

NICOLE MA

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EDUCATION

B.S. in Computer Science & Minor in Mathematics, Stanford University 2024 - 2028

- Relevant Courses: Modern Mathematics: Discrete, Programming Abstractions in C++, Standard C++ Programming

High School Diploma, Sage Hill School 2020 - 2024

- GPA: 4.0/4.0 UW, 4.7/4.0 W
- Relevant Courses: AP Calculus BC, Multivariable Calculus, Linear Algebra, Advanced Topics in Mathematics (Introductory Group and Number Theory), AP Computer Science A
- Activities: Teens in AI (Co-President), Code4Good (President), Sustainability Service Learning (Garden Leader), Science Olympiad (Vice President), Varsity Girls' Lacrosse (Starter)

SKILLS

Python, TensorFlow, Keras, Scikit-learn, Xarray, cURL, R, C++, Java, Javascript, Next.js, HTML, CSS, MySQL, MATLAB, Git

EXPERIENCE

Machine Learning and Atmospheric Science Research Fellow Jun 2023 - Present
Simons Summer Research Program *Stony Brook, NY*

- Created 8 machine learning models to bias-correct wind speed assessments and forecasts for offshore wind energy applications using TensorFlow and Python
- Reduced biases in state-of-the-art operational models by over 50% on 10 vertical levels
- Chosen as 1 of 44 research fellows from pool of ~1000 nominees (~4.4%)
- Abstract accepted for the 2024 NAWEA WindTech Conference; Currently first-authoring research paper

Climate Modeling Research Intern Aug 2021 - Aug 2023
Caltech/NASA Jet Propulsion Laboratory *Pasadena, CA*

- Statistically analyzed 11 climate models and applied them to forecast the timing of 9 global and regional climate tipping points using Python and R
- Published research paper as 1st author in the Q1 journal *Earth and Space Science*; only high school 1st author out of all issues in 2022
- Presented research at the American Meteorological Society 103rd Annual Meeting

Machine Learning Research Intern Nov 2021 - Jan 2023
SoftCom Lab, California State Polytechnic University-Pomona *Pomona, CA*

- Used webscraping to collect 60K+ data points on X/Twitter
- Created two Convolutional Neural Networks to detect and classify hate speech with state-of-the-art AUC scores
- Created website using Google Firebase and Plotly to monitor >10K tweets each day and to display real-time analysis
- Published research as 1st author in the proceedings of the International Conference on Advances in Computer Science and Information Technology

PUBLICATIONS AND PROJECTS

21st Century Global and Regional Surface Temperature Projections. Used climate models to estimate calendar years of when surface temperatures will increase by 1.5, 2.0, and 2.5°C relative to the preindustrial period, both globally and in three target regions: the Arctic Circle, Tropics, and Antarctic Circle. Won the CESASC JHJ Prize for Fundamental Science in Physics (doi.org/10.1029/2022EA002662).

Citation: Ma, N., Jiang, J. H., Hou, K., Lin, Y., Vu, T., Rosen, P. E., et al. (2022). 21st century global and regional surface temperature projections. Earth and Space Science, 9, e2022EA002662.

A Novel System for Regional Twitter Hate Speech Analysis and Detection Using Deep Learning Models and Web Scraping. Constructed binary classification and multi-class CNNs (Convolutional Neural Networks) to detect hate speech from real-time Twitter data and classify tweets with hate speech into five categories. The binary classification model reached an AUC score of 98.95% and the multi-class classification model reached an AUC score of 89.46%. Won 1st in the 2022 igniteCS Programming Expo (doi.org/10.5121/csit.2023.130207).

Citation: Ma, Nicole & Sun, Yu. (2023). A Novel System for Regional Twitter Hate Speech Analysis and Detection using Deep Learning Models and Web Scraping. 93-103. 10.5121/csit.2023.130207.

Constructing a Novel Multidirectional Stochastic Process Model to Simulate the Latitude of the North Atlantic Jet Stream. Created set of multidirectional stochastic process models to simulate the latitude of the North Atlantic Jet Stream by applying vector autoregression. Reached 36.1% improvement from the RMSE score of the baseline, unidirectional model. Won 1st Place in the Virtual Region Junior Science and Humanities Symposium (JSHS) (bit.ly/NJSHS_NMa).

Using Machine Learning to Improve Offshore Wind Resource Assessment and Forecasting. Constructed a Random Forest Regressor, a Support Vector Machine, a Convolutional Neural Network, and a Feedforward Neural Network to reduce biases in ERA5 wind speeds by over 50%. Presenting research as 1st author at the 2024 NAWEA/WindTech conference (Paper in Progress).

AWARDS

Various Hackathon and Programming Awards. One Percenter Award, Project Euler (top 1% among all age groups, 1 million+ participants total); 1st Place, 2022 igniteCS Programming Expo (650+ participants); 1st Place, 2021 GameGala (500+ participants); 2nd Place in Machine Learning, 2022 Southern California Orange County Science Olympiad Regional (40+ teams).

2024 Jane Street WiSE Program Attendee. Less than 100 women chosen to attend a fully-funded program at Jane Street's headquarters to learn about probability, applications of computer science in financial modeling, and concepts of trading.

61st National Junior Science and Humanities Symposium (NJSHS) Finalist. ~3% of 8000+ participants in regional symposiums are invited to the national JSHS. I placed 1st in the virtual region and was 1 of 22 students nationwide chosen to compete orally in the Mathematics and Computer Science category.

3rd Place in Environmental Engineering, 2024 California Science and Engineering Fair (CSEF). I placed 1st in Energy Conversion/Alternate Energy at the Orange County Science and Engineering Fair (OCSEF), and received the highest number of special awards of the year (Association of Women in Water, Energy, and Environment Award, NASA Earth System Science Award, and the Energy Coalition First Place Award).

2023 American Invitational Mathematics Examination (AIME) Qualifier. Scored above the AIME cutoff for the AMC 12, which tests understanding of combinatorics, number theory, algebra, and geometry.

2023 CESASC JHJ Prize for Fundamental Science (Physics). The JHJ Prize is an annual award given to a maximum of three research papers authored by researchers under the age of 26 in any field of fundamental science. Candidates must have published a lead-authored paper in a reputable international journal. I received this award for my paper "21st Century Global and Regional Surface Temperature Projections."