

Gustavo PÉREZ

Postdoctoral Scholar at UC Berkeley (EECS)–Computer Vision & Machine Learning

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Research interests: Image understanding; Machine learning and human-in-the-loop; AI for science—My research in computer vision and machine learning focuses on finding effective ways to combine human and computational effort to facilitate scientific discovery.

EDUCATION

December 2023	Doctorate of Philosophy in Computer Science GPA : 3.9/4.0
September 2018	University of Massachusetts, Amherst Advisor : Subhransu Maji Computer Vision Lab Thesis : Data to science with AI and human-in-the-loop Committee : Subhransu Maji, Daniel Sheldon, Daniela Calzetti, Erik Learned-Miller
February 2021	Master of Science in Computer Science GPA : 3.9/4.0
September 2018	University of Massachusetts, Amherst Advisor : Subhransu Maji Computer Vision Lab Thesis : Machine learning for star cluster identification* * CICS Outstanding Synthesis Award
June 2018	Master of Science in Biomedical Engineering GPA : 4.6/5.0
January 2016	Universidad de los Andes, Colombia Advisor : Pablo Arbeláez Biomedical Computer Vision Lab Thesis : Automated diagnosis of lung cancer with 3D CNNs* * 1st place at the ISBI 2018 - Lung Nodule Malignancy Prediction, Based on Sequential CT Scans Challenge
September 2008	Bachelor of Science in Electronic Engineering
January 2004	Universidad del Norte, Colombia Thesis : Medulogram Analysis Using Artificial Intelligence

RESEARCH EXPERIENCE

Current Position	Postdoctoral Scholar
January 2024	University of California, Berkeley (EECS) Advisors : Stella Yu & Michael Lustig Berkeley AI Research (BAIR) Lab
Present	Visiting Scholar
January 2024	University of Michigan (CSE)
January 2024	Graduate Research Assistant
January 2019	University of Massachusetts, Amherst (CICS) Advisor : Subhransu Maji Computer Vision Lab
June 2018	Graduate Research Assistant
January 2016	Universidad de los Andes, Colombia Advisor : Pablo Arbeláez Biomedical Computer Vision Lab

SCHOLARSHIPS & AWARDS

October 2021	CICS Outstanding Synthesis Project Award. UMass Amherst, MA
April 2018	1st place at the ISBI 2018 Lung Nodule Malignancy Prediction Challenge. ISBI 2018, Washington DC
September 2017	Fulbright scholarship. Colciencias-Fulbright Cohort 2018, Bogota, Colombia. Funding awarded : \$330.000.000 COP ~\$110.000 USD
December 2016	Best project of the faculty award. EEII 2016, Universidad de los Andes, Bogota, Colombia
September 2008	Distinguished student. Universidad del Norte, Barranquilla, Colombia.

Journal Articles & Conference Proceedings

- February 2024 **Pérez, G., Maji, S., Sheldon, D. DISCount : Counting in Large Image Collections with Detector-Based Importance Sampling.** Association for the Advancement of Artificial Intelligence (AAAI). [Paper](#)
- November 2023 **Correa, S., Pérez, G., Jaramillo, P., Taneja, J. Taking the long view : Enhancing learning on multi-temporal, high-resolution, and disparate remote sensing data.** The 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (ACM BuildSys 2023). [Paper](#)
- July 2023 ***Liu, Y., *Pérez, G., Cheng, Z., Sun, A., Hoover, S., Wei, F. Maji, S., Peng, B. (*equal contribution) ZeoNet : 3D convolutional neural networks for predicting adsorption in nanoporous zeolites.** Journal of Materials Chemistry A. [Paper](#)
- January 2023 **Belotti, M., Deng, Y., Zhao, W., Simons, V., Cheng, Z., Pérez, G., Tielens, E., Maji, S., Sheldon, D., Kelly, J., Horton, K. Long-term analysis of persistence and size of swallow and martin roosts in the US Great Lakes.** Remote Sensing in Ecology and Conservation. [Paper](#)
- October 2022 **Deng, Y., Belotti, M., Zhao, W., Cheng, Z., Pérez, G., Tielens, E., Simons, V., Sheldon, D., Maji, S., Kelly, J., Horton, K. Quantifying long-term phenological patterns of aerial insectivores roosting in the Great Lakes region using weather surveillance radar.** Global Change Biology. [Paper](#)
- August 2022 **Linden, S., Pérez, G., Calzetti, D., Maji, S., Messa, M., Whitmore, B., Chandar, R., Adamo, A., et al. Star Cluster Formation and Evolution in M101 : An Investigation with the Legacy Extragalactic UV Survey.** The Astrophysical Journal. [Paper](#)
- August 2022 **Pérez, G., & Maji, S. Domain Adaptors for Hyperspectral Images.** 26TH International Conference on Pattern Recognition, ICPR. [Paper](#) [Project page](#)
- July 2021 **Balagurunathan, Y., Beers, A., McNitt-Gray, M., Hadjiiski, L., Napel, S., Goldgof, D., Pérez, G., Arbelaez, P., et al. Lung Nodule Malignancy Prediction in Sequential CT Scans : Summary of ISBI 2018 Challenge.** IEEE Transactions on Medical Imaging. [Paper](#)
- February 2021 **Pérez, G., Messa, M., Calzetti, D., Maji, S., Jung, D., Adamo, A., & Siressi, M. StarcNet : Machine Learning for Star Cluster Identification.** The Astrophysical Journal. [Paper](#) [Project page](#)
- June 2020 **Pérez, G., & Arbeláez, P. Automated lung cancer diagnosis using three-dimensional convolutional neural networks.** Medical & Biological Engineering & Computing. [Paper](#) [Project page](#)
- November 2017 **Pérez, G., & Arbeláez, P. Automated Detection of Lung Nodules with Three-dimensional Convolutional Neural Networks.** Proc. SPIE 10572, 13th International Conference on Medical Information Processing and Analysis. [Paper](#) [Project page](#)

