

Pablo Cárdenas

PROGRAMMING AND MATHEMATICS

About me

Background

I studied Civil Engineering at UNI and did a Masters in Applied Mathematics at IMCA. During my studies I have spent a lot of time studying programming and data science in a self-taught way.

Non-Technical Skills

- Critical Thinking
- Proactive problem solving
- Intellectual curiosity
- Effective Communication

Technical Skills

- Ability to prepare data for efficient analysis.
- Ability to write efficient and maintainable code.
- Ability to apply math and statistics properly

LINUX, FOSS

Im a fan of open source projects. I have been using Linux for 9 years for its stability, reliability and ease of operation and maintenance. For me, having a terminal is enough to work.

Quick overview *(details on the following pages)*

SKILLS **AWS Databases** (RDS, DocumentDB, DynamoDB, ElastiCache), **AWS Services** (IAM, EC2, Elastic Beanstalk, Lightsail, ECS, EKS, S3), **Quantum Computing** (AWS Bracket, IBM Qiskit) **SQL** (Mysql, PostgreSQL, SQLite), **Python for Web Development** (django, flask, fastapi, sqlalchemy, jinja2, wtforms, gunicorn, uwsgi), **Python for DataScience** (tensorflow, torch, scikitlearn, stablebaselines, keras-rl, pandas, matplotlib, numpy, scipy, pygame, opencv), **Web Development** (Javascript, PWA, Webpack, ReactJS, AJAX, jQuery, sass, open-props, bootstrap), **Python for GIS** (geopandas, fiona, shapely, rasterio, pyproj), **R for DataScience** (caret, modelr, RMarkdown, shiny, ggplot2, feather, dplyr, purrr, tidyr, stringr, lubridate, magrittr, devtools, testthat), **R for GIS** (sf, terra, sp, raster, tmap)), **Java** (Android, kotlin, Apache Tomcat, LibGDX)), **TEX** (PlainTEX, L^ATEX)), **PHP** (synfony, doctrine, PHPUnit, drupal, wordpress)), **Shell** (Bash, Powershell, VBScript), **Networking** (SSH, FTP, OpenVPN, IPTables)), **VCS** (Github, Gitlab, CI-CD), **Other** (Test-Driven Development, Functional Programming), **.NET** (C#, VB.NET), **Text Editor** (Vim, VSC), **Web Server** (Apache, Nginx, CertBot)

EXPERIENCE

Dates	Skills	Topic
2024 jan-mar	Classification, Regression, Clustering, SVM, Deep Learning, GPT, Unsupervised, Python (pytorch)	Machine Learning course at IMPA
2023 dec – 2024 feb	AWS (s3, ec2, lambda), docker, Python (pytorch with cuda, opencv)	Video analysis and Image recognition
2023 sep-dec	Python (pandas, geopandas, SQL, COM)	Traffic Simulation for ATU
2023 mar-jun	Python (pandas, geopandas, SQL, COM)	Traffic Simulation for Protránsito
2022 jan – now	Montecarlo Simulation, Python for GIS, C	Simulation of Urban Growth
2022 feb – 2023 jun	R for DS and GIS	Machine Learning for Hydrology
2022 mar – 2023 jun	Montecarlo Simulation, Python (gym, pytorch, stablebaselines)	Reinforcement Learning for Mining
2021 jan – 2022 dec	Webapp, Linux, SQL, Nginx, Python (flask, Jinja2, SQLAlchemy, wtforms, pytest)	Web development for IMCA
2020 jan – 2021 jun	SQL, Python (SQLAlchemy, Jinja2), Moodle API	Reports automation
2020 jan – 2021 mar	SQL, Python (SQLAlchemy, Jinja2), Google API, Moodle API	Email Automation
2019 jan-dec	Webapp, Linux, SQL, Apache, Python (Django), React	Web Development for FIC-UNI
2018 jan-dec	Webapp, Linux, SQL, Apache, PHP (Symfony, Doctrine, PHPUnit)	Web Development for FIC-UNI
2018 ago – 2021 ago	Computer Programming, Numerical Analysis	Teacher Assistant at UNI
2016 jan – 2018 jun	.NET (C#, VBA, Python) para AutoCAD, Revit	Engineering

Considering hiring me?

