Curriculum Vitae
Alejandro Flores-Velazco

I'm a PhD candidate of 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 set used for classification. These reduced subsets can be either heuristically obtained [CCCG'19, CCCG'20] or ε-coresets [ESA'20]. Additionally, I've been working on proposing new data structures specially tailored for answering ε-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-now

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

Work

Facebook Inc.
Software Engineer PhD Intern

University of Maryland
TA & Summer Lecturer

Universidad Simón Bolívar
Research & Teaching Assist.

Research

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

4 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-Present*

Working towards achieving more efficient nearest-neighbor classification.

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

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

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   2022

During the first term of 2022, I'll be a visiting professor for the *Department of Computer Science* at *Universidad Simón Bolívar*, in charge of teaching *Algorithms & Data Structures*.

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)

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'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.