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## EDUCATION

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### University of Massachusetts Amherst

Amherst, MA

PhD in Computer Science, GPA: 4.0

2022 – Current

Fair and Explainable Decision making Lab (FED)

Advisor: Yair Zick

- Research: Implementing and analyzing the Yankee Swap algorithm for Course Allocation. The project involves time complexity analysis, optimizing welfare and fairness metrics, and statistical analysis
- Coursework: Advanced Algorithms, Advanced NLP, Artificial Intelligence, Game Theory and Fairness, Database Design and Implementation

### Pontifical Catholic University of Chile (PUC)

Santiago, Chile

Master of Science in Engineering, GPA: 3.89

2016 – 2019

Advisor: Rodrigo Cienfuegos

- Master Thesis: Assessment of the tsunami forecast capacity using sea surface data assimilation

### Pontifical Catholic University of Chile (PUC)

Santiago, Chile

Bachelor of Science in Engineering (Mathematical Engineering), GPA: 3.64

2012 – 2016

- Relevant Coursework: Linear Algebra, Stochastic Models, Probabilities Theory, Statistical Inference, Probabilistic Graphical Models, Regression Analysis, Time Series, Discrete Mathematics, Multivariate Calculus, Simulations, Optimization under Uncertainty, Real Analysis, Partial Differential Equations

## RESEARCH AND WORK EXPERIENCE

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### Vinken Consultancy / Energy and Complex Systems Lab (PUC)

Santiago, Chile

Data Scientist/R&D Engineer

Jun 2021 – Jul 2022

- Project lead on short and long term forecasting methods for solar energy and electric demand time series
- Built an algorithm to curate solar irradiance data hosted in SQL databases and developed supervised learning forecasting model that incorporated Fourier analysis along with physical and persistence forecasting models
- Integrated the forecasting tool to the backend of existing solar operation management software
- Collaborated on optimizing solar farm cleaning scheduling project in which a Markov Decision Process model was built to select optimal cleaning dates under different sources of uncertainty [1]

### Public Funding Research Project

Santiago, Chile

Project Engineer

Dec 2019 – May 2021

- Posed the tsunami source reconstruction problem from coastal observations as an inverse problem through a Bayesian Inference approach
- Built an algorithm to reconstruct the tsunami source and propagate it. Achieved state of the art tsunami forecasts

### Research Center for Integrated Disaster Risk Management (CIGIDEN)

Santiago, Chile

Researcher

Mar 2019 – May 2021

- Built an algorithm to select candidate tsunami observation points through Principal Component Analysis (PCA) and later clusterize them
- Implemented near-real time data assimilation algorithm for tsunami forecasting, run multiple simulations considering different observation networks and built heuristic to find the optimal one
- Achieved state of the art tsunami forecast for near field points with a network of only 3 observation stations for the study case [3]
- Implemented the methodology for the entire Chilean coast under stochastic scenarios and achieved significant results by adding only 11 observation stations

### Earthquake Research Institute (ERI), University of Tokyo

Tokyo, Japan

Research Fellowship

Oct 2017 – Nov 2017

Supervisor: Kenji Satake

- Master thesis research fellowship on Empirical Orthogonal Functions and Data Assimilation for tsunami forecasting

## PUBLICATIONS

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- [1] M. González-Castillo, P. Navarrete, T. Tapia, Á. Lorca, D. Olivares, and M. Negrete-Pincetic, “Cleaning scheduling in photovoltaic solar farms with deterministic and stochastic optimization”, *Sustainable Energy, Grids and Networks*, vol. 36, p. 101–147, 2023.
- [2] Y. Wang, H. Tsushima, K. Satake, and P. Navarrete, “Review on recent progress in near-field tsunami forecasting using offshore tsunami measurements: Source inversion and data assimilation”, *Pure and Applied Geophysics*, pp. 1–20, 2021.
- [3] P. Navarrete, R. Cienfuegos, K. Satake, Y. Wang, A. Urrutia, R. Benavente, P. Catalán, J. Crempien, and I. Mulia, “Sea surface network optimization for tsunami forecasting in the near field: Application to the 2015 illapel earthquake”, *Geophysical Journal International*, vol. 221, no. 3, pp. 1640–1650, 2020.
- [4] Y. Wang, K. Satake, R. Cienfuegos, M. Quiroz, and P. Navarrete, “Far-field tsunami data assimilation for the 2015 illapel earthquake”, *Geophysical Journal International*, vol. 219, no. 1, pp. 514–521, 2019.

## CONFERENCES, SEMINARS AND POSTERS

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- P. Navarrete, C. Cousins, V. Viswanathan. & Y. Zick (2023). Efficient Yankee Swap for Fairly Allocating Courses to Students. *Columbia Workshop on Fairness in Operations and AI*. Columbia University, New York.
- P. Navarrete, R. Cienfuegos, A. Urrutia., R. Benavente & J. Crempien (2020). Optimal network for sea surface tsunami data assimilation for the entire Chilean coast. *Fourth Colloquium on Geophysical Signatures of Earthquakes and Volcanoes*. Santiago, Chile.
- P. Navarrete, R. Cienfuegos, K. Satake (2018). Assessment of the tsunami forecast capacity using sea surface data assimilation: The 2015 Illapel Earthquake. *III Engineering UC-USM Congress*. Santiago, Chile.

## SELECTED PROJECTS

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### Amplification of Biases in Language Models due to Data Dilution

*COMPSCI 685 Advanced Natural Language Processing*

Spring 2023

- Conducted iterative GPT-2 finetuning, text generation, and then finetuning on the generated data, to measure the effect diluting the training data has on text quality in terms of exposure bias.
- Results showed that the quality reduces considerably after each iteration but exposure bias is not able to capture it

### Reducing Hallucination through Dynamic Partition

*Bio NLP Independent Study*

Spring 2023

- Modified the T5 summarization model, incorporating context partition to induce repetition of certain medical jargon, and avoid hallucinations in electrical health record summarization

## TEACHING

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- **Teaching Associate** at University of Massachusetts Amherst Sep 2023 – Dec 2023  
*Introduction to Programming with Python (Fall 2023)*
- **Teaching Assistant** at University of Massachusetts Amherst Sep 2022 – Aug 2023  
*Introduction to Computation (Fall 2022), Reasoning Under Uncertainty (Spring 2023, Summer 2023)*
- **Adjunct Professor** at Pontifical Catholic University of Chile Mar 2020 – Jul 2022  
*Stochastic Models (Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022)*
- **Teaching Assistant** at Pontifical Catholic University of Chile Mar 2013 – Dec 2018  
*Stochastic Models, Linear Algebra, Calculus II, Marketing*

## SKILLS

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- **Programming:** Python, SQL, MATLAB, C#, Java, Bash, L<sup>A</sup>T<sub>E</sub>X, R, Excel
- **Libraries:** Pytorch, NumPy, Pandas, Networkx, Matplotlib

## SCHOLARSHIPS AND AWARDS

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- PUC School of Engineering Letter of Recognition for Outstanding Teaching 2022
- Most Inspiring Professor of the Industrial and Systems Engineering Department 2020
- JASSO Grant for exchange students in Japan 2017