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

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GitHub

Google Scholar

Education

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

August 2015 - May 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

May 2021 - Present
Apple
Research Intern
Design + Visualization Group.
Apple AI/ML

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

May 2018 - August 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

May 2017 - August 2017
Google
Software Engineering Intern

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

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

Awards

May 2019 **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

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

August 2015 - May 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

February 3, 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

December 2021 **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

October 2021 **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

December 2020 **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

October 2020 **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

October 2019 **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

May 2020 **"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

May 2019 **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

June 2018 **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 for ACM Fairness, Accountability, and Transparency (FAccT)
2022 AC for Late Breaking Work at ACM Conference on Human Factors in Computing Systems (CHI)

Student Volunteer

October 2019 IEEE Visualization (VIS)
January 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 HCII 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

Spring 2021

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

Spring 2021

Svelte + Jupyter Widgets

A framework for creating reactive data science widgets using Svelte JS.

Blog GitHub Video

Spring 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

September 2015 - May 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

Spring 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