Felipe I. Gutiérrez González

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EDUCATION

- **Pontificia Universidad Católica de Chile** — Santiago, Chile
  - PhD in Engineering Sciences — 2021 – Present
  - Master in Data Management and Processing — 2018 - 2021
  - Master in Urban Development — 2016 - 2017
  - Urban Planning Professional Degree — 2013 - 2017
  - BSc. of Social Science — 2013 - 2016

SCHOLARSHIPS & ACADEMIC ACHIEVEMENTS

- **National Doctorate Scholarship**, National Research and Development Agency (ANID), Chile (2024).
- **San Andrés Scholarship**, awarded by College UC for Master's studies for academic excellence (2019).
- **Top-Ranked Graduate (Rank 1/12)**, Master in Data Management and Processing, PUC.
- **Top-Ranked Graduate (Rank 1/2)**, Urban Planning Professional Degree, PUC.
- **Top-Ranked Graduate (Rank 1/56)**, BSc. of Social Science, PUC.

PUBLICATIONS

- **Gutiérrez, F.**, & Löbel, H. (2025). Model Transferability Informed by Embedding's Topology. In *NeurReps Workshop @ NeurIPS 2025* (Extended Abstract). **(Workshop at A* Conference)**
- Baboun, J., Beaudry, I. S., Castro, L. M., **Gutiérrez, F.**, et al. (2024). Identifying outbreaks in sewer networks: An adaptive sampling scheme under network's uncertainty. *Proceedings of the National Academy of Sciences, 121*(14). **(Q1 Journal)**
- Reyes, A., Mendoza, M., Vera, C., Lucchini, F., Dimter, J., **Gutiérrez, F.**, et al. (2024). SpatialCluster: A Python library for urban clustering. *SoftwareX, 26*. **(Q3 Journal)**
- Vera, C., Lucchini, F., Bro, N., Mendoza, M., Löbel, H., **Gutiérrez, F.**, et al. (2022). Learning to cluster urban areas: two competitive approaches and an empirical validation. *EPJ Data Science, 11*(1). **(Q1 Journal)**

RESEARCH & DEVELOPMENT EXPERIENCE

- **Visiting Research Intern** — Feb 2026 – Apr 2026
  AIDOS Lab (PI: Prof. Bastian Rieck), University of Fribourg, Switzerland
  - Conducted international research collaboration within the context of my PhD, focusing on the intersection of Deep Learning and Topological Data Analysis (TDA).
  - Research on topology-based measures of generalization of deep neural networks based on the training trajectories of the networks.
- **Research Assistant** — Nov 2023 – Dec 2024
  Project: "Neural Bases of Language Acquisition" (PI: Prof. Marcela Peña), Pontificia Universidad Católica de Chile
  - Processed and analyzed electroencephalography (EEG) data from infants to investigate the neural foundations of language acquisition.
  - Conducted research into Temporal Response Function (TRF) models for analyzing neural responses to continuous stimuli.

- **AI Research Intern, Banco de Crédito e Inversiones (BCI)** Aug 2023 – Dec 2023
  Project developed within the Sin Límites UC Innovation Center co-curricular program.
  - Developed a novel system to detect model decalibration by implementing a "Topological Uncertainty" score, a method that assesses prediction reliability by monitoring the topology of a network's activation graphs.
  - This approach enables the detection of data distribution shifts without the need for retraining, providing a crucial tool for maintaining model performance in production environments.
  - Conducted a formal research and benchmarking study on the performance of various vector databases for ML applications.

- **Machine Learning Intern, Entel** Aug 2022 – Dec 2022
  Project developed within the Sin Límites UC Innovation Center co-curricular program.
  - Designed and trained a deep learning model for Speech Emotion Recognition to classify emotional states from audio recordings.
  - Benchmarked the model on standard academic datasets to create a robust prototype for analyzing customer service calls.

- **Data Science Intern, Entel** Mar 2021 – Jul 2021
  Project developed within the Sin Límites UC Innovation Center co-curricular program.
  - Prototyped and evaluated RSS-based algorithms for user geolocation using mobile network antenna signal strength.
  - Developed models to infer location from signal patterns using anonymized dummy data to ensure user privacy.

- **Research Assistant** Nov 2020 – Jul 2021
  MiDaS UC, Santiago, Chile
  - Optimized wastewater sampling strategies for COVID-19 surveillance by processing geographical and graph data with Python.

- **Data Science Intern, ISA Intervial** Aug 2019 – Dec 2019
  Project developed within the Sin Límites UC Innovation Center co-curricular program.
  - Implemented a Bayesian statistical model to quantify and predict vehicular accident risk across a national highway network.
  - Analyzed historical data to identify and prioritize high-risk zones, providing actionable insights for road safety interventions.

- **Consultant** Dec 2019 – Apr 2021
  Economatica, Santiago, Chile
  - Automated institutional data pipelines by developing several web data retrieval and processing projects.

- **Geospatial Data Analyst Intern** Jan 2018 – Mar 2018
  AES Gener, Santiago, Chile
  - Analyzed geographic data to select optimal sites for residential-scale renewable energy projects.

RESEARCH CENTER AFFILIATIONS

- **Affiliated PhD Researcher**, National Center for Artificial Intelligence (CENIA), Chile 2022 – Present
  Chile's national center of excellence for the research, development, and transfer of Artificial Intelligence.

TEACHING EXPERIENCE

Lecturer

- **Programming as a Tool for Engineering** First Semester 2023
  School of Engineering, Pontificia Universidad Católica de Chile

- **Introduction to Data Science** First Semester 2022
  Master of Artificial Intelligence (MIA), School of Engineering, PUC

Teaching Assistant

- **Intelligent Urban Systems** (Professor: Hans Löbel) First Semester 2023

- **Introduction to Data Science** (Professor: Paula Aguirre) Semesters: 1-2021, 2-2022

- **Machine Learning Geospatial Analysis Workshop** (for IRS, Chile; Prof: P. Aguirre) October 2020

- **Geospatial Data Science** (Professor: Paula Aguirre) First Semester 2020

- **The City: History and Processes** (Professor: Macarena Ibarra) First Semester 2017

- **Urban Sociology** (Professors: F. Sabatini, N. Carroza) Semesters: 1-2016, 2-2016, 1-2017

TECHNICAL SKILLS & LANGUAGES

- **Areas of Expertise:** Machine Learning, Deep Learning, Topological Data Analysis (TDA), Geospatial Data Science (GIS), EEG/Signal Analysis, Web Scraping, Data Visualization.
- **Programming and Technology Stack:** Python, SQL (PostgreSQL, PostGIS, PgVector), Generative AI APIs (OpenAI, Gemini), Data Pipeline Automation.
- **Key Libraries and Frameworks:** PyTorch, Scikit-learn, Pandas, Geopandas, Librosa (Audio), MNE-Python (EEG), Ripser/GUDHI (TDA), Requests/BS4/Scrapy (Web Scraping), Matplotlib/Seaborn (Visualization)
- **Languages:** Spanish (Native), English (Professional Working Proficiency, CEFR B2+ Certified by Pearson).

REFERENCES

- **Hans Löbel, PhD.**
  Assistant Professor, Departments of Computer Science and Transport Engineering & Logistics, Pontificia Universidad Católica de Chile.
  PhD advisor and research supervisor. Contact: halobel@uc.cl.