Pablo Andrés Huijse Heise

pablo (dot) huijse (at) gmail (dot) com
pablo (dot) huijse (at) uach (dot) cl
http://phuijse.github.io
+56-9-98278979
Instituto de Informática, Universidad Austral de Chile,
General Lagos 2086, Edificio 10000, Valdivia, Chile.
Inés Gebhard Paulus 733, Valdivia, Chile.

Education

- PhD in Electrical Engineering, *Universidad de Chile.* 2010-2014
- Electrical Engineering degree, *Universidad de Chile.* 2004-2010
- Bachelor of Science in Electrical Engineering, *Universidad de Chile.* 2004-2008

Academic positions

- Assistant professor, *Informatics Institute, Universidad Austral de Chile.* 2018-today
- Young researcher, *Millennium Institute of Astrophysics.* 2018-today
- Postdoc researcher, *Millennium Institute of Astrophysics.* 2015-2017

Research - Interests

Machine Learning, Deep Learning, Information Theory, Bayesian Inference, Statistical Signal Processing, Astroinformatics.

Research - Projects and Grants

As principal investigator:

- Novel Deep Learning Architectures for Astronomical Time Series, *Universidad Austral de Chile.*
  Funded by ANID FONDECYT regular 1211374 grant. 2021-2023
- Efficient methods based on information theory and machine learning for astronomical images and time series analysis, *Universidad de Chile/Universidad Austral de Chile.*
  Funded by CONICYT FONDECYT regular 1170305 grant. 2017-2020

- Development of methods for big-data astronomical problems based on Information Theory and Machine Learning, *Millennium Institute of Astrophysics*.
  Funded by CONICYT FONDECYT postdoctoral 3150460 grant. 2015-2017

As co-investigator:

- Sistema integrado de análisis de fuentes sonoras ambientales: Sistema FUSA, *Universidad Austral de Chile*, principal investigator: Enrique Suárez, `enriquesuarez(at)uach(dot)cl`.
  Funded by ANID FONDEF ID20I10333 grant. 2020-2022
- Fortalecimiento de la ciencia de datos en la Universidad Austral de Chile, *Universidad Austral de Chile*, principal investigator: Eliana Scheihing, `escheihi(at)inf(dot)uach(dot)cl`.
  Funded by grant CONICYT PAI 79170017 grant. 2018-2021
- Pesquisa temprana de alteraciones del desarrollo en bebés mediante el uso de machine learning, *Universidad Austral de Chile*, principal investigator: Victor Poblete.
  Funded by INNOVING 2030 internal grant. 2020-2020

As research assistant:

- Big-data based real-time astronomy applications for the LSST era, *Universidad Chile*, principal investigator: Pablo A. Estévez, `pestevez(at)yahoo(dot)com`.
  Funded by CONICYT/NSF DPI20140090 grant. 2015-2018
- Advanced neural networks and information theoretic learning methods for time series: applications to astronomical light curves and biomedical signals, *Universidad Chile*, principal investigator: Pablo A. Estévez.
  Funded by CONYCIT FONDECYT regular 1110701 grant. 2011-2014

Doctoral studies:

- Finding periodicities in astronomical light curves using information theoretic learning, *doctoral research at the Universidad de Chile*, supervisor: Prof. Pablo A. Estévez.
  Funded by CONICYT scholarship for PhD education in Chile. 2010-2014
- Design of an overcomplete decomposition for the correntropy function, *internship at the Computational Neuro-Engineering Laboratory, University of Florida*, supervisor: Prof. José Príncipe, `principe(at)cnel(dot)ufl(dot)edu`.
  Funded by CONICYT travel grant for doctoral students. 2013-2013
- "Design of a pipeline for periodic light curve discrimination and its application to the EROS-2 database", *internship at the Institute of Applied Computational Sciences, Harvard University*, supervisor: Prof. Pavlos Protopapas, `pavlos(at)seas(dot)harvard(dot)edu`.
  Funded by CONICYT travel grant for doctoral students. 2012-2012

Research - Publications in WoS/ISI Journals

[1] F. Förster, G. Cabrera-Vives, E. Castillo-Navarrete, P. A. Estévez, P. Sánchez-Sáez, J. Arredondo, F. E. Bauer, R. Carrasco-Davis, M. Catelan, F. Elorrieta, S. Eyheramendy, P. **Huijse**, G. Pignata, E. Reyes, I. Reyes, D. Rodríguez-Mancini, D. Ruz-Mieres, et al. "The Automatic Learning for the Rapid Classification of Events (ALeRCE) Alert Broker". In: *The Astronomical Journal* 161.5 (2021), p. 242. DOI: 10.3847/1538-3881/abe9bc. arXiv: 2008.03303.