EMAIL

pablo.cardenas@imca.edu.pe

CALL

+51 958 439 563

WEB

pcardenasb.com

LINKEDIN

linkedin.com/in/pcardenasb

Achievements

- First place in the Qiskit Fall Fest Peru 2022 Quantum Computing Hackathon.
<http://imca.edu.pe/es/noticia/new/noticia/alumno-del-imca-gana-hackaton-de-computacion-cuantica>
- Exhibition at IMCA 25th Anniversary Conferences
<http://imca.edu.pe/es/noticia/event/conferencias/conferencias-imca-25-anos>
- First place in the PreMaster course for admission of the program of Master of Science in Applied Mathematics program, corresponding to summer 2014..
- First place in the PreMaster course for admission of the program of Master of Science in Applied Mathematics program, corresponding to summer 2014..
- First Place in the 2013-2 UNI FIC Project Contest: Basic Sciences Category. with the theme: "Numerical Convergence of Nonlinear Static Analysis of a Simple Cutting Model"
Technologies used: Matlab

Interests

Data Science Data Science brings together knowledge and technologies from different areas to which I am related such as statistics, mathematics, computing, among others. These days, you can easily find big data apps everywhere. The languages for programming in Data Science are R and Python. I master both languages. In python, I use the scikit-learn, tensorflow, pytorch, dash, pandas libraries. In R, I use the tidyverse libraries (dplyr, tidyr, purrr, ggplot2), as well as datascience libraries such as modelr, caret, shiny, among others.

Web Services I started in the world of web services at Linode. My personal website <https://pcardenasb.com> is hosted in a Linode VPS. Currently, I know how to use Amazon web services like IAM, S3, EC2, ECS, EKS for handling applications and containers. Also, I know some AWS databases like RDS, DocumentDB, DynamoDB, ElastiCache. It should be noted that it helped me to have a solid knowledge in Linux, Docker, Kubernetes, SQL, MongoDB and Redis to be able to quickly learn their equivalents in AWS.

Reinforcement Learning I have recently learned reinforced learning techniques such as SARSA and Q-Learning, approximate methods, among others. Im reading these topics from Suttons book. Deep Reinforcement Learning libraries exist in python that provide the algorithms. I know reinforced learning libraries like Stable-Baselines and Keras-RL.

Quantum Computing Quantum computing is my Masters thesis topic. I master Quantum Computing libraries like IBM Qiskit and AWS Bracket. Quantum computing is a topic with quite potential and is a good long-term research topic.

Experience Details

Institute of Pure and Applied Mathematics - IMPA

Machine Learning course

jan-mar 2024

I successfully completed the Machine Learning course at IMPA. The contents of the course was:

- Basic notions of statistical learning
- Linear Regression
- Linear Classification
- Sampling Methods
- Model Choosing and Regularization
- Beyond Linear methods
- Support Vector Machines
- Tree-based methods
- Deep Learning
- GPT
- Unsupervised Learning

Technologies used: **Python** (pandas, pytorch), PTV Vissim.

EDSA

Vehicular counting using AI

dec 2023 - jan 2024

Video processing of 5400 hours of video using several remote servers on AWS EC2, Vast.ai, Vultr and Paperspace. The process took about also 5400 hours of computing. Implementing a user friendly interface using Jupyter Notebook and then with Flask and Celery.

Technologies used: **Python** (pytorch, ultralytics, opencv, jupyter, flask, celery), **AWS** (ec2, s3, lambda), **Other services** (paperspace, vast.ai, vultr).

ATU - Autoridad de Transporte Urbano para Lima y Callao - MTC

Vehicular Traffic Microsimulation

sep-dec 2023

Technical Analysis and Field Activity Evaluation for the Subdirectorate of Studies and Projects within the Infrastructure Directorate in the framework of the functions of the Urban Transport Authority for Lima and Callao - ATU. In particular, I was part of the profile study for the Improvement of the Red Corridor. My role involved automating traffic simulations using Python.

