RODRIGO DE LA FUENTE

linkedin.com/in/rodrigo-de-la-fuente +1 (336)-692-7990 rodelafue@gmail.com https://rodelafue.github.io
2881 Walnut View Ct, Winston Salem NC, 27103, USA

EDUCATION

North Carolina State University **Raleigh, NC**
Ph.D. in Industrial Engineering, College of Engineering *June 2016*
Dissertation title: Simulation Metamodeling with Gaussian Processes: A Numerical Study
Committee: S. D. Roberts (Chair), J. Joines, R. Uzsoy, J. Guinness

North Carolina State University **Raleigh, NC**
Master of Industrial Engineering, College of Engineering *May 2013*

University of Wisconsin-Madison **Madison, WI**
English as a Second Language Program January - July 2011

Universidad del Bio-Bio **Concepcion, Chile**
Bachelor of Science in Engineering - Industrial Engineering (Valedictorian) *May 2009*

Universidad del Bio-Bio **Concepcion, Chile**
Bachelor of Business Administration - Accounting (Valedictorian) *December 2004*

ACADEMIC EXPERIENCE

Assistant Professor - University of Concepcion, Chile August 2016 - Present

- Research and development of Large-scale Simulation and Optimization models for Emergency Systems and applications of Machine Learning to both the Forestry and Transport Industries.
- Teach Simulation Modeling and Data Science courses to undergraduate engineering students (150 students per year approximately).
- Teach Simulation Analysis, Stochastic Models (half-course), Logistic Engineering (half-course), and Operations Management (half-course) at the graduate level. (20 students per year approximately).
- Supervise research endeavors of 20 honors students, five masters of science students, and one Ph.D. student. Served as a thesis committee member of 13 MSc. of Industrial Engineering students and 2 MSc. of Economics students (Machine learning applications).
- Mentor and help for the placement of six honors students in Ph.D. programs in several universities in the U.S.
- Organize science dissemination seminars (20+) as part of the outreach efforts of the Industrial Engineering Department.
- Researcher in Industry Consulting project as an expert in the field of Data Science.

Director of the Master of Operations Management - University of Concepcion, Chile,*March 2019 - June 2021*

- Lead a complete reformulation of the program coursework and paved the way for transitioning from traditional classroom to a hybrid delivery method. Presented and defended all proposed changes at the department, college, and university levels.
- Supervised and coordinated the administration and governance of a program with seven participating faculty and 15 students enrolled per year.
- Acted as the liaison among the graduate students, program faculty, and the college and graduate school administrations.
- Served as the program's representative on collegiate and/or University governance committees.

Research Assistant - North Carolina State University, *June 2015 - June 2016*

. Studied the effect of isotropic and anisotropic covariance functions on the predictive power of Gaussian Processes as surrogate simulation models.
. Compared the predictive power of several machine learning algorithms as surrogate models for both Systems Dynamics and Discrete Events Simulations.
. Implemented a distributed simulation system to evaluate the effect the number of replications has on the predictive accuracy of different machine learning models.

RESEARCH INTERESTS

Large-scale simulation models for emergency response systems, online simulation-optimization for dynamic systems, vehicle routing models evaluated using discrete event simulation, machine learning applications to transport mode choice, deep learning and reinforcement learning coupled with different simulation paradigms, geographical information systems for city-wide policy evaluations, applications of operations research tools in the forestry industry.

PUBLICATIONS

Peer-reviewed Articles

1. Salas, P., **De la Fuente, R. A.**, Astroza, S. & Carrasco, J. A. (2022). *Comparison of Statistical and Machine Learning Methods to Understand and Predict Travel Mode Choice: A Methodological Approach*, Expert Systems with Applications, https://doi.org/10.1016/j.eswa.2021.116253 - Q1.
2. Bjånes, A. S., **De la Fuente, R. A.**, & Mena, P. A. (2021). *A deep learning ensemble model for wildfire susceptibility mapping*. Ecological Informatics, https://doi.org/10.1016/j.ecoinf.2021.101397 - Q2.
3. Aguayo, M. M., Fierro, P. E., **De la Fuente, R. A.**, Sepúlveda, I. A., & Figueroa, D. M. (2021). *A mixed-integer programming methodology to design tidal current farms integrating both cost and benefits: A case study in the Chacao Channel, Chile*. Applied Energy, https://doi.org/10.1016/j.apenergy.2021 .116980 - Q1.
4. **De la Fuente, R. A.**, Cancino, J., & Acuña, E. (2021). *Comparison of machine learning methods for dry biomass estimation based on green logging residues chips*. International Journal of Forest Engineering, https://doi.org/10.1080/14942119.2021.1892415 - Q3.
5. Rodriguez, S. A., **De la Fuente, R. A.**, & Aguayo, M. M. (2021). *A simulation-optimization approach for the facility location and vehicle assignment problem for firefighters using a loosely coupled spatio-temporal arrival process*. Computers & Industrial Engineering, https://doi.org/10.1016/j.cie.2021.107242 - Q1.
6. Neira, D. A., Aguayo, M. M., **De la Fuente, R. A.**, & Klapp, M. A. (2020). *New compact integer programming formulations for the multi-trip vehicle routing problem with time windows*. Computers & Industrial Engineering, https://doi.org/10.1016/j.cie.2020.106399 - Q1.
7. Rodriguez, S. A., **De la Fuente R, A.**, & Aguayo, M. M. (2020). *A facility location and equipment emplacement technique model with expected coverage for the location of fire stations in the Concepción province, Chile.* Computers & Industrial Engineering, https://doi.org/10.1016/j.cie.2020.106522 - Q1.

