

SEBASTIÁN AGUILERA NOVOA

Physicist - Data Scientist

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Bogotá D.C.

EXPERIENCE

Internship in Molecular Modeling and Simulations

São Carlos Institute of Physics - University of São Paulo

Feb 2023 - Apr 2023

São Carlos, Brazil

- Set up and contrast Monte Carlo (MC) and molecular dynamics (MD) simulations of a protein-ligand system to generate structured data (positions, velocities, RMS, etc).
- Analyze the structured data generated by the MC and MD simulations using Markov model algorithms (lagtime, hidden markov chains, etc).

MAAD - Soundscape Analysis in Python

scikit-maad project

Jan 2023 - Feb 2023

Bogotá D.C., Colombia

- Create spectral and time traits with examples, test, and documentation.

Birdsongs

Research group Datalab - National University of Colombia

2022

Bogotá D.C., Colombia

- Set up and evaluate a ML algorithm (using YOHO/CNN) using the data generated by the model as an augmentation data technique (*in process*).
- Create and analyze synthetic birdsongs of the specie *Zonotrichia Capensis* from five countries.
- Generate unstructured data (audio/images of birdsongs) using a physical model and Python language.

Summer Research Program

Electrical & Computer Engineering - University of Delaware

Jun 2021 - Sep 2021

Delaware, EEUU

- Analyze and visualize raw audio data using signal processing, 2-week records from a microphone in a river.

PROJECTS

Birdsongs

National University of Colombia

Aug 2022 - Currently

Bogotá D.C., Colombia

- Python packing of the **motor gestures for birdsongs** model that simulates the sound production in birds.
- Automate the generation of synthetic birdsongs (audio/images) using numerical optimization theory and algorithms, numerical methods, and signal processing.

INTERESTED IN

Acoustics

Machine Learning

Languages

Ecology

Simulations

Music

Teaching

EDUCATION

B.Sc. in Physics

National University of Colombia

2015 - 2023

Bogotá D.C.

Residential Electrical Installation Technician

Servicio Nacional de Aprendizaje (SENA)

2012 - 2013

Bogotá D.C.

MOST PROUD OF



Awarded Jhoti and Salazar Scholarship

São Carlos Institute of Physics (IFSC)

2023

São Carlos, Brazil



Second best undergraduate dissertation in physics

Physics Department, UNAL

2023

Bogotá, Colombia

STRENGTHS

Hard-Working

Eye for detail

Passionate

Creativity

Adaptability

Fast-Learning

Programming

Autodidact

Data Analysis

Numerical Optimization

Signal Processing

Mathematical Modeling

Critical Analysis

LANGUAGES

Spanish

English

Portuguese



- Study and analyze of bandwidth as function of the length of the trilled syllables (last syllables of the birdsongs) for several *Zonotrichia Capensis* from different countries.

Aprender - A New Way of Learning

Independent

📅 2019 – 2022 📍 Bogotá D.C., Colombia

- Design, create and host a homepage for the preparatory.
- Implement the Moodle platform on the homepage as a Learning Management Platform.
- Mathematics and physics teacher: design and creation of lessons and tests for evaluation.

Recorder Characterization

National University of Colombia

📅 2020 📍 Bogotá D.C., Colombia

- Study the recorder musical instrument from experimental, theoretical, and computational physics.
- Analyze and visualize the structured data generated and measured from the study in order to compare them.

Acoustic Simulation of a Classroom

National University of Colombia

📅 2019 📍 Bogotá D.C., Colombia

- Modeling and simulation of a conference classroom using the Lattice Boltzmann Method (LBM), writing in c++ using OOP, to generate comparable structured data.
- Physical and computational measurement of classroom reverberation time for comparison.

Physics Laboratories

National University of Colombia

📅 Aug 2015 – Dec 2021 📍 Bogotá D.C., Colombia

- Set up laboratories to validate physical theories by measuring structured data (physical measurable quantities).
- Create lab reports with the state of art, discussion and analysis (involving mathematical fittings to the structured data), methodology, and conclusions.

SOFTWARE SKILLS

Python, Latex, Office
Github, Linux, SSH, Matlab, Raven
Mathematica, Julia, Krita, C++, Power BI
JavaScript, HTML, SQL, CSS



PYTHON LIBRARIES

Matplotlib, Numpy, Scipy, Plotly, Pandas
Pytorch, Scikit-Learn, Pytest, Seaborn
Scrapy, PeakUtils, Sympy, Lmfit, Librosa
Django



WORKSHOPS/SCHOOLS

Machine Learning for Quantum Matter and Technology

Workshop - Organized by Universidad de los Andes

📅 2019 📍 Bogotá, Colombia

TRAINING/CERTIFICATIONS

Structuring Machine Learning Projects

Coursera

📅 In Process 📍 Online

Introduction to Structured Query Language (SQL)

Coursera

📅 2023 📍 Online

Neural Networks and Deep Learning

Coursera

📅 2021 📍 Online

Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

Coursera

📅 2021 📍 Online

PUBLICATIONS

📖 Books

- S. A. Novoa, *Design, development, and evaluation of a computational physical model to generate synthetic birdsongs from recorded samples*. National University of Colombia, digital archive., 2022, Bachelor's Dissertation.

REFEREES

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