>Technological University of Pereira</i>	Pereira, Colombia , 01/2019 - 12/2020
<ul style="list-style-type: none">Constructed and managed the university's first comprehensive database for dropout prediction, encompassing over 100,000 socio-academic data points, enabling data-driven insights into academic and behavioral trends.Trained and deployed the university's first predictive machine learning model that accurately identifies students at risk of dropping out, achieving up to 80% classification accuracy, significantly reducing dropout rates through targeted retention strategies.	
Research Scientist , <i>Technological University of Pereira</i>	Pereira, Colombia , 01/2016 - 12/2019
<ul style="list-style-type: none">Developed a Magnetic Resonance Images (MRIs) segmentation algorithm for brain lesion detection, increasing classification sensitivity to 95% and enhancing diagnostic precision in medical imaging.Engineered a time-series prediction algorithm for epileptic seizures using EEG and ECG signals with 94% accuracy, contributing to early warning for enhanced patient care.Proposed a novel information-theoretic subsampling algorithm for imbalanced data classification in tabular data, achieving an average accuracy rate of 94%.Authored 5 research articles at top-tier journals such as Neurocomputing and international conferences like CIARP and IWAIPR.	

Skills

Machine Learning Techniques: Deep Learning, Computer Vision, Representation Learning, Transfer Learning, Domain Adaptation, Self-supervised Learning, Signal Processing, Time Series Analysis, Natural Language Processing, Generative AI, Large Language Models, Transformers, Data Science, Probability, Statistics, Information Theory, Applied Mathematics.

Programming Languages: Python, C, C++, Matlab

Frameworks and Tools: PyTorch, TensorFlow, Scikit-learn.

Languages: English, Spanish

Publications

- Hoyos-Osorio, J. K., Et al. (2022). *"The Representation Jensen-Rényi Divergence"*. IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP.
- Hoyos-Osorio, J. K., Et al. (2022). *"Predictive Model to Identify College Students with High Dropout Rates"*. Revista eletrónica de investigación educativa.
- Hoyos-Osorio, J. K., Et al. (2021). *"Relevant Information Undersampling to Support Imbalanced Data Classification"*. Neurocomputing.
- Hoyos-Osorio, J. K., Et al. (2018). *"Imbalanced Data Classification using a Relevant Information-based Sampling Approach"*. Progress in Artificial Intelligence and Pattern Recognition, IWAIRP.
- Hoyos-Osorio, J. K., Et al. (2018). *"Clustering-based Undersampling to Support Automatic Detection of Focal Cortical Dysplasias"*. Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications, CIARP.
- Hoyos-Osorio, J. K., Et al. (2016). *"Automatic Epileptic Seizure Prediction based on Scalp EEG and ECG Signals"*. IEEE Symposium on signal processing, images, and artificial vision, STSIVA.
- Hoyos-Osorio, Et al. (2023). *"The Representation Jensen-Shannon Divergence"*. arXiv preprint arXiv:2305.16446 (Under review).
- Skean, O., Hoyos-Osorio, J. K., Et al. (2023). *DiME: Maximizing Mutual Information by a Difference of Matrix-Based Entropies"*. arXiv preprint arXiv:2301.08164 (Under review).

Conference and Workshop Presentations

- NeurIPS, 2023, United States: *The Representation Jensen-Shannon Divergence*.
- ICASSP, 2022, Singapore: *The Representation Jensen-Rényi Divergence*.
- IWAIPR, 2018, Cuba: *Imbalanced Data Classification using a Relevant Information-based Sampling Approach*.
- CIARP, 2018, Spain: *Emotion Recognition with Ensemble Using mRMR-Based Feature Selection*.
- CIARP, 2017, Chile: *Clustering-based Undersampling to Support Automatic Detection of Focal Cortical Dysplasias*.
- STSIVA, 2016, Colombia: *Automatic Epileptic Seizure Prediction based on Scalp EEG and ECG Signals*

Certificates

Generative AI with Large Language Models, DeepLearning.AI & AWS

12/2023

Data Analytics, Technological University of Pereira

04/2018