

# Curriculum Vitae

## Alejandro Flores-Velazco



I earned my PhD from the Department of Computer Science at the University of Maryland, College Park, advised by Prof. [David Mount](#). My research interests lie generally in Theoretical Computer Science, including Computational Geometry, Approximation Algorithms and Data Structures, and their applications in Machine Learning.

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My current research revolves around the goal of achieving more efficient nearest-neighbor classification, showing results that are practical for large-scale applications, while also having provable theoretical guarantees. This work focuses on two main subjects. First, on the development and analysis of algorithms to reduce the training sets used for classification. These reduced subsets can be either heuristically obtained [[CCCG'19](#), [CCCG'20](#)] or  $\epsilon$ -coresets [[ESA'20](#)]. Additionally, I've been working on proposing new data structures specially tailored for answering  $\epsilon$ -approximate nearest-neighbor classification queries [[ESA'21](#)], achieving the lowest complexity of any approach so far.

### TL;DR

#### Education



Ph.D. and M.Sc.  
in Computer Science  
*University of Maryland, College Park*  
2015-2022



B.Eng. in Computer Science  
*Universidad Simón Bolívar*  
2009-2014 · Cum Laude

#### Work



Google  
*Software Engineer*



Facebook Inc.  
*Software Engineer PhD Intern*



University of Maryland  
*TA & Summer Lecturer*

#### Research

- Computational Geometry
- Algorithms & Theory
- Data Structures
- Machine Learning

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Publications in  
top algorithms  
conferences!

+6 other publications!

#### Others

Programming: C/C++ JAVA R

HASKELL PYTHON

Languages: ENGLISH SPANISH

## Education



### University of Maryland, College Park

*Ph.D. in Computer Science*

2015-2022

Dissertation titled "*Algorithms and Data Structures for Faster Nearest-Neighbor Classification*" under the supervision of Prof. **David Mount**.

*M.Sc. in Computer Science*

2015-2018

Scholarly paper titled "*Nearest Neighbor Condensation with Guarantees*" under the supervision of Prof. **David Mount**. Coursework taken (GPA 3.728):

- Computational Geometry · Prof. David Mount
- Network Design Foundation · Prof. Mohammad T. HajiAghayi
- Randomized Algorithms · Prof. Aravind Srinivasan
- Computational Complexity · Prof. Xiaodi Wu
- Advanced Computer Graphics · Prof. Matthias Zwicker
- Logic and Artificial Intelligence · Prof. V.S. Subrahmanian
- Database Management Systems · Prof. Amol Deshpande
- Computational Genomics · Prof. Mihai Pop
- Network Analysis & Modeling of Biological Systems · Prof. Eytan Ruppin
- Fundamentals of Software Testing · Prof. Atif Memon



### Universidad Simón Bolívar, Venezuela

*B.Eng. in Computer Science · Cum Laude*

2009-2014

GPA of 4.269/5 with an specialization in:

- Algorithm Design (covering Theory of Computation & Metaheuristics).
- Artificial Intelligence (covering Automated Planning & Machine Learning).

Bachelor's thesis titled "*Bio-inspired Metaheuristics for Instance Selection*" was awarded *Outstanding Honorable Mention*, supervised by Prof. **Emely Arráiz**.

## Work Experience



### Google

*Software Engineer*

July 2022 - Now

I'm working in the NYC offices with the YouTube Learning Discovery team. My role consists on modifying and improving YouTube's recommendation system (the largest such system in the world) by leveraging Algorithms, Machine Learning techniques, and Data Science, to booster Learning and Educational content within the platform.



## University of Maryland, College Park

### *Instructor*

Summer 2021

I was an instructor for CMSC420 (Advanced Data Structures) at the *Department of Computer Science at UMD*. In this class, I covered balanced binary trees, hash tables, union-find, skiplists, tries, BITs, segment trees, *kd*-trees and quadtrees. For this term, I ran an experimental version of the class, by adding new topics and changing the projects towards using competitive programming sites (e.g., [SPOJ](#), [TopCoder](#)). While student reviews can be harsh, from this term alone, I achieved the second highest [rating](#) so far of any professor for this class.

### *Teaching Assistant*

2015-2022

Working as a TA for the *Department of Computer Science* at UMD. During this time, I've been in charge of leading discussion sessions and grading for:

- Computational Geometry · Prof. David Mount
- Object-Oriented Programming · Lec. Nelson Padua-Perez
- Introduction to Computer Systems · Lec. Nelson Padua-Perez
- Game Programming · Prof. David Mount
- Bioinformatics · Prof. Mihai Pop

The last few years I've acted as *Lead TA*, having to organize, coordinate and distribute the grading workload from +500 students among +30 TAs each term, for the introductory classes of one of the largest undergrad CS programs of the USA.



