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.

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.

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

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

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

2023 **Mozilla Technology Fund**
$50,000 grant to develop Zeno as an auditing tool for AI.

2023 **Stanford HAI Audit Challenge**
Zeno was a finalist for the HAI challenge for designing better AI auditing tools.

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.

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

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.

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

[11] **Where Does My Model Underperform? A Human Evaluation of Slice Discovery Algorithms**
Nari Johnson, Ángel Alexander Cabrera, Gregory Plumb, Ameet Talwalkar
AAAI Conference on Human Computation and Crowdsourcing (HCOMP). Delft, Netherlands, 2023.
PDF Details

[10] **Towards a More Rigorous Science of Blindspot Discovery in Image Classification Models**
Gregory Plumb*, Nari Johnson*, Ángel Alexander Cabrera, Ameet Talwalkar
Transactions on Machine Learning Research (TMLR). 2023.
PDF Code Details

[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.
PDF BibTex Website Code Details

[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 Details

[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). 2023.
PDF BibTex Details

[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 Details

[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 Code Details

[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 Details

[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 Details

[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 Details

[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 Website Blog Video Code Details

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 Details

[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 Details

[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 Details

[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 Website Video Code Details

Talks

2022, 2023 Evaluating Machine Learning
CMU 05-618/318: Human-AI Interaction
CMU 10-605/805: ML with Large Datasets
CMU 17-634: Applied Machine Learning

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

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

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

2021 Ethics in Data Visualization
CMU 05-899: Data Visualization

2021 D3 Deep Dive

CMU 05-899: Data Visualization

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.

Mentoring

Spring 2023 - Summer 2023 **Steven Huang** Research Associate, Carnegie Mellon
Chart builder for Zeno.

Spring 2023 - Present **Josh Zhou** B.S. in Computer Science, Carnegie Mellon
Instance tagging for Zeno.

Fall 2022 - Present **Tianqi Wu** M.S. in Computer Science, Carnegie Mellon
Interactive slice discovery for Zeno.

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 **Kan Sun** B.S. in Math, Carnegie Mellon.
Algorithmic discovery of ML errors.

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.

2020 **CMU AI Mentoring Program**

Service

Program Committee

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

2022 - 2023 PC, ACM Fairness, Accountability, and Transparency (FAccT)

2022 - 2023 PC, IEEE VIS Workshop on Visualization for AI Explainability (VISxAI)

2023 Organizer, CSCW Workshop on Supporting User Engagement in Testing, Auditing, and Contesting AI

2023 PC, CHI Workshop on Trust and Reliance in AI-Assisted Tasks (TRAIT)

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

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 - 2023 IEEE VIS
2022 - 2023 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 - 2023 REU application reviewer
2020 - 2021 Ph.D. student faculty representative

Press

2023 "Auditing AI: Announcing the 2023 Mozilla Technology Fund Cohort" - *Mozilla*
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

2023 **Zeno**
An interactive ML evaluation framework for any data or model.
Website GitHub

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 1.6k 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