Under-review Articles

1. Sepulveda, I, Aguayo, M. M., **De la Fuente, R. A.** & Obreque, C., *An heuristic approach for the mobile dental clinic scheduling*, submitted to Health Care Management Science (Under second review) - Q2.
2. Essus, Y., **De la Fuente, R. A.**, & Venkitasubramanian, A., Survival based real-time optimization for relocation and dispatching of Emergency Medical Services with balanced workload and outsourced ride-hailing services, submitted to OMEGA Journal (Preparing submission for second review) - Q1.

Peer-reviewed Conference Proceedings

1. Erazo, I. I. and **De la Fuente, R. A.** (2021) *A Simulation-Based Approach to Compare Policies and Stakeholders' Behaviors for the Ride-Hailing Assignment Problem*, 2021 Winter Simulation Conference (Accepted conditional to presentation).
2. **De la Fuente, R. A.**, Gatica, J. & Smith, R. L. (2019) *A Simulation Model to Determine Staffing Strategy and Warehouse Capacity for a Local Distribution Center* In Proceedings of the 2018 Winter Simulation Conference, edited by N. Mustafee et al., Piscataway, New Jersey: IEEE, Inc.
3. **De la Fuente, R. A.**, Smith, R. L., & Erazo, I. I. (2018) *Enabling Intelligent Processes in Simulation Utilizing the TensorFlow Deep Learning Resources*. In Proceedings of the 2018 Winter Simulation Conference, edited by M. Rabe et al., Piscataway, New Jersey: IEEE, Inc.
4. **De la Fuente, R. A.**, and Smith, R. L. (2017). *Metamodeling a System Dynamics Model: A Contemporary Comparison of Methods*. In Proceedings of the 2017 Winter Simulation Conference, edited by W. Chan et al., Piscataway, New Jersey: IEEE, Inc.

Book Chapters

1. Jimenez, J, Rivas, C. & **De la Fuente, R. A.** (2021), *Technical and Economic Viability of Agricultural Residue-Based Power Generation in Southern Chile Through Discrete Location Models*, Invited Book Chapter, Springer Proceedings of the 3rd International Conference on BioGeoSciences: Modeling Natural Environments, https://doi.org/10.1007/978-3-030-88919-7.

Working Papers

1. Salas, P., **De la Fuente, R. A.**, Riquelme, J. A., *Application of Non-supervised Learning Tools and Visualization Techniques to Understand the Segmentation Dynamics of First-Year Engineering Students*.
2. **De la Fuente, R. A.**, Aguayo, M. M., & Contreras, C., *An optimization-based approach for an integral forest fires monitoring system with multiple technologies and drone routing*.
3. Neira, D., Aguayo, M. M., & **De la Fuente, R. A.**, A new compact formulation for the vehicle routing problem with release dates.
4. Ubilla, H, **De la Fuente, R. A.**, Aguayo, M. M., & Bjånes, A., *Bike Stations Location Model for a Bike Sharing System and its Application to the city of Concepción*.

CONFERENCE AND SEMINAR PRESENTATIONS

Conferences

1. **Winter Simulation Conference**, *Phoenix, AZ, USA* *December 2021*
   A Simulation-Based Approach to Compare Policies and Stakeholders' Behaviors for the Ride-Hailing Assignment Problem.
2. **The Transportation Research Board 99th Annual Meeting** , *Washington, DC, USA* *January 2020*
   Comparison of Statistical and Machine Learning Methods to Understand and Predict Travel Model Choice: A Methodological Approach.
3. **Winter Simulation Conference**, *National Harbor, MD, USA* *December 2019*
   A Simulation Model to Determine Staffing Strategy and Warehouse Capacity for a Local Distribution Center.
4. **Second International Scientific Convention UCLV 2019**, *Santa Clara, Cuba* *June 2019*
   Technical and Economic Viability of Agricultural Residue-Based Power Generation in Southern Chile Through Discrete Location Models.
5. **Winter Simulation Conference**, *Gothenburg, Sweden* *December 2018*
   Enabling Intelligent Processes in Simulation Utilizing the TensorFlow Deep Learning Resources.
6. **Winter Simulation Conference**, *Las Vegas, NV, USA* *December 2017*
   Metamodeling a System Dynamics Model: A Contemporary Comparison of Methods.

