Ángel Alexander Cabrera

I am a PhD student in the Human-Computer Interaction Institute (HCII) at Carnegie Mellon University, advised by Adam Perer and Jason Hong. I work on human-centered data science, specifically in applying techniques from HCI and visualization to help people better understand and improve their machine learning models. I am supported by an NSF Graduate Research Fellowship.

Before CMU, I graduated with a B.S. in Computer Science from Georgia Tech where I worked with Polo Chau and Jamie Morgenstern. I've spent time at Apple AI/ML, Microsoft Research, and a few summers as a software engineering intern at Google working on Google Maps, Cloud Dataflow, and Android Auto.

cabreraalex.com

cabrera@cmu.edu

GitHub

Google Scholar

Education

2019 - Present
PhD in Human-Computer Interaction (HCI)
Carnegie Mellon University
Advised by Adam Perer and Jason Hong.
Data Interaction Group

2019
B.S. in Computer Science
Georgia Institute of Technology
Concentration in intelligence and modeling/simulation.
Minor in economics.

Fall 2017
Sciences Po - Paris, France
Exchange program with a focus on economics and political science.

Work Experience

Summer 2021
Apple
Research Intern
Design + Visualization Group, see Symphony.
Apple AI/ML

Summer 2020
Microsoft Research
Research Intern
Worked on behavioral model analysis with Steven Drucker and Marco Tulio Ribeiro.
VIDA Group

Summer 2018
Google
Software Engineering Intern
Researched and prototyped improvements for automated driver assistance systems and hyperlocal weather prediction for the next generation of Android Auto.
WSJ Article

Summer 2017
Google
Software Engineering Intern

Created an anomaly detection and trend analysis system for Google's data processing pipelines.

Summer 2016 **Google**
Engineering Practicum Intern
Built an analytics platform for monitoring and catching erroneous edits to Google Maps.

Awards

2019 - Present **National Science Foundation Graduate Research Fellowship (NSF GRFP)**
Three-year graduate fellowship for independent research. Full tuition with an annual stipend of $34,000.
Website

2019 **Love Family Foundation Scholarship**
Co-awarded the $10,000 scholarship for the undergraduate with the most outstanding scholastic record.
Announcement

2015 - 2019 **Stamps President's Scholar**
Georgia Tech and the Stamps Family Charitable Foundation
Full ride scholarship with $15,000 in extracurricular funding awarded to 10 incoming students.
Website

2018 **The Data Open Datathon**
Correlation One and Citadel Securities
Placed third and won $2,500 for creating a ML system to predict dangerous road areas.
Press Release

Refereed Publications

[6] **Symphony: Composing Interactive Interfaces for Machine Learning**
Alex Bäuerle*, Ángel Alexander Cabrera*, Fred Hohman, Megan Maher, David Koski, Xavier Suau, Titus Barik, Dominik Moritz
ACM Conference on Conference on Human Factors in Computing Systems (CHI). New Orleans, 2022.
Website

[5] **An open repository of real-time COVID-19 indicators**
Alex Reinhart, Logan Brooks, Maria Jahja, Aaron Rumack, Jingjing Tang, [et al, including Ángel Alexander Cabrera]
Proceedings of the National Academy of Sciences (PNAS). 2021.
PDF BibTex Website

[4] **Discovering and Validating AI Errors With Crowdsourced Failure Reports**
Ángel Alexander Cabrera, Abraham Druck, Jason Hong, Adam Perer
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Virtual, 2021.
PDF BibTex Website

[3] **Regularizing Black-box Models for Improved Interpretability**
Gregory Plumb, Maruan Al-Shedivat, Ángel Alexander Cabrera, Adam Perer, Eric Xing, Ameet Talwalkar
Conference on Neural Information Processing Systems (NeurIPS). Vancouver, 2020.
PDF BibTex Code Website

[2] **Designing Alternative Representations of Confusion Matrices to Support Non-Expert Public Understanding of Algorithm Performance**
Hong Shen, Haojian Jin, Ángel Alexander Cabrera, Adam Perer, Haiyi Zhu, Jason Hong
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Virtual, 2020.
PDF BibTex Website

[1] **FairVis: Visual Analytics for Discovering Intersectional Bias in Machine Learning**
Ángel Alexander Cabrera, Will Epperson, Fred Hohman, Minsuk Kahng, Jamie Morgenstern, Duen Horng (Polo) Chau
IEEE Conference on Visual Analytics Science and Technology (VAST). Vancouver, Canada, 2019.
PDF BibTex Blog Video Demo Code Website

Workshops, Demos, Posters, and Preprints

[3] **"Public(s)-in-the-Loop": Facilitating Deliberation of Algorithmic Decisions in Contentious Public Policy Domains**
Hong Shen, Ángel Alexander Cabrera, Adam Perer, Jason Hong
Fair & Responsible AI Workshop at CHI. Hawaii, USA, 2020.
PDF Workshop Website

