Manuel Pérez Carrasco

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EDUCATION

University of Concepción   Concepción, Chile

MSc. Computer Science. GPA 6.1/7.0   *Mar. 2017 – Oct. 2019*

B.S. Industrial Engineering* GPA 5.9/7.0   *Mar. 2013 – Sep. 2018*

- Graduated with maximum distinction from MSc. and B.S. degrees.
- Author of thesis called "*Semi-supervised adversarial variational domain adaptation for image classification*". Supervised by professor Guillermo Cabrera. Grade 7.0/7.0
- Author of undergraduate honor research thesis called "*Attributes transfer in deep neural networks and their application to astronomical images*". Supervised by professor Guillermo Cabrera. Grade 7.0/7.0
- Honors and Awards:
  * Master's thesis received best student paper award at Astroinformatics 2019 conference, Caltech.
  * Undergraduate honor research thesis published in Publications of the Astronomical Society of the Pacific.
  * Recipient of fully-funded scholarship for MSc. degree.

* Notice that in Chile, B.S. degrees are usually 11 semesters long.

RESEARCH AND PROFESSIONAL EXPERIENCE

Co-director / Lead Data Scientist   Concepción, Chile

Data Science Unit (UDS) at University of Concepción   *Jul. 2019 – Present*

- Our main goal is to generate technological transfer between the academy and Chilean organizations. We develop projects and academic programs to promote the development of data science capabilities within our country. Some of the projects I have worked on are:

- **Deep-Hub**: co-designed and co-implemented a labeling, training and prediction platform to count, detect and segment trees using high-dimensional georeferenced forest images taken with drone cameras and satellite images, via cloud-based infrastructure.
- **ALeRCE's Anomaly Detector**: led the design and implementation of the current astronomical light curve anomaly detection algorithms within the ALeRCE Broker framework.
- **Predictive Maintenance**: led the design and implementation of a software to detect failures and perform causal analysis in industrial cellulose drying machines.
- **El Chile que Queremos (ECCQ)**: led the technical development of a platform to automate the analysis of citizen responses on the social dialogs generated due to the 2019's Chilean social outbreak. This platform was later adapted to integrate new instances of citizen participation and generate analysis in the context of the upcoming Chilean constitution. Project requested by the Chilean Ministry of Social Development and Sciences.

Research Assistant   Cambridge, MA, USA

Institute for Applied Computational Sciences (IACS) at Harvard University   *Jan. 2019 – Jul. 2021*

- Member of the *Harvard-Chile Data Science School (2019).*
- Development of master's thesis. Research focused on semi-supervised domain adaptation algorithms for image classification (2019-1). Recipient of IACS financial aid for research development (stipend and flight tickets).
- Development of research focused on the learning of contrastive feature representations for semi-supervised domain adaptation (2020-2/2021-1). .
- Working under Professor Pavlos Protopapas, IACS Scientific Program Director.

Research Assistant   Concepción, Chile

Biomedical Laboratory at University of Concepción   *Jan. 2020 – Sep. 2020*

- Developed a real-time drowsiness detection algorithm using EEG signals, and a real-time segmentation algorithm for gait phases using accelerometer signals. Projects funded by the Chilean government, *Fund for the Promotion of Scientific and Technological Development.*

Internship   Concepción, Chile

Coca-Cola Embonor S.A   *Jan. 2018 – Feb. 2018*

- Developed a forecasting software composed by a ensemble of ML and statistical models to estimate sales and demand for $\sim$ 1500 sku.

Teaching Experience

University of Concepción   Concepción, Chile

Lecturer at the School of Engineering Department.   *Jul. 2019 – Present*

- Co-taught Introduction to Machine Learning (2019-2), Topics in Machine Learning (2020-1), Fundamentals in Data Science (2021-2/2022-2), and Deep Learning (2022-1/2023-1). Elective courses for graduate and undergraduate students.

  * Co-designed curriculum, lectures, assessments, laboratories, and homework for audiences of ~ 30 students.
  * Co-graded assessments, homework and projects.
  * Co-taught with Professor Rodrigo de la Fuente (2019-2020) and Guillermo Cabrera (2021-present).

Teaching Assistant at the School of Engineering.   *Aug. 2017 – Sept. 2020*

- Teaching assistant of Systems Modeling (2017-2), Machine Learning for Business Intelligence (2018-1), Introduction to Data Science (2020-1), and Data Science II (2020-2).