Preprints & Working Papers

- January 2024 ***Pérez, G., *Zhao, W., Cheng, Z., Belotti, M., Deng, Y., Simons, V., Tielens, E., Kelly, J., Horton, K., Maji, S., Sheldon, D. (*equal contribution) Using spatio-temporal information in weather radar data to detect and track communal roosts.** BioRxiv. [Paper](#)
- December 2023 **Pérez, G., Sheldon, D., Van Horn, G., Maji, S. Human in-the-Loop Estimation of Cluster Count in Datasets via Similarity-Driven Nested Importance Sampling.** arXiv :2312.05287. [Paper](#)

Workshop & Short Papers

- November 2023 Zhao, W., **Pérez, G.**, Cheng, Z., Belotti, M., Deng, Y., Simons, V., Tielens, E., Kelly, J., Horton, K., Maji, S., Sheldon, D. **A Semi-Automated System to Annotate Communal Roosts in Large-Scale Weather Radar Data.** NeurIPS 2023 Computational Sustainability Workshop. [Paper](#)
- November 2022 **Pérez, G.**, Linden, S., Mcquaid, T., Messa, M., Calzetti, D., Maji, S. **An AI-Assisted Labeling Tool for Cataloging High-Resolution Images of Galaxies.** NeurIPS 2022 AI for Science Workshop. [Paper](#)
- June 2019 *Bravo, L., *Pardo, A., ***Pérez, G.**, & Arbeláez, P. (*equal contribution). **Finding Four-Leaf Clovers : A Benchmark for Fine-Grained Object Localization.** CVPR 2019 Workshop on Fine-Grained Visual Categorization (FGVC6). [Paper](#) [Project page](#)
- April 2016 **Pérez, G.** **Lung Nodules Detection in CT images using Computer Vision.** VIII International Seminar in Bio-medical Engineering. Universidad de los Andes. Colombia. Conference Proceeding, ISSN 2322-7702.

ACADEMIC SERVICE

Honors Thesis (499Y/T) committee member

- > Student : Advait Gosai, University of Massachusetts, Amherst (2024)
Thesis : *"Human-In-The-Loop Counting in Large Image Collections based on Natural Language Queries"*

Early Research Scholar Program mentor (2023-2024) [website](#)

- > The CICS ERSP is a dual-mentored, structured, research apprenticeship experience for undergraduates in a multi-institutional effort to address the underrepresentation of minority students in computing.

Reviewer for the following international conferences and workshops

- > International Conference on Computer Vision–ICCV (2023)
- > Association for the Advancement of Artificial Intelligence–AAAI AI for Social Impact Track (2024, 2023, 2022)
- > IEEE/CVF Winter Conference on Applications of Computer Vision–WACV (2024, 2023)
- > Computational Sustainability workshop–CompSust (2023)
- > Fine-Grained Visual Categorization workshop–FGVC (2023, 2022, 2021)
- > LatinX in AI/CV workshop–LXAI/LXCV (2023, 2022, 2021)
- > European Association for Signal Processing–EUSIPCO (2023, 2022, 2021, 2020, 2019)
- > Symposium of Image, Signal Processing, and Artificial Vision–STSIVA (2021, 2019)
- > International Conference on Image, Video Processing and Artificial Intelligence–IVPAI (2018)

