Josiah Aklilu

Portfolio: josaklil-ai.github.io
Github: github.com/josaklil-ai

Email: josaklil@stanford.edu
Mobile: 303-214-8514

Education

- **Stanford University**   Stanford, California, US
  Doctor of Philosophy - Biomedical Informatics   *Sept 2020 - present*

  Completed coursework: Convex Optimization (EE364A), Deep Learning for Computer Vision (CS231n), Natural Language Processing with Deep Learning (CS224n), Applied Multivariate Statistics, Representations and Algorithms for Computational Molecular Biology, Statistical Inference, Data Science for Medicine

- **University of Denver**   Denver, Colorado, US
  Bachelor of Science - Mathematics, Computer Science, and Physics; GPA: 3.95/4   *Sept 2016 - June 2020*

  Coursework: Partial Differential Equations, Advanced Linear Algebra, Calculus of Several Variables, Topics in Artificial Intelligence, Advanced Data Structures and Algorithms, Graph Theory, Uncertainty and Error Analysis, Introduction to Real Analysis, Introduction to Abstract Algebra, Quantum Physics, Numerical and Computational Methods in Physics, Analytical Mechanics, Web Programming

Publications

- **Aklilu, J.**[*], **Gupte, S.R.**[*], **Nirschl, J.J., Yeung, Serena.** ***Revisiting active learning queries in the era of Foundation Models:*** Under review at *NeurIPS* 2023.

- **Aklilu, Josiah and Yeung, Serena.** ***ALGES: Active Learning with Gradient Embeddings for Semantic Segmentation of Laparoscopic Surgical Images:*** Published in the *Proceedings of Machine Learning for Health Care*, 182, 2022.

- **Olsen, G.**[*], **Goodman, E.D.**[*], **Aklilu, J., Yang, J., Sorenson, E., Yeung, S., Jopling, J., Azagury, D.** ***Using artificial intelligence to model the expert panel diagnosis of cholecystitis severity:*** Under review at *Annals of Surgery - Open.*

Projects

- **Artificial Intelligence Identifies Factors Associated with Blood Loss and Surgical Experience in Laparoscopic Cholecystectomy Videos (multitask learning, computer vision, deep learning, vision-transformers, surgery)** (Work in progress) Using a transformer-based spatiotemporal model for multitask learning on videos using SwinV2 and a super image approach. Mapping computer-vision derived features such as the frequency of dissection before adverse events from monocular laparoscopic video to intra/post-operative events including bile spillage and estimated blood loss. Tech: PyTorch-Lightning, Hydra, OpenCV

- **Endoscopic video library for quantitative surgical skill assessment (foundation models, representation learning)**(Work in progress) Embedding intracorporeal video using vision and vision-language foundation models and employing supervised contrastive learning to build a representation space for classifying experts vs novices in surgical peformance. Tech: PyTorch-Lightning

- **3D Reconstruction of Laparoscopic Surgical Scenes (neural radiance fields, computer vision, surgery)** (Work in progress) Learning camera extrinsics and intrinsics jointly while employing neural radiance fields to reconstruct laparoscopic surgical scenes with deformable tissues and rigid instrumentation. Tech: PyTorch-Lightning

- **What's Poppin - Geographical Event Locator (iOS development, social media, software engineering)** Developed an event planning application that allows for easy localization of social events near the user based on category and relevance. Tech: Swift, XCode (May '20)

- **Computer vision and Social Robotics Laboratory website (web programming)** Built a website for Dr. Mohammad Mahoor's computer vision and social robotics laboratory at the University of Denver. Tech: HTML, CSS (Aug '17)

Experience

- **Graduate Teaching Assistant**   Stanford University
  Representations & Algorithms for Computational Molecular Biology   *Sep 2021 - Present*
  - TA for an advanced course in computational methods for molecular biology. Topics ranged from algorithms for biological sequence alignment, phylogenetic tree creation, hidden Markov models, protein structure prediction, protein energetics, chemoinformatics, pharmacogenomics, and applications of classical machine learning methods for biomolecular data.
  - Held office hours for course with over 100 students.

