Eduardo Adame Salles 🐧

✉ eadamesalles@gmail.com   📍 Rio de Janeiro - Brazil   ♔ April 2003   in eadamesalles   ⌂ adamesalles

About me

I am an individual with a passion for learning things that can help people.

During my technical course, I focused on structural analysis, computational mechanics, and robotics. I was the captain and founding member of the leading drone team in the state of Rio de Janeiro, ranking 8th nationally in the Formula Drone SAE Brazil competition, with about 50 competitors. During this time, I also participated in several national knowledge olympiads and received numerous awards, notably in the OBMEP, the world's largest student olympiad, reaching over 18 million students and more than 47,000 schools.

I have some experience in creating educational materials such as courses and textbooks. At FGV, I have fully embraced teaching opportunities and have two years of experience as a teaching assistant. For two years, I have been part of the Scientific Initiation and Master's Program, meaning that upon completing my undergraduate degree, I will have fulfilled the credits required for a master's degree, with only the thesis remaining. In terms of research, I have been working on Gaussian Processes under the supervision of Professor Luiz Max de Carvalho.

Furthermore, since February 2023, I have been temporarily employed as a consultant and research assistant for The World Bank during a 1-year project, where I engaged in data collection and processing, as well as the implementation and adjustment of econometric models using PyTorch.

Educational Background

> BSc. in Data Science and Artificial Intelligence `2021 – Today`

School of Applied Mathematics, Getulio Vargas Foundation (FGV EMAp).
Rio de Janeiro, Brazil.

Scientific Initiation and Master's Program in Mathematics (PICME).
- » Spring 2021 - Real Analysis (Undergraduate-level) - Grade: 9.5/10.
- » Autumn 2022 - Linear Algebra (Graduate-level) - Grade: A.
- » Spring 2022 - Numerical Analysis (Graduate-level) - Grade: A.
- » Autumn 2023 - Visual Data Analysis (Graduate-level) - Grade: A.

Other Graduate-level courses taken: Computational Statistics, Statistical Inference, and Causal Inference.

Undergraduate Student Representative at the Assessment Commission (CPA) from 2022 to 2024.

> Technical Degree in Industrial Mechanics `2018 – 2020`

Federal Center for Technological Education Celso Suckow da Fonseca (CEFET/RJ).
Angra dos Reis, Rio de Janeiro, Brazil.

Professional Experience

> **Consultant / Research Assistant**
The World Bank.

I work in developing, applying, improving, and optimizing econometric models for geospatial land use data in Latin America and the Caribbean (LAC). This project is supervised by Professors Marcelo Sant'Anna (FGV EPGE), Rafael Araújo (FGV EESP), and Francisco Costa (University of Delaware). Currently, we are handling a dataset comprising tens of millions of entries, for which I am also responsible for data cleaning and processing. I primarily use PyTorch for scalability with NVIDIA CUDA. This contract is expected to last until April 2024.

Academic Experience

> **Teaching Assistant**
Feb/2022 – Today
School of Applied Mathematics at FGV.

Courses:
» Autumn 2022 - Introduction to Computation. Instructor: Prof. Rafael de Pinho, PhD.
» Spring 2022 - Multivariate Calculus. Instructor: Prof. Maria Izabel Camacho, PhD.
» Summer 2023 - Multivariate Calculus. Instructor: Prof. Sônia Durães, PhD.
» Autumn 2023 - Data Science Techniques and Algorithms. Instructor: Prof. Alberto Paccanaro, PhD.
» Spring 2023 - Statistical Inference. Instructor: Prof. Philip Thompson, PhD.
» Summer 2024 - Multivariate Calculus. Instructor: Prof. Sônia Durães, PhD.
» Summer 2024 - Introduction to Real Analysis (Graduate-level). Instructor: Prof. Philip Thompson, PhD.

> **Vice President**
Aug/2021 – Aug/2022
Applied Mathematics Academic Board at FGV EMAp (DAMA).

Selected by the student body of FGV EMAp. Among my achievements during this period, the highlight is the creation and execution of the first SEEMAp - Week of Extension of the School of Applied Mathematics - which has since become an annual event. It gathers over 200 students and teachers from across Brazil.