[2] F. Pérez-Galarce, K. Pichara, P. **Huijse**, M. Catelan, and D. Mery. "Informative Bayesian model selection for RR Lyrae star classifiers". In: *Monthly Notices of the Royal Astronomical Society* 503.1 (2021), pp. 484–497. DOI: 10.1093/mnras/stab320. arXiv: 2105.11531.

[3] V. Poblete, D. Espejo, V. Vargas, F. Otondo, and P. **Huijse**. "Characterization of Sonic Events Present in Natural-Urban Hybrid Habitats Using UMAP and SEDnet: The Case of the Urban Wetlands". In: *Applied Sciences* 11.17 (2021), p. 8175. DOI: 10.3390/app11178175.

[4] P. Sánchez-Sáez, I. Reyes, C. Valenzuela, F. Förster, S. Eyheramendy, F. Elorrieta, F. E. Bauer, G. Cabrera-Vives, P. A. Estévez, M. Catelan, G. Pignata, P. **Huijse**, D. D. Cicco, P. Arévalo, R. Carrasco-Davis, J. Abril, R. Kurtev, et al. "Alert classification for the ALeRCE broker system: The light curve classifier". In: *The Astronomical Journal* 161.3 (2021), p. 141. DOI: 10.3847/1538-3881/abd5c1. arXiv: 2008.03311.

[5] J. Peña, C. Fuentes, F. Förster, J. Martínez-Palomera, G. Cabrera-Vives, J. C. Maureira, P. **Huijse**, P. A. Estévez, L. Galbany, S. González-Gaitán, and T. de Jaeger. "Asteroids' Size Distribution and Colors from HITS". In: *The Astronomical Journal* 159.4 (2020), p. 148. DOI: 10.3847/1538-3881/ab7338. arXiv: 2003.05499.

[6] F. Tobar, L. Araya-Hernández, P. **Huijse**, and P. M. Djurić. "Bayesian reconstruction of Fourier pairs". In: *IEEE Transactions on Signal Processing* 69 (2020), pp. 73–87. DOI: 10.1109/TSP.2020.3038135. arXiv: 2011.04585.

[7] J. Astudillo, P. Protopapas, K. Pichara, and P. **Huijse**. "An Information Theory Approach on Deciding Spectroscopic Follow-ups". In: *The Astronomical Journal* 159.1 (2019), p. 16. DOI: 10.3847/1538-3881/ab557d. arXiv: 1911.02444.

[8] R. Carrasco-Davis, G. Cabrera-Vives, F. Förster, P. A. Estevez, P. **Huijse**, P. Protopapas, I. Reyes, J. Martínez-Palomera, and C. Donoso. "Deep learning for image sequence classification of astronomical events". In: *Publications of the Astronomical Society of the Pacific* 131.1004 (2019), p. 108006. DOI: 10.1088/1538-3873/aaef12. arXiv: 1807.03869.

[9] F. Förster, T. J. Moriya, J. C. Maureira, J. P. Anderson, S. Blinnikov, F. Bufano, G. Cabrera-Vives, A. Clocchiatti, T. de Jaeger, P. A. Estévez, L. Galbany, S. González-Gaitán, G. Gräfener, M. Hamuy, E. Y. Hsiao, P. Huentelemu, P. **Huijse**, et al. "The delay of shock breakout due to circumstellar material evident in most type II supernovae". In: *Nature Astronomy* 2.10 (2018), pp. 808–818. DOI: 10.1038/s41550-018-0563-4. arXiv: 1809.06379.

[10] J. Martínez-Palomera, F. Förster, P. Protopapas, J. C. Maureira, P. Lira, G. Cabrera-Vives, P. **Huijse**, L. Galbany, T. de Jaeger, S. González-Gaitán, G. Medina, G. Pignata, J. S. Martín, M. Hamuy, and R. R. Muñoz. "The High Cadence Transit Survey (HiTS): Compilation and Characterization of Light-curve Catalogs". In: *The Astronomical Journal* 156.5 (2018), p. 186. DOI: 10.3847/1538-3881/aadfd8. arXiv: 1609.03567.