- **Undergraduate Teaching Assistant**   University of Denver
  NoSQL Databases for Big Data   *Jun 2018 - Aug 2018*
  - TA for summer introductory course in NoSQL Databases with topics ranging from writing queries for non-relational databases to exploring different non-relational database models like graphical (Neo4j) and document-based (MongoDB).
  - Course with over 20 students.

- **Recitation Instructor**   University of Denver
  Introduction to Data Structures and Algorithms   *Aug 2017 - Aug 2019*
  - Instructed and reinforced topics discussed in lecture and explained course material including implementations of various graph algorithms, algorithm runtime complexities, sorting and string-matching algorithms, tree representations, and various algorithm design paradigms.
  - Lead one-hour recitation sessions for roughly 15 students twice per week.

- **Recitation Instructor**   University of Denver
  Discrete Structures   *2019*
  - Instructed in course material ranging from topics in bit-wise operations, counting, combinatorics, probability, and set logic.
  - Lead one-hour recitation sessions for roughly 10 students once a week.

Skills & Interests

- **Languages:** Python, R, Java, C++, SQL, LaTeX **Frameworks:** PyTorch, Pytorch-Lightning, TensorFlow, Keras, Scikit **Tools & Platforms:** Git, Hydra, Scipy & GCP, Slurm, Linux, WordPress **General:** Presentation, written & oral communication, mentorship, leadership **Interests:** Multi-modal models, diffusion models & audio production, basketball, weightlifting

Honors and Awards

- William K. Bowes Jr. Fellow, Stanford Graduate Fellowship - Sep, 2020
- University of Denver Distinction in Computer Science - Jun, 2020
- University of Denver Hornbeck Scholar - Mar, 2019

Volunteer Experience

Academic Fellow — Stanford University
Stanford ADVANCE Summer Institute — *Jun 2020 - Aug 2020*
- Complete a course the programming language R for statistical analysis and other applications in data science projects.
- Engaged in weekly journal clubs and workshops discussing navigating graduate school and research.

Treasurer — University of Denver
Black Student Alliance @ DU — *Sep 2019 - Jun 2020*
- Served as treasurer co-managing a budget of over 8000 USD for an organization dedicated to providing a space for discussions pertaining to African-American culture.
- Participated in financial officer meetings with representatives from other affinity groups to approve funding for various on-campus events and programs.

Peer Leader — University of Denver
Equity in STEM — *Mar 2017 - Jun 2020*
- Served as a mentor and leader for the E-STEM program, advising and assisting a group of incoming 1st year college students from minority backgrounds and historically underrepresented groups in STEM fields.
- Helped plan and run orientation weeks for E-STEM participants.

Planning Committee Leader & Facilitator — University of Denver
Black Male Initiative Summit @ DU — *Mar 2017 - Jun 2020*
- Facilitated group discussions with 10-15 high school students on topics ranging from black identity to financial responsibility, education, and leadership.
- Co-organized the 2018 and 2019 BMIS summit.

Board Member — University of Denver
Ritchie School Advisory Board — *Aug 2017 - Aug 2019*
- Engaged as a member on a panel of undergraduate and graduate students advising the faculty of the Daniel F. Ritchie School of Engineering and Computer Science on improvements to department curriculum.

Board Member — University of Denver
African Students United @ DU — *Aug 2016 - Jun 2017*
- Gave a presentation to students with African heritage on Ethiopian culture and cuisine as a part of a series of presentations on the African continent.

Other

Personal Care Worker — Aurora, Colorado
Continuum of Colorado | Deluxe Home Health Care Agency — *Sep 2019 - Jun 2020*
- Assisted client with special needs with daily activities in the residence.
- Certified CPR/First Aid/AED.

Instrumental Piano Competitor — Aurora, Colorado
Piano Laura Lynn Club — *Aug 2013 - Jun 2016*
- Performed in three iterations of the annual United States International Duo Competition at the Broadmoor Hotel and also performed in several local recitals.
- Competed in the National Federation Junior Festivals held under the auspices of the Denver South Federation of Music Clubs, winning superior and excellent ratings.