Harvard University   Cambridge, MA, USA

Teaching Fellow of CS109b: Advanced Topics in Data Science at IACS.   *Feb. 2019 – May 2019*

- Served as teaching fellow for Advanced Topics in Data Science, a mandatory course for the Data Science Master Program and Computer Science PhD Secondary Field in Data Science at Harvard University.

  * In charge of grading, office-hours, and guiding students in their applied machine learning projects.
  * Worked under professor Pavlos Protopapas.

Publications

M. Pérez-Carrasco, G. Cabrera-Vives, L. Hernández-García, F. Förster, et al. "*Alert Classification for the ALeRCE Broker System: The Anomaly Detector*". The Astronomical Journal (AJ), 2023.

M. Pérez-Carrasco, G. Cabrera-Vives, L. Hernández-García, F. Förster, et al. "*Multi-Class Deep SVDD: Anomaly Detection Approach in Astronomy with Distinct Inlier Categories*". ICML 2023 Workshop on Machine Learning for Astrophysics, 2023.

D. Moreno-Cartagena, G. Cabrera-Vives, P. Protopapas, Cristobal Donoso, **M. Pérez-Carrasco**, M. Cádiz-Leyton. "*Positional Encodings for Light Curve Transformers: Playing with Positions and Attention*". ICML 2023 Workshop on Machine Learning for Astrophysics, 2023.

G. Cabrera-Vives, C. Bolívar, F. Förster, A. Muñoz-Arancibia, **M. Pérez-Carrasco**, E. Reyes, L. Denneau. "*Domain Adaptation via Minimax Entropy for Real/Bogus Classification of Astronomical Alerts*". ICML 2023 Workshop on Machine Learning for Astrophysics, 2023.

M. Pérez-Carrasco, B. Karelovic, R. Molina, R. Saavedra-Passache, Pierluigi Cerulo, and G. Cabrera-Vives. "*Precision silviculture: use of UAVs and comparison of deep learning models for the identification and segmentation of tree crowns in pine crops*". International Journal of Digital Earth (IJDE), 2022.

M. Pérez-Carrasco, P. Protopapas, and G. Cabrera-Vives. "*Con^{2}DA: Simplifying Semi-supervised Domain Adaptation by Learning Consistent and Contrastive Feature Representations*". NeurIPS 2021 Workshop on Distribution Shifts, 2021.

P. Sánchez-Sáez, H. Lira, L. Martí, N. Sánchez-Pi, **et al.** "*Searching for Changing-state AGNs in Massive Data Sets. I. Applying Deep Learning and Anomaly-detection Techniques to Find AGNs with Anomalous Variability Behaviors*". The Astronomical Journal, 2021.

F. Förster, G. Cabrera-Vives, E. Castillo-Navarrete, P. A. Estevéz, P. Sánchez-Sáez, **et al.** "*The Automatic Learning for the Rapid Classification of Events (ALeRCE) Alert Broker*". The Astronomical Journal, 2021.

M. Pérez-Carrasco, G. Cabrera-Vives, P. Protopapas, N. Astorga, and M. Belhaj. "*Matching Embeddings for Domain Adaptation*". ArXiv 1909.11651, 2020.

M. Pérez-Carrasco, G. Cabrera-Vives, M. Martinez-Marín , P. Cerulo, R. Demarco, P. Protopapas, J. Godoy, and M. Huertas-Company. "*Multiband galaxy morphologies for CLASH: a convolutional neural network transferred from CANDELS*", Publications of the Astronomical Society of the Pacific (PASP), 2019.

Conferences and Workshops

ICML 2023 Workshop on Machine Learning For Astrophysics. **Poster**. Honolulu, Hawaii, USA.

VII Millenium Institute of Astrophysics (MAS) Workshop, 2023. **Talk**. Santiago, RM, Chile.

NeurIPS 2021 Workshop on Distribution Shifts. **Poster**. Vancouver, BC, Canada.

Astroinformatics 2019. **Talk. Best student paper award**. Caltech, Pasadena, CA, USA.

ComputeFest 2019. **Trainer**. Harvard University, Cambridge, MA, USA.

Big Data Astronomy Workshop 2018. **Talk**. University of Concepción, Concepción, Biobio, Chile.

Technical Skills

Languages: Spanish (Native speaker), English (TOEFL: 96/120).
O.S: GNU/Linux, macOS.
Tools: Git, Google Cloud Platform, Amazon Web Services, VS Code, LaTeX
Libraries: Pytorch, Keras, Tensorflow, scikit-learn, NumPy, Matplotlib, pandas.