Technologies used: **Python** (pandas, lxml, Jinja2, geopandas, shapely, pywin32), PTV Vissim.

Vice-Rectorate of Research - UNI Research Assistant (Developer)

jan-dec 2023

Research Assistant for the Formative Research Project 2023 - PC-PFR-38-2023 of the Vice-Rectorate of Research at the National University of Engineering (UNI). The research's title is "Hierarchization according to the importance of elements in Lima's Traffic Network." Specific tasks in the research included:

- Implementing the data reading code in geographic format.
- Implementing the Frank-Wolfe algorithm to solve the Traffic Assignment Problem.
- Coding to visualize the importance of each street and avenue in the network.
- Parallel programming of the algorithm to calculate the importance of each street and avenue in the network.
- Implementing Binary Heaps and Fibonacci Heaps data structures to solve the shortest path problem in a graph.
- Preparation of a Final Delivery report.

Technologies used: **C** (heaps, Dijkstra, Traffic Assignment Problem), **Python** (fiona, shapely, pyproj, geopandas).

ProTránsito - Metropolitan Municipality of Lima - MML Vehicular Traffic Microsimulation

mar-jun 2023

Vehicular Traffic Microsimulation service for the Investment, Improvement, and Expansion Project of the Traffic Light Infrastructure in the District of Santiago de Surco.

This work involved working on the microsimulation models of 498 intersections in Surco, El Agustino - San Juan de Lurigancho; Chorrillos and Barranco; Av. Universitaria; Av. Javier Prado; Central Zone I and II; San Juan de Miraflores and Villa Maria del Triunfo; Villa El Salvador; La Molina and Santa Anita.

Technologies used: **Python** (pandas, lxml, Jinja2, geopandas, shapely, pywin32), PTV Vissim.

Vice-Rectorate of Research - UNI Research Assistant (Developer)

jan 2022 - now

Creation of Urban Growth Models Using Monte Carlo Simulation for the Human Settlement of Leticia, Lima, Peru.

Technologies used: **C** (cuda, openmp), **Python** (fiona, shapely, pyproj, geopandas).

Institute of Applied Mathematics and Related Areas Web Developer

jan 2020 - dec 2022

I developed the website of the Institute of Mathematics and Related Sciences ([tt http://imca.edu.pe](http://imca.edu.pe)). This page has the database of all IMCA associate professors, masters and doctoral students of the different programs offered by IMCA. Flask was used to make the page as customizable as possible. As Flask is a Micro Framework it does not take care of things like database, templates, forms, unit tests. For those things you use independent packages like SQLAlchemy, Jinja2, WTForms, Pytest. Webpack was used to compile the styles.

Source code: https://gitlab.com/pablo-cardenas/flask_imca

Technologies Used: **SQL** (MySQL), **Python** (Flask, SQLAlchemy, Jinja2, WTForms, Pytest), **Javascript** (Webpack), **Web Development** (open-props, sass)

German Collaboration UNI - GIZ (Gesellschaft für Internationale Zusammenarbeit) Assistant Technician of Modeling

jan 2020 - jul 2021

I was part of the German collaboration GIZ-UNI in the projects of "Strengthening Technical Capacities and Gathering Basic Information for Urban Transport Management in the City of Chiclayo" and "Technical Assistance and Training in Investment Project, Urban Transport Management, Mobility Plan and Route Regulatory Plan"

I served as a modeling specialist with field personnel management skills - supporting macrosimulation design and modelling, job monitoring and reporting

My activities were: Revision of database information for macrosimulation models. Database ordering evaluation for macrosimulation model. Implementation of four-stage model. Implementation of models of generation and attraction of trips. Model implementation for travel-matrix distribution od. Implementation of modal partition model. Implementation of assignment model -

Technologies Used: **Python** (scikit-learn, pandas, scipy, geopandas, shapely, fiona), **R** (purrr, dplyr, tidyr, ggplot2, caret, modelr), PTV Vissim, PTV Visum, TransCAD.