[11] J. Peña, C. Fuentes, F. Förster, J. C. Maureira, J. S. Martín, J. Littín, P. **Huijse**, G. Cabrera-Vives, P. A. Estévez, L. Galbany, S. González-Gaitán, J. Martínez, T. de Jaeger, and M. Hamuy. "Asteroids in the High Cadence Transient Survey". In: *The Astronomical Journal* 155.3 (2018), p. 135. DOI: 10.3847/1538-3881/aaaaed. arXiv: 1806.03352.

[12] R. C. Ramos, D. Minniti, F. Gran, M. Zoccali, J. Alonso-García, P. **Huijse**, M. G. Navarro, Á. Rojas-Arriagada, and E. Valenti. "The VVV survey RR Lyrae population in the galactic center region". In: *The Astrophysical Journal* 863.1 (2018), p. 79. DOI: 10.3847/1538-4357/aacf90. arXiv: 1807.04303.

[13] P. **Huijse**, P. A. Estévez, F. Förster, S. F. Daniel, A. J. Connolly, P. Protopapas, R. Carrasco, and J. C. Príncipe. "Robust Period Estimation Using Mutual Information for Multiband Light Curves in the Synoptic Survey Era". In: *The Astrophysical Journal Supplement Series* 236.1 (2018), p. 12. DOI: 10.3847/1538-4365/aab77c. arXiv: 1709.03541.

[14] R. C. Ramos, M. Zoccali, F. Rojas, A. Rojas-Arriagada, M. Gárate, P. **Huijse**, F. Gran, M. Soto, A. A. R. Valcarce, P. A. Estévez, and D. Minniti. "Proper motions in the VVV Survey: Results for more than 15 million stars across NGC 6544". In: *Astronomy & Astrophysics* 608 (2017), A140. DOI: 10.1051/0004-6361/201731462. arXiv: 1709.07919.

[15] F. Förster, J. C. Maureira, J. S. Martín, M. Hamuy, J. Martínez, P. **Huijse**, G. Cabrera, L. Galbany, T. de Jaeger, S. González–Gaitán, J. P. Anderson, H. Kunkarayakti, G. Pignata, F. Bufano, J. Littín, F. Olivares, G. Medina, et al. "The high cadence transient survey (hits). i. survey design and supernova shock breakout constraints". In: *The Astrophysical Journal* 832.2 (2016), p. 155. DOI: 10.3847/0004-637X/832/2/155. arXiv: 1609.03567.

[16] P. Protopapas, P. **Huijse**, P. A. Estevez, P. Zegers, J. C. Principe, and J.-B. Marquette. "A novel, fully automated pipeline for period estimation in the EROS 2 data set". In: *The Astrophysical Journal Supplement Series* 216.2 (2015), p. 25. DOI: 10.1088/0067-0049/216/2/25. arXiv: 1412.1840.

[17] P. **Huijse**, P. A. Estevez, P. Protopapas, J. C. Principe, and P. Zegers. "Computational intelligence challenges and applications on large-scale astronomical time series databases". In: *IEEE Computational Intelligence Magazine* 9.3 (2014), pp. 27–39. DOI: 10.1109/MCI.2014.2326100. arXiv: 1509.07823.

[18] P. **Huijse**, P. A. Estevez, P. Protopapas, P. Zegers, and J. C. Principe. "An information theoretic algorithm for finding periodicities in stellar light curves". In: *IEEE Transactions on Signal Processing* 60.10 (2012), pp. 5135–5145. DOI: 10.1109/TSP.2012.2204260. arXiv: 1212.2398.

[19] P. **Huijse**, P. A. Estévez, P. Zegers, J. C. Príncipe, and P. Protopapas. "Period estimation in astronomical time series using slotted correntropy". In: *IEEE Signal Processing Letters* 18.6 (2011), pp. 371–374. DOI: 10.1109/LSP.2011.2141987. arXiv: 1112.2962.

Research - Publications in Conference Proceedings

[1] A. Morales, J. Rojas, P. **Huijse**, and R. C. Ramos. "A Comparison of Convolutional Neural Networks for RR Lyrae Light Curve Classification". In: *2021 IEEE Latin American Conference on Computational Intelligence (LA-CCI)*. IEEE. 2021, pp. 1–6. DOI: 10.1109/LA-CCI48322.2021.9769795.