> **Teaching Assistant**
Feb/2019 – Jul/2020
Federal Center for Technological Education (CEFET/RJ).

Teaching Assistant during the "Fundamentals of Mechanical Design" course (Autumn 2019, Spring 2019 and Autumn 2020).

Awards

🏆 Scientific Initiation scholarship. Project: "Shape-constrained Gaussian Processes" - National Institute of Mathematics Science and Technology (INCTMat), 2023.

🏆 Silver Medal - Elon Lages Competition, Brazilian Mathematical Olympiad (OBM), 2022.

🏆 Gold Medal (1st Place) - Science, Technology and Innovation Fair of the State of Rio de Janeiro (FECTI), 2021.

🏆 Silver Medal - Brazilian Mathematical Olympiad of Public Schools (OBMEP), 2019.

🏆 Bronze Medal - Brazilian Mathematical Olympiad of Public Schools (OBMEP), 2018.

Activities

> Presentations and Courses Taught at Events

2022   **Applications of Machine Learning in Engineering.**
Presented at the Week of Teaching, Research, and Extension (SEPEX) as a guest of the director and faculty of CEFET/RJ UnED Angra dos Reis, my alma mater in Mechanics. The presentation aimed to demystify the initial steps for students in Mechanical, Electrical, and Metallurgical Engineering in Machine Learning techniques. The approach was not to delve into mathematical details but to explain in a simple, visual, and intuitive manner how to apply a model in a project in these fields.

2021   **Drone Application in Firefighter Support.**
A project I co-developed with two colleagues from the Stardust team and the Technical Course in Mechanics, guided by Professors Marcelo dos Reis Faria, PhD, and Paulo Victor dos Santos, MSc. The project gained significant recognition, winning first place at the CEFET/RJ SEPEX for all UnEDs and at the Rio de Janeiro State Science, Technology, and Innovation Fair (FECTI). We also became finalists at the Brazilian Science and Engineering Fair (FEBRACE).

2020   **LaTeX: A Tool for Writing High-Quality Scientific Texts.**
An 8-hour course taught by me, under the guidance of Professor Paulo Victor dos Santos, during SEPEX at all campus of the CEFET/RJ.

2019   **LaTeX: A New Approach to Academic Writing**
An 8-hour course co-taught with Professors Cláudio Corrêa and Maurício de Carvalho during SEPEX at the CEFET/RJ.

2018   **Basic Principles of Aerodynamics and Construction of an Elastic Energy Propelled Glide.**
A 3-hour workshop co-taught with Professor Paulo Victor dos Santos during SEPEX at the UnED Angra dos Reis of CEFET/RJ.

> Participation on Congresses

2023   **Latin American Congress on Industrial and Applied Mathematics (LACIAM).**

2023   **42nd National Congress of Applied and Computational Mathematics (CNMAC).**

> Work in Progress

2023 – Today   **Efficient function emulation for the normalised power prior**
joint work with Luiz Max Carvalho (FGV EMAp), Andrew Manderson (MRC Biostatistics) and Joseph G. Ibrahim (University of North Carolina)

2023 – Today   **SGGP.jl: Shape Constrained Gaussian processes in Julia**
joint work with Luiz Max Carvalho (FGV EMAp)

2023 – Today   **Bayesian shape-constrained curve-fitting with Gaussian processes: prior elicitation and computation**
joint work with Luiz Max Carvalho (FGV EMAp)

› Research Projects

Jul/2023 – Today

Shape-constrained Gaussian Processes

Supervised by Professor Luiz Max de Carvalho, PhD.

The use of Gaussian processes is a powerful technique for estimating functions which cannot be evaluated across their entire domain, allowing for the quantification of estimation uncertainties, especially when following the Bayesian paradigm. However, when we have prior knowledge about the shape properties of a function, especially its derivatives, it is possible to enhance the quality of our estimates. This project focuses on the development and application of shape-constrained Gaussian processes to improve function estimation. The project repository is available on: `https://github.com/adamesalles/shape-constrained-gaussian-processes`.