## Facebook Inc.

### *Software Engineer PhD Intern*

Summer 2019

Working in the Seattle offices with the Signals Intelligence team on state-of-the-art Machine Learning techniques. In particular, my work focused on improving the Identity Prediction pipeline by identifying a new features that could be used to increase the accuracy of the existing prediction models.



## Universidad Simón Bolívar, Venezuela

### *Visiting Professor*

Spring 2022

I was a visiting professor (virtually) for the *Department of Computer Science* at *Universidad Simón Bolívar*, in charge of teaching *Algorithms & Data Structures II*.

### *Research Assistant*

2013-2014

I was an undergraduate research assistant for the *Department of Computer Science* at *Universidad Simón Bolívar*, as a member of the GRAPHIUM project, under the supervision of Prof. [María-Esther Vidal](#).

## Venezuela Inteligente

*Co-founder/Lead Developer*

*2012-2017*

*Venezuela Inteligente* is a civil rights organization that promotes the use of technology for the benefit of society. As part of this organization, I've developed two long-term projects:

1. [ComoVotar.org](#) (*How to vote?* in spanish) is an interactive website that simulates the entire electronic voting process in Venezuela; it has been used by over 1MM people.
2. [VeSinFiltro.com](#) (*Watch without filter* in spanish) was built to help internet users in Venezuela to overcome the increasing censorship both on TV and the Internet. Used by over 25k people to date.

## Research

### Selected Publications (see them all [here](#))

#### Preprint

Improved Search of Relevant Points for Nearest-Neighbor Classification  
**AFV**

*30th Annual European Symposium on Algorithms, 2022*

► *The paper won the Best Paper award of Track S (Simplicity) of the conference!*

#### ESA'21

Boundary-Sensitive Approach for Approximate Nearest-Neighbor Classification  
**AFV**, David Mount

*29th Annual European Symposium on Algorithms, 2021*

#### ESA'20

Coresets for the Nearest-Neighbor Rule  
**AFV**, David Mount

*28th Annual European Symposium on Algorithms, 2020*

#### CCCG'20

Social Distancing is Good for Points too!  
**AFV**

*32nd Canadian Conference on Computational Geometry, 2020*

► *The paper was awarded the Best Student Paper at the conference!*

#### CCCG'19

Guarantees on Nearest-Neighbor Condensation Heuristics  
**AFV**, David Mount

*31st Canadian Conference on Computational Geometry, 2019*

► *The paper was later invited and published in a special issue of the CGTA Journal*

## Posters, Demos and Talks

- ▽ Talk at ESA'22 (European Symposium on Algorithms), Potsdam, Germany (virtual).
- ▽ Talk at the CG:YRF'22 (Young Researchers Forum at the Symposium on Computational Geometry), Berlin, Germany (virtual).
- ▽ Talk at ESA'21 (European Symposium on Algorithms), Lisbon, Portugal (virtual).
- ▽ Talk at the 5th Workshop on Geometry and Machine Learning, during SoCG'21 (Symposium on Computational Geometry), Buffalo, USA (virtual).
- ▽ Talk at ESA'20 (European Symposium on Algorithms), Pisa, Italy (virtual).
- ▽ Talk at the CCCG'20 (Canadian Conference in Computational Geometry) at the University of Saskatchewan, Canada (virtual).
- ▽ Talk at the CCCG'19 (Canadian Conference in Computational Geometry) at the University of Alberta, Canada.
- ▽ Talk at the 4th Workshop on Geometry and Machine Learning, during SoCG'19 (Symposium on Computational Geometry), Portland, USA.
- ▽ Poster at the 2019 Amazon Graduate Research Symposium, Amazon HQ, Seattle, USA.
- ▽ Talk at the FWCG'18 (Fall Workshop in Computational Geometry) at Queens College - CUNY, New York, USA.
- ▽ Poster at the 2018 TRIPODS Workshop at The Ohio State University, Ohio, USA.
- ▽ Attended the 2018 Summer School on "*Theory and Foundations of Topology, Geometry and Data Analysis*" at The Ohio State University, Ohio, USA.
- ▽ Talk at the FWCG'17 (Fall Workshop in Computational Geometry) at Stony Brook University, New York, USA.
- ▽ Attended the SCGP Spring School on Discrete and Computational Geometry, at the Simons Center for Geometry and Physics, New York, USA.
- ▽ Talk at the FWCG'16 (Fall Workshop in Computational Geometry) at the CUNY Graduate Center, New York, USA.