Tatiana Acero Cuellar

Ph.D. candidate at the University of Delaware | Unidel Fellow
Department of Physics and Astronomy
Sharp Laboratory, 104 The Green, Newark, DE 19716

Contact Information

email: taceroc@udel.edu

Education

August 2022 – Current (~ August 2027)
Ph.D. Physics, Department of Physics and Astronomy
University of Delaware, Newark, DE
GPA: 3.8/4.0

April 2021 B.Sc in Physics,
Universidad Nacional de Colombia, Bogotá, D.C
GPA: 4.5/5.0

Research Experience

July 2020 – present: Research Fellow
University of Delaware, Department of Physics and Astronomy
Advisor: Federica B. Bianco.

May 2024 – present: Research Fellow
University of Delaware, Department of Geography
Advisor: Federica B. Bianco & Kyle Davis

Work Experience

March 2021 - August 2021: Junior BI Analyst
Ministerio Minas y Energía (Minister of Mines and Energy - Colombia)
Supervisor: Julian Paéz.

Ph.D. Research:

1. Implementing Machine Learning techniques that improve the efficiency of astronomical events classification using images from telescopes. I developed a CNN that can classify images as containing a true astrophysical object that changes over time or not.
2. Leveraging model interpretability by first developing interpretable models, including attention maps, and by second, exploring the latent space of the CNN, and applying different techniques (dimensionality reduction, mutual information content) that can link the decision made by the CNN and astrophysical parameters extracted from the images.
3. I am developing a framework to simulate how our telescopes detect scattered light from astronomical events.
4. Work on a multidisciplinary project focused on implementing a Machine Learning segmentation model able to detect fishponds in Nigeria using satellite RGB data.

Personal Profile and Strengths

I have extended experience in coding and solid knowledge of the Python language, including Numpy, Keras, Seaborn, Sklearn, Scikit-learn, Pandas, Tensorflow, Pytorch. I have specific expertise in Computer Vision using both traditional and machine learning methods and libraries including OpenCV and SciPy. I have implemented supervised and unsupervised machine learning models for applications in Astrophysics. I have some knowledge in Software development with Java, Vue, Vuejs, Vuex, Node, Express, APIs, HTML, CSS and Postman. All the projects that I have developed were stored and versioned using Github.

I have a strong background in analytical thinking, and problem solving acquired through my studies in Physics. I have research experience as well as experience working in small and large teams; I am eager and enthusiastic to learn new skills and gain new experiences; I am self-motivated and driven to research and develop solutions to new problems. I am responsible, disciplined, and determined, always giving 100% for everything.

I have a deep interest in using my abilities, and the ones that I will acquire through my path as a Ph.D. student in helping to create solutions to real-world problems. I have the background knowledge necessary to apply machine learning techniques to different fields and make interpretations out of them.

Scholarships and Fellowships

- La Serena School for Data Science 2023; NOIRLab; La Serena; Chile; August 2023
- International HPC Summer School 2023; Atlanta, Georgia, USA; July 2023
- LSST Data Science Fellowship Program 2022-2024
- Bayesian Deep Learning for Cosmology and Time Domain Astrophysics; Paris, France; June 2022
- **2022-2027 Unidel Distinguished Grad Scholar Fellowship from the graduate college, University of Delaware.**
- LSST Corporation and the Enabling Science Grant program partially supported TAC through Grant No. 2021-040: https://www.lsstcorporation.org/node/289
- July 2020 - December 2021 University of Delaware's Summer Research Program.

Schools and Workshops

- La Serena School for Data Science 2023; NOIRLab; La Serena; Chile; August 2023
- International HPC Summer School 2023; Atlanta, Georgia, USA; July 2023
- LSST Data Science Fellowship Program 2022-2024
- Bayesian Deep Learning for Cosmology and Time Domain Astrophysics; Paris, France; June 2022

Services

- 2023-2024, Treasurer - Physics and Astronomy Graduate Student Society @UD
- 2024-Present, Membership Committee – Informatics and Statistics Science Collaboration @ LSST-Rubin

Posters and talks

- *American Geophysics Union (AGU) Fall Meeting 2024; Washington DC, USA; December 2024; eLightning Presentation Title: Automatic Delineation of Fish Ponds across Nigeria with Machine Learning Image Segmentation Models.*

- Rubin Community Workshop 2024 – LSST; SLAC, Menlo Park, CA, USA; July 2024; Poster Title: *A comparative study of different Deep Learning image-based models for Real-Bogus classification.*

- 2023 Annual Meeting of the APS Mid-Atlantic Section; Newark, DE, USA; November 2023; Talk title: *Forward modeling of dust and transients - a method for the generation of synthetic Light Echoes.*

- LSST@Europe5: Towards LSST Science, together!; Poreč, Croatia; September 2023; Poster title: *Forward modeling of dust and transients - a method for the generation of synthetic Light Echoes.*

- Data Science Symposium; Newark, DE USA; September 2023; Poster title: *Detangling the Mysteries of a CNN Used to Separate Astrophysical Transients from Artifacts.*

- International HPC Summer School; Atlanta, Georgia, USA; July 2023; Poster title: *The potential for Convolutional Neural Networks for transient detection without template subtraction.*

- Bayesian Deep Learning for Cosmology and Time Domain Astrophysics; Paris, France; June 2022; Poster title: *There's no difference: Convolutional Neural Networks for transient detection without template subtraction.*
- Data Science Symposium; Newark, DE USA; November 2021; Poster title: *There's no difference: CNN for transient detection without template subtraction.*

Languages
Spanish: First Language
English: Fluent

Links
www.linkedin.com/in/tatiana-acero-cuellar-69416914b
https://github.com/taceroc
https://scholar.google.com/citations?hl=en&user=nSY3tQQAAAAJ

Publications
Acero-Cuellar T., Bianco F., Dobler G., Sako M., Qu H., **2023** *AJ* **166** 115, https://doi.org/10.3847/1538-3881/ace9d8