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 AI, 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 and have spent time at Apple AI/ML, Microsoft Research, and Google.

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Google Scholar

GitHub

Education

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

2022 **M.S. in Human-Computer Interaction** Carnegie Mellon University

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 AI/ML** Research Intern
Modular machine learning interfaces, see Symphony.
Apple AI/ML

Summer 2020 **Microsoft Research** Research Intern
Behavioral model analysis, see AIFinnity.
VIDA Group

Summer 2018 **Google** Software Engineering Intern
Automated driver assistance and hyperlocal weather prediction for Android Auto.
WSJ Article

Summer 2017 **Google** Software Engineering Intern
Anomaly detection and regression analysis system for Google's data processing pipelines.

Summer 2016 **Google** Engineering Practicum Intern
Analytics platform for monitoring and detecting erroneous edits to Google Maps.

Awards

2019 - 2022 **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.

Refereed Publications

[9] **Zeno: An Interactive Framework for Behavioral Evaluation of Machine Learning**
Ángel Alexander Cabrera, Erica Fu, Donald Bertucci, Kenneth Holstein, Ameet Talwalkar, Jason I. Hong, Adam Perer
ACM Conference on Conference on Human Factors in Computing Systems (CHI). Hamburg, Germany, 2023.
Demo Code Website

[8] **Improving Human-AI Collaboration with Descriptions of AI Behavior**
Ángel Alexander Cabrera, Adam Perer, Jason I. Hong
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Minneapolis, 2023.
PDF BibTex Website

[7] **What Did My AI Learn? How Data Scientists Make Sense of Model Behavior**
Ángel Alexander Cabrera, Marco Tulio Ribeiro, Bongshin Lee, Rob DeLine, Adam Perer, Steven M. Drucker
ACM Transactions on Computer-Human Interaction (TOCHI). 2022.
PDF BibTex Website

[6] **Symphony: Composing Interactive Interfaces for Machine Learning**
Ángel Alexander Cabrera*, Alex Bäuerle*, 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.
PDF BibTex Video 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 Demo Code Website

[4] **Discovering and Validating AI Errors With Crowdsourced Failure Reports**
Ángel Alexander Cabrera, Abraham Druck, Jason I. 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 I. 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

[4] Evaluating Systemic Error Detection Methods using Synthetic Images

Gregory Plumb, Nari Johnson, Ángel Alexander Cabrera, Marco Tulio Ribeiro, Ameet Talwalkar

ICML - Workshop on Spurious Correlations, Invariance and Stability. Baltimore, MD, 2022.

PDF Website

[3] "Public(s)-in-the-Loop": Facilitating Deliberation of Algorithmic Decisions in Contentious Public Policy Domains

Hong Shen, Ángel Alexander Cabrera, Adam Perer, Jason I. Hong

CHI - Fair & Responsible AI Workshop. 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

ICLR - Debugging Machine Learning Models Workshop (Debug ML). 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

CVPR - Demo. Salt Lake City, Utah, USA, 2018.

PDF Video Demo Code Website

Talks

November 2022 "Designing Large Web Applications" - *CMU 05-431/631 Software Structures for User Interfaces (SSUI)*

November 2022 "Modern Web Frameworks" - *CMU 05-431/631 Software Structures for User Interfaces (SSUI)*

October 2022 "Evaluating Machine Learning" - *CMU 05-618/318: Human-AI Interaction*

October 2022 "Evaluating Machine Learning" - *CMU 10-605/805: ML with Large Datasets*

September 2022 "Visualization and Machine Learning" - *CMU 17-428/728: ML and Sensing*

September 2021 "Ethics in Data Visualization" - *CMU 05-899: Data Visualization*

September 2021 "D3 Deep Dive" - *CMU 05-899: Data Visualization*

April 2021 "Data Science Widgets with Svelte and Jupyter" - *Svelte Summit 2021*

Teaching

Fall 2022 — **05-431/631 Software Structures for User Interfaces (SSUI)** Graduate Teaching Assistant @ Carnegie Mellon
Teach weekly lab sections, grade tests and homeworks.

Fall 2021 — **05-499:C - Data Visualization** Graduate Teaching Assistant @ Carnegie Mellon
Taught a D3 course and led an ethics workshop in addition to grading and course management.

2016 - 2018 — **CS1332 - Data Structures and Algorithms** Undergraduate Teaching Assistant @ Georgia Tech
Taught a 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 2022 - Present — **Tianqi Wu** M.S. in Computer Science, Carnegie Mellon
Interactive error discovery for ML.

Summer 2022 - Present — **Erica Fu** B.S. in Information Systems, Carnegie Mellon
UX design for an ML evaluation platform. See Zeno.

Summer 2022 - Present — **Donny Bertucci** B.S. in Computer Science, Oregon State University. REU at Carnegie Mellon
Interactive model debugging. See Zeno.

Summer 2022 - Present — **Kan Sun** B.S. in Math, Carnegie Mellon.
Algorithmic discovery of ML errors.

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

Fall 2021 - Spring 2022 — **Emily Guo** B.S. in Statistics and Machine Learning, Carnegie Mellon
Improving human-AI interaction with descriptions of model behavior.

Spring 2020 - Spring 2021 — **Abraham Druck** B.S. in Mathematical Sciences, Carnegie Mellon. Now: Technology Analyst at Morgan Stanely
Crowdsourced discovery of ML failures for image captioning. See Deblinder.

Fall 2020 Spring 2020 — **CMU AI Mentoring Program**

Service

Program Committee

2022 - 2023 — AC, ACM Conference on Human Factors in Computing Systems (CHI) Late Breaking Work

2022 — AC, ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW) Posters

2022 — PC, Workshop on Visualization for AI Explainability (VISxAI) at IEEE VIS

2022 — PC, ACM Fairness, Accountability, and Transparency (FAccT)

Reviewer

2021 - 2023 — ACM Conference on Human Factors in Computing Systems (CHI)

2021 - 2023 — ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)

2020 - 2022 — IEEE VIS

2022 ACM Fairness, Accountability, and Transparency (FAccT)
2022 ACM Symposium on User Interface Software and Technology (UIST)
2022 IEEE Computer Graphics and Applications (CGASI)
2019 - 2021 IEEE Transactions on Visualization and Computer Graphics (TVCG)
2019 ACM Transactions on Interactive Intelligent Systems (TiiS)

Student Volunteer

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

Department

2022 REU application reviewer
2020 - 2021 Ph.D. student faculty representative

Press

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 Courses

Ph.D. 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