Brayan Monroy

LinkedIn | Google Scholar | GitHub | Colombia

Education

Universidad Industrial de Santander — Bucaramanga, Colombia

PhD. Student in Computer Science — *Feb 2025 – Now*

M.Sc. in Systems Engineering ***GPA: 4.97/5.00*** — *Feb 2023 – Oct 2024*

B.Sc. in Systems Engineering; ***GPA: 4.59/5.00*** — *Feb 2018 – Oct 2022*

Research Experience

High Dimensional Signal Processing Research Group (HDSP) — Bucaramanga Colombia

Researcher — *Dec 2022 – Now*

- Development the dither-based network activation, which enhances Binary Neural Network **accuracy by up to 4.51%** without increasing computational complexity.
- Formulation of adaptive sensing image acquisition protocols for the design of single-pixel compressive optical systems, resulting in an **enhancement of the PSNR score by up to 0.72 dBs** in spectral image datasets.

Undergraduate Research Assistant — *Apr 2021 – Nov 2022*

- Developed a low-dimensional representation learning method for spectral image recovery, enhancing accuracy in compressive spatial-spectral imaging applications and **achieving a 16.5% improvement in PSNR scores.**
- Implementing image processing and deep learning techniques for universal health coverage, development of chronic wounds segmentation models that **enhance F1-score in up to 16%.**

Awards & Achievements

Cum Laude: Universidad Industrial de Santander, Systems Engineering.

Andres Bello Award: Awarded to undergraduate students who have been ranked in the top 50 on National Highschool Exam, Ministry of National Education, Colombia.

Publications

Brayan Monroy, et al. "Designed Dithering Sign Activation for Binary Neural Networks," in IEEE Journal of Selected Topics in Signal Processing, doi: 10.1109/JSTSP.2024.3467926

Brayan Monroy, et al. "Automated chronic wounds medical assessment and tracking framework based on deep learning," Computers in Biology and Medicine 165, doi: 10.1016/j.compbiomed.2023.107335

Brayan Monroy, Jorge Bacca, and Henry Arguello, "Deep Adaptive Superpixels For Hadamard Single Pixel Imaging In Near-Infrared Spectrum," ICASSP 2023 pp. 1-5, doi: 10.1109/ICASSP49357.2023.10095165.

Brayan Monroy, Jorge Bacca, and Henry Arguello, "JR2net: a joint non-linear representation and recovery network for compressive spectral imaging," Appl. Opt. 61, 7757-7766 (2022)

B. Monroy, J. Bacca and H. Arguello, "Deep Low-Dimensional Spectral Image Representation for Compressive Spectral Reconstruction," 2021 IEEE 31st International Workshop on Machine Learning for Signal Processing (MLSP), Gold Coast, Australia, 2021, pp. 1-6, doi: 10.1109/MLSP52302.2021.9596541.

B. Monroy, J. Bacca, K. Sanchez, H. Arguello and S. Castillo, "Two-step Deep Learning Framework for Chronic Wounds Detection and Segmentation: A Case Study in Colombia," 2021 XXIII Symposium on Image, Signal Processing and Artificial Vision (STSIVA), Popayán, Colombia, 2021, pp. 1-6, doi: 10.1109/STSIVA53688.2021.9592008.

Projects

GeneralizedR2R | *GitHub*

- Python implementation of the paper 'Generalized Recorrupted-to-Recorrupted: Self-Supervised Learning Beyond Gaussian Noise".

JR2net | *GitHub*

- Python implementation of the paper "JR2net: A Joint Representation and Recovery Network for Compressive Spectral Imaging".

Skills

Expertise: Mathematical Optimization, Inverse Problems, Self-Supervised Learning.

Programming: Python, MATLAB, C++, Pytorch, Tensorflow, Git

Languages: Spanish (Native), English (Professional)