Dylan W. Pallickara

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Education

Poudre High School, Fort Collins, Colorado
International Baccalaureate Program, 2020-2024.
Current Rank: 1/462 Cumulative GPA 4.0; Adjusted: 4.336; Traditional Weighting: 4.519

Awards & Honors

National Merit Scholar (Semifinalist). September 2023. National Merit Scholarship Corporation.

Second round finalist (9% of worldwide submissions) Brid Port Poetry Prize, United Kingdom
September 2023. Poem: Puzzle Pieces

National Honor Society 2022 and 2023

Topical Winner, *"Fingerprints"*, *American High School Poets* - Summer 2023 anthology. New Jersey Live Poets Society. (acceptance rate < 2%)

Selective Residential Camps

Iowa Young Writers Studio, University of Iowa, Iowa City, IA, Summer 2022
Spent two weeks at the University of Iowa (Summer 2022) under the mentorship and instruction of notable alumni from the university's *Iowa Writer's Workshop* M.F.A. program.

Yale Young Global Scholars, Yale University, New Haven, CT, Summer 2023
Two weeks at Yale University in Summer 2023 (Innovations in Science and Technology Track) researching connotation loss in AI-based translations.

Kenyon Young Writers Workshop, Kenyon College, Gambier, OH, Summer 2023
Spent two weeks at Kenyon College immersed in creative writing. Poems written here went on to be published and recognized.

Advanced Coursework at Universities

CS 220 Discrete Structures and their Applications*,* Computer Science Department, Colorado State University, Summer 2021
CS220 mathematical background and foundations for computer science. Course taken by computer science sophomore undergraduates. Course grade: A

6.00.1x: Introduction to Computer Science and Programming Using Python. MITx, an online learning initiative of the Massachusetts Institute of Technology. Summer 2020.
Introduction to Computer Science and Programming Using Python: Leveraging computational thinking for problem solving using computers. Course grade: A.

Research and Internship Experience in Computer Science

Computer-Assisted Recognition of the American Sign Language
Internship with Prof. Sarath Sreedharan, Computer Science Dept., Colorado State University. Design of artificial intelligence/machine learning (AI/ML) models for transcription of the American Sign Language (ASL) that are agnostic to skin tone, texture, and finger length. All software and machine learning models that were produced have been released in the **open source** domain via GitHub. **Curated datasets** made available for download on Kaggle. My Research Portfolio with links to software codebases and datasets available at http://dylanpallickara.org/. The three efforts listed below all involved design of AI/ML models that "learned" from the data.

ASL-WireFrames: This effort involved transforming raw images of ASL hand signs into wireframes that encapsulate the joint structure of the metacarpals (palm) and phalanges (distal, intermediate, and proximate) that comprise the fingers. This representation whittles away aspects such as skin tone, texture, or finger thickness and is effective in reducing bias. The model was based on deep artificial neural networks.

ASL-Joint Angles: In this effort, the input data space was further distilled into a set of joint angles. This allowed the model to cope with variability in the length of the fingers in addition to skin tone

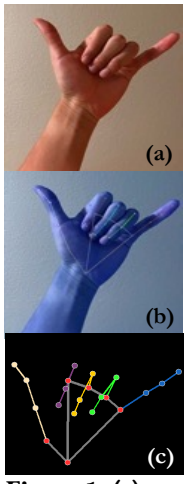

Figure 1: (a) Depiction of the ASL sign Y by me, and **(b)** wireframe computed from (a) and super-imposed on it. **(c)** the wireframe, rendered on a black canvas.

and texture. The model used was less complex, much more interpretable, and 97% accurate.

ASL-INSTRUCTION: The goal of this effort was to allow ASL learners to receive immediate and quantifiable feedback regarding their signing accuracy —helping them refine their skills without a physical teacher needing to be present. Targeted feedback (angular differences) identifies areas of improvement and when combined with deliberate practice can allow mastery of signs.

What did the poet in me discover? My work with ASL was a petri dish for how deep neural networks (a type of AI) "learn". Each input subtly adjusts the neural networks matrix of synaptic weights. Each input alters the weights (or mutates the DNA) of the neural network, but also leaves a trace of itself for posterity. I also realized how some of these AI models are exploitative by "scraping" creative work by artists. Companies such as Google, OpenAI etc. display transparency for the structure of their networks; the data used to train their networks is a closely guarded secret.

I feel that the discourse around AI (with its emphasis on singularity and sentience) is disconnected from reality. The harms be it perpetuating bias, copyright violations, exploitation of creative work, are all here (now!) with little recourse to redress them. The exploitation of creative work will be perpetuated because newer versions of AI models, use the weights of earlier models as the starting point. I want to research methods that force AI models to divulge works they have "scraped" and the bias/inequities they are inadvertently perpetuating.

COMPUTER SCIENCE COMPETITIONS

Placed 992nd in the Google International ASL Fingerspelling Competition. August 2023. Prizes totaling $200,000. The total number of entries was 19,596.

PEER-REVIEWED PUBLICATIONS

Dylan Pallickara and Sarath Sreedharan. *A Wireframe-based Approach for Classifying and Acquiring Proficiency in the American Sign Language*. Student Poster Paper. (To appear) in the Proceedings of the 38th Annual AAAI Conference on Artificial Intelligence. AAAI-24. Vancouver, CA. 2024. The AAAI conference (along with NeurIPS) is the foremost forum for AI research.

The poem, **Fingerprints,** was named Topical Winner in the "*My World*" in the *American High School Poets* - Summer 2023 anthology. New Jersey Live Poets Society. ISBN: 979-8850746568.

The poem, **Imperfect Circles**, published by *Dungeness Press Issue* #2 Summer 2023 Issue (On Metamorphosis). Online edition: https://online.fliphtml5.com/tkksy/wbzs/#p=4

EXTRACURRICULAR ACTIVITIES

Principal cellist for the Poudre High School Advanced Chamber Orchestra. AY 22-23, AY 23-24

Poudre High School, **Varsity Swim Team** AY20-21, AY21-22 [Grades 9 and 10]

Skiing: I have been downhill skiing since I was ten.

Science Olympiad, Poudre High School Team 2021-2024
Colorado Rankings: [2023: Chemistry Lab, 6th] [2022: Environmental Chemistry, 5th; Cell Biology, 8th]

COURSE WORK

International Baccalaureate (IB) Diploma Courses: Grades 11 and 12

IB Mathematics: Analysis & Approaches HL, IB Theory of Knowledge, IB World Authors 1HL, IB World Authors 2 HL, IB Chemistry 1 HL, IB Chemistry 2 HL, IB Contemporary World Politics HL, IB History of The Americas 1 HL, IB Physics SL, IB Spanish Level 5 SL, IB Business Management SL.

Advanced Placement (AP) Courses

AP Computer Science Principles, AP Calculus-BC, AP Chemistry., AP-Biology, AP Statistics, AP Psychology, and AP United States Government and Politics

PROFICIENCIES

Programming Languages: Python and Java

Artificial Intelligence/Machine Learning Frameworks: TensorFlow and Scikit Learn

Spanish [Tested for Seal of Biliteracy, Colorado Department of Education] Results: May 2024