[2] A. Sánchez, P. **Huijse**, F. Förster, and G. Cabrera-Vives. "Amortized Variational Inference (AVI) for Type Ia Supernova Light Curves". In: *NeurIPS 2021, Machine Learning and the Physical Sciences Workshop*. 2021. URL: https://ml4physicalsciences.github.io/2021/files/NeurIPS_ML4PS_2021_10.pdf.

[3] N. Astorga, P. **Huijse**, P. Protopapas, and P. Estévez. "MPCC: Matching Priors and Conditionals for Clustering". In: *European Conference on Computer Vision*. Springer, Cham. 2020, pp. 658–677. DOI: 10.1007/978-3-030-58592-1_39. arXiv: 2008.09641.

[4] N. Astorga, P. **Huijse**, P. A. Estévez, and F. Förster. "Clustering of Astronomical Transient Candidates Using Deep Variational Embedding". In: *2018 International Joint Conference on Neural Networks (IJCNN)*. IEEE. 2018, pp. 1–8. DOI: 10.1109/IJCNN.2018.8489358.

[5] E. Reyes, P. A. Estévez, I. Reyes, G. Cabrera-Vives, P. **Huijse**, R. Carrasco, and F. Forster. "Enhanced rotational invariant convolutional neural network for supernovae detection". In: *2018 International Joint Conference on Neural Networks (IJCNN)*. IEEE. 2018, pp. 1–8. DOI: 10.1109/IJCNN.2018.8489627. arXiv: 1808.03626.

[6] P. **Huijse**, N. Astorga, P. Estévez, and G. Pignata. "Latent representations of transient candidates from an astronomical image difference pipeline using variational autoencoders". In: *26th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning, ESANN 2018*. i6doc.com publication. 2018, pp. 321–326. URL: https://www.esann.org/sites/default/files/proceedings/legacy/es2018-130.pdf.

[7] S. Ulloa, P. A. Estevez, P. **Huijse**, C. M. Held, C. A. Perez, R. Chamorro, M. Garrido, C. Algarin, and P. Peirano. "Sleep-spindle identification on EEG signals from polysomnographie recordings using correntropy". In: *2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*. IEEE. 2016, pp. 3736–3739. DOI: 10.1109/EMBC.2016.7591540.

[8] P. **Huijse**, P. A. Estévez, F. Förster, and E. Berrocal. "Discriminating variable star candidates in large image databases from the HiTS survey using NMF". In: *Procedia Computer Science* 53 (2015), pp. 29–38. DOI: 10.1016/j.procs.2015.07.276.

[9] D. Nova, P. A. Estévez, and P. **Huijse**. "K-Nearest Neighbor Nonnegative Matrix Factorization for Learning a Mixture of Local SOM Models". In: *Advances in Self-Organizing Maps and Learning Vector Quantization*. Springer, Cham, 2014, pp. 229–238. DOI: 10.1007/978-3-319-07695-9_22.

[10] P. **Huijse**, P. A. Estévez, P. Protopapas, P. Zegers, and J. C. Príncipe. "Computational Challenges in Processing Very Large Astronomical Survey Databases". In: *2012 9th Asia-Pacific Symposium on Information and Telecommunication Technologies (APSITT)*. IEEE. 2012, pp. 1–6. URL: https://ieeexplore.ieee.org/document/6379705.

[11] P. A. Estévez, P. **Huijse**, P. Zegers, J. C. Principe, and P. Protopapas. "Period detection in light curves from astronomical objects using correntropy". In: *The 2010 International Joint Conference on Neural Networks (IJCNN)*. IEEE. 2010, pp. 1–7. DOI: 10.1109/IJCNN.2010.5596557.

Research - Conference Organization

- Neural and learning systems chair, IEEE Latin American Conference on Computational Intelligence (LA-CCI), Montevideo, Uruguay. 2022
- Neural and learning systems chair, IEEE Latin American Conference on Computational Intelligence (LA-CCI), Temuco, Chile. 2021
- General chair, IEEE Latin American Summer School on Computational Intelligence (EVIC), Valdivia, Chile. 2019

Teaching - Courses

- Bayesian Learning and Neural Networks, Master in Informatics, UACh. 2019-today
  https://phuijse.github.io/BLNNbook/
- Scientific Computing with Python, Informatics Eng., UACh. 2019-today
  https://phuijse.github.io/PythonBook/
- Simulation, Informatics Eng., UACh. 2020-today
  https://phuijse.github.io/MonteCarloBook/
- Artificial Intelligence, Informatics Eng., UACh. 2018-today
  https://phuijse.github.io/MachineLearningBook/
- Statistical tools for research, Master in Informatics, UACh 2018-today
  http://magister-informatica-uach.github.io/INFO337
- Linear systems analysis, Informatics Eng., UACh 2018-2021
  https://phuijse.github.io/UACH-INFO183/