Reviewer for the following scientific journals

- > International Journal of Computer Vision–IJCV (2023)
- > IEEE Transactions on Geoscience and Remote Sensing–IEEE TGRS (2024, 2023)
- > Scientific Reports (2023)
- > Annals of Translational Medicine (2020)
- > Oral Diseases (2020)
- > Medical & Biological Engineering & Computing (2024, 2019)
- > IEEE Transactions on Cybernetics (2018)

INVITED TALKS

DISCount : Counting in Large Image Collections with Detector-based Importance Sampling

- > New England Computer Vision Workshop at Dartmouth College. Hanover, NH. December 2023
- > UMass Machine Learning Club–Advanced Lecture. Amherst, MA. September 2023

Using Spatio-Temporal Information in Weather Radar Data to Detect Communal Bird Roosts

- > 3rd International Radar Aeroecology Conference (IRAC 2022). Davos, Switzerland. (Remote). June 2022

Finding Four-Leaf Clovers : A Benchmark for Fine-Grained Object Localization

- > Camera Trap Tech Symposium. Google Headquarters, Mountain View, CA, USA. (Remote). November 2019

Automated detection of lung cancer using 3D ConvNets

> IEEE International Symposium on Biomedical Imaging (ISBI)–Lung Nodule Malignancy Prediction. Washington DC. April 2018

SELECTED PROJETS & DATASETS

DISCOUNT

2022 - 2023

[Project page](#) github.com/gperezs/DISCount
Counting in Large Image Collections with Detector-based Importance Sampling

AI for Ecology :

INSECTIVORE RESPONSE TO ENVIRONMENTAL CHANGE

2021 - 2023

[Project page](#) github.com/darkecology/roost-system
Roost detection from weather radar data to investigate the behavior of three aerial insectivore species as bellwethers for environmental change and ecosystem health : Purple Martin, Tree Swallow, and Mexican free-tailed Bat

AI for Sustainability :

ZEO.NET

2021 - 2023

[Project page](#)
Deep learning of nanoporous materials for energy-efficient chemical separations

TAKING THE LONG VIEW

2022 - 2023

[Project page](#)
Enhancing learning on multi-temporal, high-resolution, and disparate remote sensing data for measuring the spread of buildings

AI for Astronomy :

STARCNET

2018 - 2021

[Project page](#) github.com/gperezs/StarcNet
Machine learning pipeline to identify star clusters in the multi-color images of nearby galaxies, from observations obtained with the Hubble Space Telescope

AI for Healthcare :

LUNG CANCER DIAGNOSIS

2016 - 2018

[Project page](#) github.com/gperezs/LungCancerDiagnosis-pytorch
Automated detection of lung cancer in chest LDCT images. Our method was ranked 1st place at the ISBI 2018 Lung Nodule Malignancy Prediction challenge

Datasets :

FLC DATASET

2017 - 2019

[Project page](#)
Four-Leaf Clover (FLC) dataset is a experimental framework for studying fine-grained object localization problems. The dataset is composed of more than 100,000 images, containing 2,151 carefully annotated clover instances of four, five or six leaves

TEACHING EXPERIENCE

January 2019 | Graduate Teaching Assistant | COMPUTER SYSTEMS PRINCIPLES–COMPSCI 230
September 2018 | University of Massachusetts Amherst

December 2016 | Graduate Teaching Assistant | ANALYSIS AND PROCESSING OF BIOMEDICAL IMAGES–IBIO 3470
August 2016 | Universidad de los Andes, Colombia

PROFESSIONAL EXPERIENCE

January 2016 | Project Manager
March 2010 | HORMESA America Ltd., Bogotá, Colombia

February 2010 | Junior Engineer
March 2009 | HORMESA America Ltd., Bogotá, Colombia

“ REFERENCES

- > **Subhransu Maji**
Associate Professor (smaji@cs.umass.edu)
CICS, University of Massachusetts Amherst

- > **Daniel Sheldon**
Associate Professor (sheldon@cs.umass.edu)
CICS, University of Massachusetts Amherst

- > **Daniela Calzetti**
Distinguished Professor & Department Head (calzetti@astro.umass.edu)
Department of Astronomy, University of Massachusetts Amherst

- > **Pablo Arbeláez**
Director (pa.arbelaez@uniandes.edu.co)
Center for Research and Formation in Artificial Intelligence, Universidad de los Andes, Colombia