Pablo Andrés Huijse Heise

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I 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

II 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

III Research - Interests

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

IV 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, 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, funded by 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, funded by CONICYT/NSF DPI20140090 2015-2018
- Advanced neural networks and information theoretic learning methods for time series: applications to astornomical light curves and biomedical signals, *Universidad Chile*, principal investigator: Pablo A. Estévez, funded by CONYCIT FONDECYT regular 1110701 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, 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, funded by CONICYT travel grant for doctoral students 2012-2012

V Research - Publications in WoS/ISI Journals

- P. Sánchez-Sáez, I. Reyes, C. Valenzuela, F. Förster, S. Eyheramendy, F. Elorrieta, F. Bauer, G. Cabrera-Vives, P. Estévez, M. Catelan, et al. Alert classification for the alerce broker system: The light curve classifier. *The Astronomical Journal*, volume 161, page 141. IOP Publishing, 2021.
- 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. *Applied Sciences*, volume 11, page 8175. Multidisciplinary Digital Publishing Institute, 2021.

- F. Pérez-Galarce, K. Pichara, **P. Huijse**, M. Catelan, and D. Mery. Informative bayesian model selection for rr lyrae star classifiers. *Monthly Notices of the Royal Astronomical Society*, volume 503, pages 484–497. Oxford University Press, 2021.
- F. Förster, G. Cabrera-Vives, E. Castillo-Navarrete, P. Estévez, P. Sánchez-Sáez, J. Arredondo, F. Bauer, R. Carrasco-Davis, M. Catelan, F. Elorrieta, et al. The automatic learning for the rapid classification of events (alerce) alert broker. *The Astronomical Journal*, volume 161, page 242. IOP Publishing, 2021.
- F. Tobar, L. Araya-Hernández, **P. Huijse**, and P. M. Djurić. Bayesian reconstruction of fourier pairs. *IEEE Transactions on Signal Processing*, volume 69, pages 73–87. IEEE, 2020.
- J. Peña, C. Fuentes, F. Förster, J. Martínez-Palomera, G. Cabrera-Vives, J. Maureira, **P. Huijse**, P. Estévez, L. Galbany, S. González-Gaitán, et al. Asteroids' size distribution and colors from hits. *The Astronomical Journal*, volume 159, page 148. IOP Publishing, 2020.
- 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. *Publications of the Astronomical Society of the Pacific*, volume 131, page 108006. IOP Publishing, 2019.
- J. Astudillo, P. Protopapas, K. Pichara, and **P. Huijse**. An information theory approach on deciding spectroscopic follow-ups. *The Astronomical Journal*, volume 159, page 16. IOP Publishing, 2019.
- **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. *The Astrophysical Journal Supplement Series*, volume 236, page 12. IOP Publishing, 2018.
- 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. *The Astrophysical Journal*, volume 863, page 79. IOP Publishing, 2018.
- J. Peña, C. Fuentes, F. Förster, J. C. Maureira, J. San Martín, J. Littín, **P. Huijse**, G. Cabrera-Vives, P. Estévez, L. Galbany, et al. Asteroids in the high cadence transient survey. *The Astronomical Journal*, volume 155, page 135. IOP Publishing, 2018.
- 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, et al. The high cadence transit survey (hits): Compilation and characterization of light-curve catalogs. *The Astronomical Journal*, volume 156, page 186. IOP Publishing, 2018.
- F. Förster, T. Moriya, J. Maureira, J. Anderson, S. Blinnikov, F. Bufano, G. Cabrera-Vives, A. Clocchiatti, T. De Jaeger, P. Estévez, et al. The delay of shock breakout due to circumstellar material evident in most type ii supernovae. *Nature Astronomy*, volume 2, pages 808–818. Nature Publishing Group, 2018.
- R. C. Ramos, M. Zoccali, F. Rojas, A. Rojas-Arriagada, M. Gárate, **P. Huijse**, F. Gran, M. Soto, A. Valcarce, P. Estévez, et al. Proper motions in the vvv survey: Results for

more than 15 million stars across ngc 6544. *Astronomy & Astrophysics*, volume 608, page A140. EDP Sciences, 2017.

- F. Förster, J. C. Maureira, J. San Martín, M. Hamuy, J. Martínez, **P. Huijse**, G. Cabrera, L. Galbany, T. De Jaeger, S. González-Gaitán, et al. The high cadence transient survey (hits). i. survey design and supernova shock breakout constraints. *The Astrophysical Journal*, volume 832, page 155. IOP Publishing, 2016.
- 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. *The Astrophysical Journal Supplement Series*, volume 216, page 25. IOP Publishing, 2015.
- **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. *IEEE Computational Intelligence Magazine*, volume 9, pages 27–39. IEEE, 2014.
- **P. Huijse**, P. A. Estevez, P. Protopapas, P. Zegers, and J. C. Principe. An information theoretic algorithm for finding periodicities in stellar light curves. *IEEE Transactions on Signal Processing*, volume 60, pages 5135–5145. IEEE, 2012.
- **P. Huijse**, P. A. Estévez, P. Zegers, J. C. Príncipe, and P. Protopapas. Period estimation in astronomical time series using slotted correntropy. *IEEE Signal Processing Letters*, volume 18, pages 371–374. IEEE, 2011.