As collaborator:

- Data mining, Master in Informatics, UACh. 2018-today
  https://github.com/magister-informatica-uach/INFO343-unidad5
- Communications, Informatics Eng., UACh. 2018-today
  https://phuijse.github.io/UACH-INFO185/

As teaching assistant:

- Neural Networks and Information Theoretic Learning, Electrical Eng., U. de Chile. 2013-2015
- Computational Intelligence, Electrical Eng., U. de Chile. 2010-2016

Teaching - Alumni

- Nicolas Astorga, "Generative-Inference models: theory and applications", MSc in Electrical Engineering, U. de Chile. 2021
- Alfredo Morales, "Adaption layers for the classification of light curves using artificial neural networks", Informatics Engineering, UACh. 2021
- Leonardo Bravo, "Deep Neural network to classify light curves simulated for the vera rubin observatory", MSc on Informatics, UACh. 2021
- Luis Guzmán, "Development of an imaging tool to quantify 3D biomedical image sequences", Informatics Engineering, UACh. 2021
- Javier Rojas, "Variational autoencoder with factorized covariance for astronomical images", Informatics Engineering, UACh. 2020
- Gabriela Gonzalez, "Injury prediction on amateur runners using physical activity tracking data", MSc on Informatics, UACh. 2020

- Victor Vargas, "Automatic gesture recognition for chilean sign language translation", Informatics engineering, UACh. 2019

In co-supervision:

- Diego Espejo, "Tool for the monitoring of Valdivian wetlands using neural networks for polyphonic sound event detection", Acoustics Eng., UACh. 2022
- Alexis Sánchez, "Bayesian parameter estimation using amortized variational inference", MSc in Computer Science, U. de Concepción. 2021
- Luis Alvarado, "Application of deep neural networks for the automatic recognition of musical chords", MSc on Acoustics, UACh. 2020
- Fabian Ruíz, "Characterizing gender bias in communication media by using dynamic topic models", MSc on Informatics, UACh. 2019
- Yetzabeth Gonzalez, "Design and implementation of a translation system from voice or text to chilean sign language using a 3D avatar", Acoustics Engineer, UACh. 2019
- Javiera Astudillo, "An Information Theory Approach on Deciding Spectroscopic Follow Ups", MSc on Computer Science, PUC. 2019
- Pablo Saavedra, "Estudio de la utilización del potencial de información cruzado en el aprendizaje con ensamble de redes neuronales", Electrical Engineering, U. de Chile. 2017
- Joaquín Sanchez, "Análisis morfológico utilizando matching pursuit para detección de husos sigma en registros polisomnográficos", Electrical Engineering, U. de Chile. 2016
- Emanuel Berrocal, "Métodos de detección de estrellas variables en imágenes astronómicas basados en factorización no-negative de matrices", Mathematical Engineering, U. de Chile. 2015
- Marianne Fiedler, "Optimización de la detección de periodos de estrellas variables en la nube de magallanes", U. de los Andes. 2015

Others - Technical skills

- **Programming languages:** ○○○ Python, C and C++ ○○ C#, CUDA and Bash ○ R, Rust, Julia, Lua, HTML/CSS and Javascript
- **Libraries and APIs**: ○○○ NumPy, SciPy, Pandas, Scikit-Learn, Matplotlib, Holoviews, PyTorch, JAX, Flax, NumPyro, PyMC ○○ OpenMP, OpenCV
- **IDEs and VSc:** ○○○ VSCode, NeoVim and Git ○○ Matlab ○ RStudio
- **OSs and platforms:** ○○○ GNU Linux and MS Windows ○○ Arduino/AVR, Raspberry PI, Olimexino and Teensy (ARM)
- **Editorial/Multimedia:** ○○○ Latex and Jupyter Book ○○ Libreoffice, GIMP, Inkscape, OBS studio, Shotcut, Blender, Unity and Godot

○○○ Proficient ○○ Familiar ○ Basic

Others - Languages

- Spanish (native)
- English (fluent)

Others - Interests

Specialty coffee, PC video games, Board games, 3D printing, Video game design and Game engines, Japanese animation and culture, Karate-do, Hiking, Transverse flute and saxophone, Bread making.