Carlos Pinzón

Mathematician and engineer, passionate about algorithms and human centered AI

Carlos Antonio PINZÓN HENAO
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Origin: Bogotá, Colombia

Residence: Palaiseau, France

EDUCATION

July 2020 - Today		**PhD: Fairness and privacy issues in machine learning** École Polytechnique, Inria. (Palaiseau, France)
Jan. 2018 - Sep. 2020		**Master in engineering (computer science):** 4 semesters. Highest grade, honors and graduation speech. Pontificia Universidad Javeriana Cali (PUJ Cali).
Aug. 2011 - Dec. 2017		**Bachelor in Mathematics**: 9 semesters. Highest grade, honors, graduation speech and award. Escuela Colombiana de Ingeniería (ECI).
Jan. 2011 - July 2017		**Bachelor in electronics engineering**: 10 semesters. Highest grade and award. Escuela Colombiana de Ingeniería (ECI).
Aug. 2016 - July 2017		**DAAD scholarship**: academic semester and internship semester. ▪ Winter semester 2016 / 2017 at KIT, Karlsruhe, Germany. ▪ Internship as market analyst at ICIS, Karlsruhe.

LANGUAGES

Spanish: Mother tongue.

English[1]: Fluid, C1.

French: Good and improving. Around B2.

German[2] [3]: Was B2~C1 back in 2017. I'm forgetting it slowly.

WORK EXPERIENCE

July 2020 - Today	**Doctoral researcher** at Team Comète, LIX, INRIA. Individual and group projects.
Sep. 2020 - Feb. 2022	**Professor assistant** for programming course CSE 101. École Polytechnique.
Mar. 2018 - May 2020	**Data analyst and software developer**: Dashboard and backend algorithms. Centro de excelencia CAOBA (big data center).
Nov. 2018 - Aug. 2019	**App developer using Ionic**: Entrepreneurship *Uigo* with three colleagues.
Aug. 2018 - Dec. 2019	**Professor assistant of trees and graphs** with Camilo Rocha. PUJ, Cali.
Jan. 2018 - May 2018	**Professor of linear algebra and algorithms**: 3 groups, 3 subjects. ALLI (algebra), PIMO (programming II) y ALGO (algorithms). ECI, Bogotá.
Jan. 2017 - June 2017	**Market analyst (intern)**: Forecasting of LNG flow in the UK and electricity prices in Germany using MLearning. ICIS Tschach Solutions, Karlsruhe.
Jan. 2014 - May 2015	**Assistant** for linear algebra course. Prof. Guiomar Lleras. ECI, Bogotá.

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[1] Sep. 2020, C1 IELTS.
[2] Feb. 2016, B1 Goethe Zertifikat: 80 speaking, 96 writing, 77 listening, 80 reading.
[3] June 2017, C1 TestDaF: 5/5 Listening, 4/5 speaking, 4/5 writing, 4/5 reading.

RESEARCH AND ACADEMIC PROJECTS

Fairness

- **On the incompatibility of accuracy and equal opportunity**
  Practical cases and characterization of our theoretical result of AAAI 2022. *ML Journal 2023*.
- **On the impossibility of non-trivial accuracy in presence of fairness constraints**
  Cases where the accuracy-fairness trade-off is extreme. *AAAI 2022, PFIA 2022 in french*.
- **Causal discovery for fairness**
  Analysis of the causality framework for assessing fairness in ML. *NIPS workshop 2022*.

Privacy

- **Frequency estimation of evolving data under local differential privacy**
  Algorithm for longitudinal private (noisy) data collection. *EDBT 2023, APVP 2023 in french*.
- **Minimizing information leakage under padding constraints** (privacy, *ISPEC 2023*)
- **Fast Python sampler of the von Mises Fisher distribution** (numpy sampler; preprint)

Math

- **Optimal discretization of continuous random variables with applications to ML** (master thesis)
  How to discretize an interval in n bins minimizing the MSE? Supervised by Camilo Rocha.
- **Espacios ad-compactos** (bachelor thesis).
  Study of a generalization of compactness in topology. Supervised by Néstor Raúl Pachón.
- **Computing aggregate knowledge as the greatest lower bound of knowledge.**
  RAMICS 2021. (posets, discrete math)
- **Make puzzles great again.** 4 curious problems and solutions. *LNCS 11760*.

Diverse technical topics

- **Segmentation of crop images.** path routing for a land robot from aerial photos of potato crops.
- **Cardiac data filtering.** Matlab GUI for image and signal processing of beating hearts of lab rats.
- **Algorithmic analysis of blockchain efficiency with communication delay**.
  Model for blockchain growth using graph theory. *FASE 2020*.
- **Double-spend attack models with time advantage for Bitcoin**
  Theoretical models for double-spend attacks to the Bitcoin network. *CLEI 2016*.

PERSONAL SKILLS

Communication and personality

- I am kind, simple and effective, which spreads comfort around to my colleagues, supervisors and the people I supervise. I am also very responsible with my tasks and I am interested in listening, helping and coordinating with others.
- Many students and coworkers have praised the way I understand and explain complicated topics. I transmit ideas with modesty, empathy and common sense.
- I have given talks and speeches to large audiences (~60, ~120 and >1000).

Preferred topics

- Mathematics: logic, probability and statistics.
- Computer science: machine learning, divide and conquer mindset.

Technical skills

- Very experienced with Python and Javascript. I understand Python deeply.
- Preferred science tools: numpy, scikit-learn, pytorch, vsCode, sublime, colab.
- Some experience with C, C++ and Java, mostly in programming contests.
- Front-end programming skills. Vanilla JS+CSS+HTML, jQuery, angular, react, TS.
- Server-side preferred tools: Linux, git, node, flask, sqlite.

CERTIFICATES AND AWARDS

Online courses (mostly coursera)

- **6th IVADO/Mila deep learning school**. Université de Montréal.
- **Economics of money and banking**. Columbia University.
- **Artificial intelligence data fairness and bias**, LearnQuest.
- **Internet giants: law and economics of media platforms**. U. of Michigan.
- **Machine learning**. Stanford University. Perfect score, 100%.
- **Digital signal processing**. École Polytechnique Fédérale de Lausanne.

Awards

- **Datatón Bancolombia 2019**. Third place (national), with two friends.
- **2 master scholarships** at ECI for obtaining the highest grades in electronics and then in mathematics.
- **Academic excellence scholarship** more than 8 times consecutively at ECI for being among the top 3 students in electronics and mathematics.
- **Programming contests CCPL** with two friends. Team Ecigma Alpha.
  - Third best team in Colombia during 2014 (bronze medal).
  - First place in some contests during 2015 and 2016.
  - Special invitation to visit Google and Microsoft offices in Bogotá.

Palaiseau, October 2023

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