VI Research - Publications in Conference Proceedings

- 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.
- 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)*, pages 1–6. IEEE, 2021.
- N. Astorga, **P. Huijse**, P. Protopapas, and P. Estévez. MPCC: matching priors and conditionals for clustering. In *European Conference on Computer Vision*, pages 658–677. Springer, Cham, 2020.
- **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*, pages 321–326. i6doc. com publication, 2018.
- 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)*, pages 1–8. IEEE, 2018.
- 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)*, pages 1–8. IEEE, 2018.

- 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)*, pages 3736–3739. IEEE, 2016.
- **P. Huijse**, P. A. Estévez, F. Förster, and E. Berrocal. Discriminating variable star candidates in large image databases from the hits survey using nmf. *Procedia Computer Science*, volume 53, pages 29–38. Elsevier, 2015.
- 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*, pages 229–238. Springer, Cham, 2014.
- **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)*, pages 1–6. IEEE, 2012.
- 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)*, pages 1–7. IEEE, 2010.

VII Research - Conference Organization

- Neural and Learning Systems chair of the IEEE Latin American Conference on Computational Intelligence, Montevideo, Uruguay 2022
- Neural and Learning Systems chair of the IEEE Latin American Conference on Computational Intelligence, Temuco, Chile 2021
- General chair of the IEEE Latin American Summer School on Computational Intelligence, Valdivia, Chile 2019

VIII Teaching - Courses

- Bayesian Learning and Neural Networks, UACh 2019-today
  https://phuijse.github.io/BLNNbook/
- Scientific Computing with Python, UACh 2019-today
  https://phuijse.github.io/PythonBook/
- Artificial Intelligence, UACh 2018-today
  https://phuijse.github.io/MachineLearningBook/
- Simulation, UACh 2020-today
  https://phuijse.github.io/MonteCarloBook/
- Statistical tools for research, UACh 2018-today
  http://magister-informatica-uach.github.io/INFO337

- Data mining (Collaborator), UACh 2018-today
  https://github.com/magister-informatica-uach/INFO343-unidad5
- Communication Systems (Collaborator), UACh 2018-today
  https://phuijse.github.io/UACH-INFO185/
- Linear systems analysis, UACh 2018-today
  https://phuijse.github.io/UACH-INFO183/
- Neural Networks and Information Theoretic Learning (Assistant), U. Chile 2013-2015
- Computational Intelligence (Assistant), U. Chile 2010-2016

IX Teaching - Alumni

- Diego Espejo, "Tool for the monitoring of Valdivian wetlands using neural networks for poliphonic sound event detection", Acoustics Engineering, UACh (co-supervisor) 2022
- Nicolas Astorga, "Generative-Inference models: theory and applications", MSc on Electrical Engineering, U. de Chile 2021
- Alfredo Morales, "Adaption layers for the classification of light curves using artificial neural networks", Informatics Engineering, UACh 2021
- Alexis Sánchez, "Bayesian parameter estimation using amortized variational inference", MSc on Computer Science, U. de Concepción (co-supervisor) 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, "Autoencoder Variacional con Covarianza Factorizada para Imágenes Astronómicas", Informatics Engineering, UACh 2020
- Gabriela Gonzalez, "Injury prediction on amateur runners using physical activity tracking data", MSc on Informatics, UACh 2020
- Luis Alvarado, "Application of deep neural networks for the automatic recognition of musical chords", MSc on Acoustics, UACh (co-supervisor) 2020
- Fabian Ruíz, "Characterizing gender bias in communication media by using dynamic topic models", MSc on Informatics, UACh (co-supervisor) 2019
- Victor Vargas, "Automatic gesture recongition for chilean sign language translation", Informatics engineering, 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 (co-supervisor) 2019
- Javiera Astudillo, "An Information Theory Approach on Deciding Spectroscopic Follow Ups", MSc on Computer Science, PUC (co-supervisor) 2019

- Pablo Saavedra, "Estudio de la utilización del potencial de información cruzado en el aprendizaje con ensamble de redes neuronales", Department of Electrical Engineering, U. de Chile (co-supervisor) 2017
- Joaquín Sanchez, "Análisis morfológico utilizando matching pursuit para detección de husos sigma en registros polisomnográficos", Department of Electrical Engineering, Universidad de Chile (co-supervisor) 2016
- Emanuel Berrocal, "Métodos de detección de estrellas variables en imágenes astronómicas basados en factorización no-negative de matrices", Department of Mathematical Engineering, Universidad de Chile (co-supervisor) 2015
- Marianne Fiedler, "Optimización de la detección de periodos de estrellas variables en la nube de magallanes", Universidad de los Andes (co-supervisor) 2015

X Others - Technical skills

- **Programming languages:** ○○○ Python, C and C++ ○○ C#, CUDA and Bash ○ R, Rust, Julia, HTML/CSS and Javascript
- **IDEs:** ○○○ VSCode and NeoVim ○○ Matlab ○ RStudio
- **VCSs:** ○○○ Git
- **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

XI Others - Languages

- Spanish (native)
- English (fluent)

XII 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.