[2] **Discovery of Intersectional Bias in Machine Learning Using Automatic Subgroup Generation**
Ángel Alexander Cabrera, Minsuk Kahng, Fred Hohman, Jamie Morgenstern, Duen Horng (Polo) Chau
Debugging Machine Learning Models Workshop (Debug ML) at ICLR. New Orleans, Louisiana, USA, 2019.
PDF Workshop Website

[1] **Interactive Classification for Deep Learning Interpretation**
Ángel Alexander Cabrera, Fred Hohman, Jason Lin, Duen Horng (Polo) Chau
Demo at IEEE Computer Vision and Pattern Recognition (CVPR). Salt Lake City, Utah, USA, 2018.
PDF Video Demo Code Website

Teaching

Fall 2021 **05499:C - Data Visualization**
Graduate Teaching Assistant @ Carnegie Mellon
Taught a D3 course and led an ethics workshop in addition to grading and course management.

Fall 2016
Spring 2017
Spring 2018 **CS1332 - Data Structures and Algorithms**
Undergraduate Teaching Assistant @ Georgia Tech
Taught a 1 1/2 hour weekly recitation, graded tests and homework, and helped create assignments.

Fall 2016 **GT 1000 - First-Year Seminar**
Team Leader @ Georgia Tech
Designed a class curriculum for incoming first years and helped lead a weekly seminar class.

Mentoring

Fall 2021 - Present
Emily Guo
B.S. in Statistics and Machine Learning, Carnegie Mellon
Improving human-AI interaction with descriptions of model behavior.

Spring 2021 - Present
Kazi Jawad
B.S. in Statistics and Machine Learning, Carnegie Mellon
Interactive exploration and debugging of image classification models.

Spring 2020 - Spring 2021
Abraham Druck
B.S. in Mathematical Sciences, Carnegie Mellon
Crowdsourced discovery of ML failures for image captioning. See Deblinder.

Fall 2020 Spring 2020
CMU AI Mentoring Program

Service

Program Committee

2022 AC, ACM Conference on Human Factors in Computing Systems (CHI) Late Breaking Work
2022 ACM Fairness, Accountability, and Transparency (FAccT)

Student Volunteer

2019 IEEE Visualization (VIS)
2019 ACM Fairness, Accountability, and Transparency (FAccT)

Reviewer

2021 - 2022 ACM Conference on Human Factors in Computing Systems (CHI)
2019 - 2021 IEEE Transactions on Visualization and Computer Graphics (TVCG)
2020 - 2021 IEEE Visualization (VIS)
2021 ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)
2019 ACM Transactions on Interactive Intelligent Systems (TiiS)

Department

2022 REU application reviewer
2020 - 2021 PhD student faculty representative

Press & Talks

2021 "Data Science Widgets with Svelte and Jupyter" - *Svelte Summit 2021*
2020 "New forecasting data could help public health officials prepare for what's next in the coronavirus pandemic" - *CNN*
2020 "Facebook and Google Survey Data May Help Map Covid-19's Spread" - *Wired*
2020 "Carnegie Mellon Unveils Five Interactive COVID-19 Maps" - *Carnegie Mellon*
2020 "Visualizing Fairness in Machine Learning" - *Data Stories Podcast*
2019 "Alex Cabrera Wins Love Family Foundation Scholarship" - *GT SCS*
2019 "Georgia Tech Satellite Successfully Launched Into Space " - *Georgia Tech*
2018 "Datathon Challenges Students to Create Solutions to Real-World Problems" - *GT SCS*

Projects and Open Source

2021 **Svelte + Vega**
A Svelte component for reactively rendering Vega and Vega-Lite visualizations.
GitHub Demo

2021 **Svelte + Jupyter Widgets**
A framework for creating reactive data science widgets using Svelte JS.
Blog GitHub Video

2020 **COVIDCast Visualization of COVID-19 Indicators**
Interactive visualization system of COVID-19 indicators gathered through >20,000,000 surveys on Facebook and Google by CMU Delphi.
Website GitHub

2015 - 2017 **PROX-1 Satellite**
Flight Software Lead and Researcher
Led a team of engineers in developing the software for a fully undergraduate-led satellite mission.
In space! Press release

2014 **CTF Resources**
Guide and resources for capture the flag (CTF) competitions with over 1.4k stars on GitHub.
Website GitHub

Selected Classes

PhD
MultiModal Machine Learning
Causality and Machine Learning
Human Judgement and Decision Making
Applied Research Methods

B.S.
Deep Learning
Data and Visual Analytics
Machine Learning
Computer Simulation
Honors Algorithms