Guilherme Seidyo Imai Aldeia, PhD.

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SUMMARY

Guilherme earned his PhD in Computer Science in December 2025. He is currently a postdoctoral researcher at CavaLab. His current work includes developing methods and applications of symbolic regression and large language models for healthcare, with an emphasis on interpretable decision-making and predictive modeling. He also works on machine learning models using fMRI data and neural network applications for temporal data. His research interests include model interpretability, data visualization, explainable AI, and healthcare prediction and modeling.

EDUCATION

PhD in Computer Science (2025) - Federal University of ABC

Latin-American Summer School in Computational Neuroscience at Universidad de Valparaíso (2025)

M.Sc in Computer Science (2022) - Federal University of ABC

B.Sc in Computer Science (2020) and Neuroscience (2023) - Federal University of ABC

EXPERIENCE

Post-doc fellow (2026) - Boston Children's Hospital, Harvard Medical School

Postdoctoral researcher at Cavalab. Contributed to multiple research projects

Teaching assistant - FIAP, Brazil (2023-2025)

Teaching assistant on Artificial Intelligence and Machine Learning courses

Teaching internship - Federal University of ABC, Brazil (2020, 2022)

Weekly development of programming exercises for students (3 months)

Teaching assistant - Algorithm Complexity Analysis (3 months)

RESEARCH EXPERIENCE

14 publications with 200+ citations (since 2020)

Three publications in Journals (*Philos. Trans. R. Soc. A., IEEE Trans. Evol. Comput.* and *Genet. Program. Evolvable Mach.*) and several international conferences (*GECCO*, *ML4HC*, *WCCI CEC*). One abstract in the *Journal of Pain Research*.

Peer review (since 2022) *IEEE Trans. Evol. Comput.*, IEEE WCCI, IEEE CAI, and *Royal Society*.

Highlights

F. O. de Franca, G. S. Imai Aldeia; Interaction–Transformation Evolutionary Algorithm for Symbolic Regression. Evol Comput 2021; 29 (3): 367–390

Imai Aldeia, G.S., de França, F.O. Interpretability in symbolic regression: a benchmark of explanatory methods using the Feynman data set. Genet Program Evolvable Mach 23, 309–349 (2022).

Imai Aldeia, G.S., Herman, D.S., La Cava, W.G. Iterative Learning of Computable Phenotypes for Treatment Resistant Hypertension using Large Language Models. Proceedings of Machine Learning Research 298:1–31, 2025.

1st Place Undergraduated Final Project at Brazilian Symposium on Information Systems CTCCSI (2020)

RESEARCH PROJECTS

Learning Computable phenotypes for Hypertension (2023 - ongoing)
Using symbolic regression and language models to generate CP for hypertension using EHR data
Understanding pediatric headaches with ML and eXplainable AI (2023 - ongoing)
Training and interpreting ML classifiers on pediatric fMRI data to understand the pain in the youth brain

Current challenges of Symbolic Regression (2022 - 2025)
PhD thesis, focusing on enhancing model accuracy and interpretability in symbolic regression
Interpretability in symbolic regression (2020-2022)
M.Sc dissertation. Creating new explanation methods and evaluating explanations in symbolic regression
Functional connectivity using graph theory to predict brain development (2020)
Undergraduate research. Learning to predict brain functional changes 3 years later.
Evolutionary Algorithms (2019)
Undergraduate research. Studying symbolic regression and proposing a new algorithm called ITEA.

SKILLS

Programming Languages. I am an advanced Python, C++, and Julia programmer.

Linux user for 10+ years. Bash, SSH, docker, cloud computing, SLURM cluster manager, git, LaTeX.

Soft Skills. Quick learner. Proactive, self-motivated.

Languages. Portuguese (native), English (fluent), Spanish (basic)

LIST OF PUBLICATIONS

- **Imai Aldeia, G. S.**, Romano, J. D., Olivetti de França, F., Herman, D. S., & La Cava, W. G. (2026). Towards symbolic regression for interpretable clinical decision scores. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 384(2317), 20240588. https://doi.org/10.1098/rsta.2024.0588
- **Imai Aldeia, G. S.**, Herman, D. S., & La Cava, W. G. 2025. Iterative Learning of Computable Phenotypes for Treatment Resistant Hypertension using Large Language Models. Proceedings of Machine Learning Research 298:1–31, 2025. Available at: https://proceedings.mlr.press/v298/aldeia25a.html
- **G. S. Imai Aldeia**, Hengzhe Zhang, Geoffrey Bomarito, Miles Cranmer, Alcides Fonseca, Bogdan Burlacu, William G. La Cava, and Fabrício Olivetti de França. 2025. Call for Action: towards the next generation of symbolic regression benchmark. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '25 Companion). Association for Computing Machinery, New York, NY, USA, 2529–2538. https://doi.org/10.1145/3712255.3734309
- **Aldeia, G.**, Moon, C., Shulman, J., Sethna, N., Smith, A., Lebel, A., La Cava, W., Holmes, S. 2025. Application of Artificial Neural Networks and Functional Brain Connectivity to Inform Pediatric Headache. The Journal of Pain, 29. https://doi.org/10.1016/j.jpain.2025.105140
- **G. S. Imai Aldeia,** Fabrício Olivetti De França, and William G. La Cava. 2024. Inexact Simplification of Symbolic Regression Expressions with Locality-sensitive Hashing. In Proceedings of the Genetic and Evolutionary Computation Conference (GECCO '24). Association for Computing Machinery, New York, NY, USA, 896–904. https://doi.org/10.1145/3638529.3654147
- **G. S. Imai Aldeia,** F. O. de França, and W. G. La Cava. 2024. Minimum variance threshold for epsilon-lexicase selection. In Proceedings of the Genetic and Evolutionary Computation Conference (GECCO '24). Association for Computing Machinery, New York, NY, USA, 905–913. https://doi.org/10.1145/3638529.3654149
- **G. S. Imai Aldeia,** F. O. de França. 2022. Interpretability in symbolic regression: a benchmark of explanatory methods using the Feynman data set. Genet Program Evolvable Mach 23, 309–349 https://doi.org/10.1007/s10710-022-09435-x
- **G. S. Imai Aldeia** and F. O. de França. 2022. Interaction-transformation evolutionary algorithm with coefficients optimization. In Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '22). Association for Computing Machinery, New York, NY, USA, 2274–2281. https://doi.org/10.1145/3520304.3533987
- F. O. de Franca, **G. S. Imai Aldeia**. 2021. Interaction–Transformation Evolutionary Algorithm for Symbolic Regression. Evol Comput; 29 (3): 367–390. doi: https://doi.org/10.1162/evco_a_00285
- **G. S. Imai Aldeia** and F. O. d. França. 2020. A Parametric Study of Interaction-Transformation Evolutionary Algorithm for Symbolic Regression. IEEE Congress on Evolutionary Computation (CEC), Glasgow, UK, 2020, pp. 1-8, https://doi.org/10.1109/CEC48606.2020.9185521
- T. Spadini, **G. S. Imai Aldeia** et al. 2019. On the application of SEGAN for the attenuation of the ego-noise in the speech sound source localization problem. 2019 Workshop on Communication Networks and Power Systems (WCNPS), Brasilia, Brazil, pp. 1-4, https://doi.org/10.1109/WCNPS.2019.8896308
- **G. S. Imai Aldeia** and F. O. de Franca .2018. Lightweight Symbolic Regression with the Interaction - Transformation Representation. IEEE Congress on Evolutionary Computation (CEC), Rio de Janeiro, Brazil, 2018, pp. 1-8, https://doi.org/10.1109/CEC.2018.8477951