Bernardo Aurelio Gonzalez Torres

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INTERESTS

Unsupervised Learning, Clustering, Dimensionality reduction, Anomaly detection, Optimization and Robust Learning

EDUCATION

2020 **M. Sc. in Computer Science**, UC Santa Cruz, USA
Advisor: Prof. Yang Liu
Thesis title: *An Algorithmic Introduction to Clustering*
GPA: 4.0/4.0
Relevant Coursework: *Machine Learning, Advanced Machine Learning, High Performance Computing, Numerical Optimization, Fourier Analysis of Boolean Functions*

2016 **M. Sc. in Computer Science**, Computer Research Center (CIC-IPN), Mexico
Advisors: Prof. Ricardo Menchaca-Mendez and Prof. Mordejai Zvi Retchkiman Konigsberg
Thesis title: *Data reduction for Machine Learning algorithms (In Spanish)*
GPA: 9.6/10.0
Relevant Coursework: *Discrete Mathematics, Linear Algebra, Probability Theory, Analysis of Algorithms, Pattern Recognition, Foundations of Machine Learning, Convex Optimization, Multi-objective Optimization*

2012 **B. Sc. in Mechatronics Engineering**, National Polytechnic Institute (IPN), Mexico
GPA: 9.05/10.00
Rank 1/120

RESEARCH EXPERIENCE

Oct 2018 - Present **Graduate Student Researcher**, *UC Santa Cruz, USA*
Clustering algorithms and applications:

- Studied different clustering algorithms and the relationship between them
- Proposed a clustering-based algorithm to empirically improve the results of the Goemans–Williamson algorithm for the Max-Cut problem (NP-hard problem)
- Worked on a sub-quadratic version of the DBSCAN clustering algorithm
- Worked on a preference based fair clustering algorithm
- Worked on a graph clustering algorithm based on Fast-ppr, an approximated version of the personalized pagerank algorithm

Summer 2018 **Machine Learning Research Intern**, *Bosch Center for Artificial Intelligence, Sunnyvale, USA*
(Mentor: Jeff Irion)
Distributed Optimization for HD-Maps (Graph SLAM Optimization):
Worked on the Graph SLAM problem for generating high-definition maps which are used for autonomous driving. An ADMM optimization algorithm for the Graph SLAM problem was formulated and implemented

Summer 2017 **Machine Learning Research Intern**, *Bosch Center for Artificial Intelligence, Palo Alto, USA*
(Mentors: Sauptik Dhar, Jeff Irion)
Robust loss functions for HD-Maps (Graph SLAM Optimization):
Worked on the Graph SLAM problem for generating high-definition maps which are used for autonomous driving. Novel edge types (using robust loss functions) were formulated and implemented in the g2o framework

Jan 2015 - May 2016	**Graduate Student Researcher**, *CIC-IPN, Mexico* (Advisor: Prof. Ricardo Menchaca-Mendez) Unsupervised learning algorithm for data pre-processing on large SVM problems: We proposed a method to reduce the size of data sets used to train SVM classifiers, in order to reduce the training time and preserve the generalization error

TEACHING EXPERIENCE

2018 - 2020 **Graduate Teaching Assistant**, *UC Santa Cruz, USA*
Courses: Introduction to Data Structures, Introduction to Data Structures and Algorithms, Foundations of Data Science
Instructors (respectively): Prof. Nina Bhatti, Prof. Patrick Tantalo, Prof. Yang Liu

- Worked with up to 250 students, holding office hours and lab sessions, both on-site and on-line
- Helped students troubleshooting their algorithms and assisted them to debug their codes
- Wrote homework problems
- Provided feedback to students in final projects evaluation
- Coordinated graders

PUBLICATIONS

- Angel E. Rodriguez Fernandez, Bernardo A. Gonzalez Torres, Ricardo Menchaca Mendez, Peter F. Stadler. **"Clustering Improves the Goemans–Williamson Approximation for the Max-Cut Problem"**. *Computation*. August 2020
- Bernardo A. Gonzalez Torres. **"An Algorithmic Introduction to Clustering"**. *arXiv preprint: 2006.04916*. June 2020

SCHOLARSHIPS, HONORS AND AWARDS

2017 - 2020	Graduate Research Assistantship at UC Santa Cruz
2016 - 2017	Miguel Velez fellowship for Latin American graduate students at UC Santa Cruz
2013 - 2015	Mexican National Council for Science and Technology (CONACyT) scholarship for M.Sc. studies
2012	Best student of the class of 2007-2012 in the field of Mechatronics Engineering at National Polytechnic Institute (IPN)
2007 - 2011	Telmex foundation scholarship for outstanding students for Bachelors studies
2006 - 2007	National Polytechnic Institute scholarship for the first year of Bachelor studies
2003 - 2006	National Polytechnic Institute scholarship for High School studies

COMPUTER SKILLS

- *Programming languages:* Python, C, Matlab, Lisp
- *Machine Learning libraries:* Pytorch, Scikit-learn, Numpy, Scipy, Pandas, Matplotlib
- *Distributed Data Processing:* Apache Spark
- *Optimization software:* IBM CPLEX, CVX, CVXPY, g2o
- *OS:* Linux, macOS, Microsoft Windows
- *Typesetting:* Latex

LANGUAGES

- Spanish (Native language)
- English (Fluent)
- German (Basic)