Feb/2018 – Dec/2021

STARDUST Drone Team

As the captain from 2019 to 2021, I led this team focused on the study, development, customization, and application of Unmanned Aerial Vehicles (UAVs). The team, comprising both faculty and students at technical and engineering levels, achieved significant milestones. In 2019, we secured the eighth position in the Formula Drone SAE Brasil competition. In 2021, we ranked first in both the CEFET/RJ extension week (across all units) and the XV FECTI by the Fundação CECIERJ. Based at CEFET/RJ UnED Angra dos Reis, our team has gained notable recognition in the state, leading to an invitation to the Brazilian Science and Engineering Fair where we became finalists in 2022.

Aug/2018 – Dec/2018

Creation of Demoiselle Mini Gliders

This team was dedicated to designing miniature gliders powered by Elastic Energy, aiming to compete in the SAE Brasil Demoiselle competition. Founded in 2018, this project is based at CEFET/RJ UnED Angra dos Reis.

› Courses and Materials Developed

2023

LaTeX Course - FGV

Developed a comprehensive LaTeX course, including text, presentations, and on-demand videos, for the Fundação Getulio Vargas. This course is offered as an asynchronous online module for undergraduate students.

2021

SymPy Course

Created a course consisting of text, a website, and videos during my technical course internship. This was designed to assist in laboratory studies and was made available through CEFET/RJ's networks. Available on: `https://github.com/adamesalles/cursosympy`.

2020

LaTeX Course (old)

Produced a LaTeX course in the form of text, presentations, and videos for my participation in events, with the content also available on YouTube: `https://www.youtube.com/playlist?list=PLtp0NMJtiOH_VR4HhOQEJdVNwb2lFzqmL`.

2019

Mechanical Design

Authored a textbook to support my TA sessions at CEFET/RJ.

> Selected Works

2023   **A Bayesian approach to understanding the Homicide Rate in the City of Rio de Janeiro by administrative regions through their Social Progress Index indicators.**

This study aims to investigate the relationship between the homicide rate in the city of Rio de Janeiro and the indicators of the Social Progress Index. Our approach involves employing Bayesian methodology to estimate the parameters of three multilevel models and subsequently comparing their performance. The Social Progress Index serves as a measure of the overall quality of life and social well-being of the population, and it has been regularly published by the Pereira Passos Institute for the City of Rio de Janeiro biennially since 2016. Given the well-known issue of violence in Rio de Janeiro, the homicide rate serves as a pertinent indicator of this problem. The city is divided into 33 administrative regions, and we utilize the corresponding data throughout this research. Available on `https://github.com/adamesalles/homicide-rate-rj`.

2023   **Gaussian Processes Visual Tool**

This paper presents the Gaussian Processes Visual Tool, an interactive tool for visualizing Gaussian Processes (GPs). The tool combines the power of Svelte, D3.js, Flask, and GPyTorch to provide a flexible and user-friendly interface. With the Gaussian Processes Visual Tool, users can visualize and understand GPs, make observations, and explore various kernel functions. The tool offers simulation options, allowing users to set axis parameters, likelihood variance, and even upload custom datasets. It stands out for its aesthetic design, comprehensive functionalities, and the integration of multiple important technologies. The Gaussian Processes Visual Tool fills a gap by offering a beautiful and useful tool that combines all essential GP functions in one place. The tool is publicly available on `https://github.com/adamesalles/gp-visual-tool/`, enabling researchers and practitioners to employ it for GP visualization, experimentation, and education.

2023   **Voyager's Journey: an interactive visualization of NASA's mission through the solar system**

Joint work with Juan Belieni (FGV EMAp) and Marcelo Amaral (FGV EMAp).

This article presents an interactive visualization using web technologies of the Voyager program by showing, for each probe, a simulation of the Solar System, containing the probe's position for each day, the main events of the mission inside a timeline and a gallery of images captured by them. The visualization is controllable by a player, which offers the option to play, pause, change the speed and reset the whole visualization. Available on `https://github.com/fgv-vis-2023/final-project-voyagers-journey/`.

> References

Prof. Luiz Max F. Carvalho, PhD.	luiz.fagundes@fgv.br	For Research
Prof. Yuri Saporito, PhD.	yuri.saporito@fgv.br	For Teaching
Prof. Philip Thompson, PhD.	philip.thompson@fgv.br	For Teaching