Facultad de Ingeniera Civil - UNI Teacher Assistant

ago 2018 - dec 2021

Teacher assistant in the following courses:

- Probability and Statistics: Descriptive and Inferential statistics. R Language (ggplot, dplyr, tidyr).
- Digital Programming: C Language
- Numerical Methods: Octave-Matlab, R.
- Linear Algebra
- Mathematics II, III, IV

He worked as a Seminar Teacher, Supervision and Correction of Qualified Practices. During the pandemic, I developed applications for proper student assessment. Random tests were generated in Latex according to a question bank. In addition, examinations were sent to individual students' emails.

In retiring as Head of Practice, I created a web application to help teachers create these kinds of questions.

(<https://pcardenasb.com/moodle-questions/>)

Technologies Used: **T_EX** (PlainT_EX, L_AT_EX), **Python** (Flask, SQLAlchemy, Jinja2, WTFForms, Pytest), **SQL** (SQLite), **Web Server** (Nginx, Linode), **Google API** (Drive, Gmail, Forms).

NCN Nuevo Control EIRL

Network and programming technical support

2016-2017

I developed different interactive web mapping systems that fit the needs. These interactive web mapping solutions allow you to display different types of geo-referenced information and interact with the user to record information. We developed a heat map of COVID19 cases, extracting data from the application "Peru in your hands".

Website: <https://ncn.pe>

Website (webarchive): <https://web.archive.org/web/20200928120346/https://covid19.ncn.pe/>

Technologies Used: Apache Tomcat, GeoServer, OpenLayers, OpenStreetMaps.

HR Ingenieros Asociados SAC

Computer Systems and Programming Support

2017-2019

it then ran programs that automated tedious jobs using AutoCad.NET, an API to program actions in autocad.

Technologies used: **.net** (c#, vb.net), autocad, revit, naviswork.

Facultad de Ingeniera Civil - UNI

Web Developer

2018

I developed the website of the UNI Faculty of Civil Engineering (<http://fic.uni.pe>). The page had to be made with a Web Framework because it wanted to have a database of all the courses of the faculty. This database should relate courses, teachers, sections, classrooms, departments, and class hours. I made a user interface in ReactJS so that students can display all possible combinations of schedules, showing the number of crosses.

Initially, I made the website in PHP, using Symfony as the Web Framework, because it was convenient to upload it via FTP on the UNI servers. Then when we had access to the servers Apache configuration. We decided to make the page in the Python language, using Django as the Web Framework.

Source code (PHP): <https://gitlab.com/pablo-cardenas/fic.uni.edu.pe>

Source code (Python): <https://gitlab.com/pablo-cardenas/django-ficuni>

Technologies Used: **SQL** (MySQL), **Python** (Django), **PHP** (Symfony, Doctrine, PHPUnit), **Javascript** (Webpack, TypeScript, ReactJS), **Web Development** (bootstrap, sass), **Web Server** (Apache).

Rendel Construccin SAC

Initially, he carried out modeling, measurement and compatibility of buildings using the Revit and Naviswork programs. The construction project of the Private University of Tacna (UPT), Colegio Prceres de Independencia (Ica), was carried out. It then ran programs that automated tedious jobs using AutoCAD.NET, an API to program actions in AutoCAD. For example, I made a program that reads all the blocks of a project and generates reports about the progress of the project observations.

Source code: <https://gitlab.com/pablo-cardenas/rfi-manager>

Technologies Used: **.NET** (C#, VB.net), AutoCAD, Revit, Naviswork.

Other links and Certificates

- Github: <https://github.com/pablo-cardenas>
- Gitlab: <https://gitlab.com/pablo-cardenas>
- HackerRank SQL (Advance) Certificate: <https://www.hackerrank.com/certificates/a112b909cadb>
- HackerRank R (Intermediate) Certificate: <https://www.hackerrank.com/certificates/50e35524dc05>
- HackerRank Javascript (Intermediate) Certificate: <https://www.hackerrank.com/certificates/1e069405765a>
- LeetCode (Top 7.3%): <https://leetcode.com/pcardenasb>
- TypeRacer (75 WPM): <https://data.typeracer.com/pit/profile?user=pablo2303>