7. **INFORMS Annual Conference**, *Phoenix, AZ, USA* *October 2012*
   Modeling Combat Air Support Using Simulation: An Object Oriented Approach.

Seminars

1. **University of Talca**, *Talca, Chile* *April 2018*
   Machine Learning Applications in Economics.
2. **East Carolina University**, *Greenville, NC, USA* *November 2017*
   Exploring Machine Learning Techniques to Improve the Forecast of Dry Biomass Yields.
3. **University of Concepción**, *Concepción, Chile* *March 2017*
   A Gentle Introduction to Python Programming for Engineers.

TEACHING INTERESTS

Undergraduate and graduate-level courses in simulation (modeling and analysis), logistic engineering, operations managements, stochastic models, programming with Python, machine learning, and deep learning.

TEACHING EXPERIENCE

Undergraduate Teaching (Instructor)

. Simulation Modeling, *Fall 2016, 2017, 2018, 2019, 2020, 2021*
. Machine Learning for Business Intelligence (Newly created), *Spring 2017, 2018, 2019, 2020, 2021*
. Introduction to Machine Learning (Newly created), *Fall 2020*

Graduate Teaching (Instructor)

. Simulation, *Fall 2016, 2017, 2018, 2019,2020*
. Logistic Engineering, *Spring 2016, 2017,2018*
. Operations Management, *Fall 2016, 2017, 2018, 2019, 2020*
. Stochastic Models, *Spring 2017, 2018, 2019, 2020, 2021*
. Machine Learning, *Fall 2016, 2017, 2018*

INDUSTRY CONSULTING PROJECTS

Breath Bio-Bio, Public Interest Project

Machine Learning specialist in charge of developing spatio-temporal air quality prediction models. We explored Convolutional recurrent neural networks and Gaussian Processes, Project ID N° 18IPP-93627 CORFO, Chile.

Exploratory Analysis of Fishing Operations

I led and supervised a team of engineers in the developing of a product that could identify a relationship between several oceanographic variables (satellite imagery) and fish catch sizes. Consulting project IIT N° 2019–349, University of Concepción, Chile.

NOTABLE MENTORED UNDERGADUATE STUDENTS

Esteban Soto (2017), Ph.D. student in Technology - Purdue University.
Ignacio Erazo Neira (2018), Ph.D. student in Operations Research - Georgia Institute of Technology.
Sebastián Rodriguez Cartes (2019), Ph.D. student in Industrial Engineering - North Carolina State University.
Daniel Neira González (2020), Ph.D. student in Operations Research - Virginia Tech.
Ignacio Sepúlveda Llanos (2020), Ph.D. student in Industrial Engineering - North Carolina State University.
Yamil Essus Pradel (2020), Ph.D. student in Industrial Engineering - North Carolina State University.
Alexandra Bjånes (2020), M.Sc. student in Data Science, Polytechnic University of Milan.

TECHNICAL SKILLS

Simulation: Discrete events, Systems dynamics, Agent based, Metamodeling, Large-Scale models.
Optimization: Linear programming, Stochastic optimization, Robust optimization, and Metaheuristics.
Logistics: Location, Inventory, Vehicle routing, and Warehousing models.
Machine Learning: Tree-based models, Deep learning: Discriminative, Descriptive and Generative models.
Geographic Information Systems: Satellite imagery, GPS data, Raster images analysis, Vector data operations, Database creation.

COMPUTATIONAL SKILLS

Programming: Python, C++, Java, R, Html.
Data Science: Tensorflow, Sklearn, Keras, Pytorch.
Simulation & Optimization: Simio, Arena, Anylogic, Gurobi, Cplex.
Geographic Information Systems: Qgis, Gdal, Geopandas, Shapely, Grass.

AWARDS AND HONORS

Fulbright Scholarship (U.S. Department of State, four years funding). *May 2011*
Becas Chile (Recipient of PhD full fellowship, Chilean government). *May 2011*
Best Student of Industrial Engineering Award (University of the Bío-Bío). *May 2009*
University of the Bío-Bío Award, Accounting Mayor (University of the Bío-Bío). *December 2004*
Best Student Business School Award (University of the Bío-Bío). *October 2003*
Bicentenary Scholarship (four years full undergraduate fellowship, Chilean government). *March 2001*