Sarah Dudgeon, MPH

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Curriculum Vitae

Educational Background

Graduate/Professional Degrees

- 2020-Present Yale University, Computational Biology & Bioinformatics (PhD)
- 2017-2018 Johns Hopkins - Public Health, Epidemiology & Biostatistics (MPH)

Undergraduate Degree

- 2010-2014 University of Michigan, Kinesiology; Minor: Engineering (BS)

Research Experience

- 2020-Pres. **Yale University; Wade Schulz MD, PhD**
  Graduate Research Assistant: Graph Analytics, Data Structures
  Evaluated reduced-dimension data representations for bypassing feature engineering and cumbersome data processing. Conducted SARS-CoV-2 serology test sensitivity analysis and developed clinical decision support algorithms with associated scientific communications (posters at conferences, peer-reviewed publications, invited presentations).
- 2018-2020 **United States Food and Drug Administration; Brandon Gallas PhD**
  Fellow: Biostatistics, Machine Learning
  Designed study, organized collaborators, and collected data for inter- and intra-reader scores for ground truth validation data, given no orthogonal truth. Used resulting dataset to develop first-ever medical device development tool of its kind. Ushered the MDDT through successful first round of FDA review.
- 2017-2019 **Johns Hopkins Hospital Wilmer Eye Institute; Alfred Sommer MD, David S. Friedman MD**
  Co-Investigator: Methods Design, Coordinator Training, Analysis
  Led clinical trial for handheld autorefractor in Madurai, India.
- 2014-2017 **University of Michigan Medical School, Department of Anatomical Sciences; B. Kathleen Alsup PhD, Glenn Fox PhD**
  Research & Teaching Assistant: Human Anatomy
  Built and tested first of its kind digital course (Top Massive Open Online Course of 2017). Found and classified first of its kind anatomic variant. Taught 800+ students annually.

Work Experience

- 2022-present **Royalty Pharma**
  Machine Learning Associate
  Built internal predictive models to understand pharmaceutical consumption trends over time for specific patient cohorts. Build models to understand race and ethnicity inequalities given prescription trends among specific drug users.
- 2021-2022 **Yale Ventures**
  Yale Blavatnik Associate

Conducted comprehensive market analyses for new opportunities and portfolio companies, worked with founders to create winning pitch decks, evaluated therapeutics, MedTech, and general tech companies.

- 2017-2018 **United States Food and Drug Administration; Digital Health Center of Excellence**
  Project Management Fellow

  Co-developed Software Pre-Certification Pilot Project with initial team. Led and presented sentiment analysis of program submissions, questions, and docket documents. Conducted product analysis for internal team use cases and demos of early regulatory pipeline.

- 2012-2014 **Intern Intraoperative Neurophysiological Monitorist, Michigan Medicine**
  Executed 100 neurosurvery, neurointerventional radiology endovascular surgery and orthopedic surgery cases (avg. 8 hr/case) monitored under supervision. Analyzed neural electric signals with Cascade software via pre-operatively placed transdermal needle electrodes. Studied neuroanesthesia and bioelectrics. One of three students in pioneering class of first academic IONM certification.

- 2008-2012 **Procurement & Sterile Supply Coordinator, Michigan Surgical Center**
  Instituted novel sterilization practice for cost savings and trained new employees. Managed materials and procurement of medical supplies, surgical sets, and devices for plastics, ortho, ophthy, and uro cases. Observed surgeries in free time. Audited and purged paper medical records, clinically assisted in pre-op and post-op, organized device trials with device representatives.

Academic and Teaching Experience

- 2022-present **Pathology Informatics Summit**
  R in Medicine Conference
  Co-Instructor: R Workshop

- 2022-2023 **Michigan Medicine**
  Teaching Fellow: Applied Machine Learning in Healthcare,
  Oversaw homework and final project progress, constructed homeworks and exams, and held office hours for local environment setup and debugging.
  Medical Device Design and Innovation
  Oversaw medical device development for multiple industry-funded products, provided guidance on verification and validation testing schemas given regulatory guidance and ISO code, and instructed students through proper use of 3D modeling software with subsequent 3D printing.

- 2015-2017 **Michigan Medicine**
  Instructor: Neurosurgical Technique & Approach
  Organized and instructed courses for neurosurgery residents, including advanced neuroanatomy and novel graphical surgical approach. Taught small group sessions on harvesting approach and tools. Observed 100+ OR cases.

- 2014-2017 **University of Michigan Medical School**
  Teaching Assistant: Human Anatomy
  Designed and Developed digital course content for 800+ students/year. Created best Massive Open Online Course of 2014. Included curriculum, student interface, testing, and online course efficacy outcomes.
- 2014-2017 **University of Michigan- High School Summer Courses**
  Course Director
  Organized and instructed comparative anatomy & phylogeny courses.

Publications

Peer-reviewed Publications:

- Hart S., Garcia V., **Dudgeon S. N.**, …, Lennerz J., Gallas B. D. 2023. Initial Interactions with the FDA on Developing a Validation Dataset as a Medical Device Development Tool. The Journal of Pathology. 261:378-384
- Page D., …, Stovgaard E. 2023. Spatial Analyses of Immune Cell Infiltration in Cancer: Current Methods and Future Directions: A Report of the International Immuno-Oncology Biomarker Working Group on Breast Cancer. The Journal of Pathology. 260(5):514-532
- Thagaard J., …, Stovgaard E. 2023. Pitfalls in Machine Learning-based Assessment of Tumor-Infiltrating Lymphocytes in Breast Cancer: A Report of the International Immuno-Oncology Biomarker Working Group on Breast Cancer. The Journal of Pathology. 260(5):498-513
- Hansel K., **Dudgeon S. N.**, …, Schulz W. 2023. From Data to Wisdom: Biomedical Knowledge Graphs for Real-World Data Insights. Journal of Medical Systems. 47(1)65
- Watkins T., Foxman E. 2023. High Burden of Viruses and Bacterial Pathobionts Drives Heightened Nasal Innate Immunity in Children with and without SARS-CoV-2. medRxiv. 2023.06.17.23291498
- Elfer K. **Dudgeon S. N.**, …, Salgado R., Gallas B. D. 2022. Pilot Study to Evaluate Tools to Collect Pathologist Annotations for Validating Machine Learning Algorithms. Journal of Medical Imaging. 9(4):047501
- Elfer K., Blenman K., **Dudgeon S. N.**, …, Salgado R., Gallas B. D. 2022. Tools for Collecting Pathologist Annotations and Understanding Interobserver Variability. Cancer Res. 82(12_Supplement):460
- Gallas B., Badano A., **Dudgeon S. N.**, …, Lennerz J.K., Myers K., Petrick N., Margerrison E. 2022. FDA Fosters Innovative Approaches in Research, Resources and Collaboration. Nature Machine Intelligence. 4(2):97-98
- Durant T. J. S., **Dudgeon S. N.**, …, Schulz W., Torres R., Olson E. M. 2022. Applications of Digital Microscopy and Densely Connected Convolutional Neural Networks for Automated Quantitation of Babesia-Infected Erythrocytes. Clinical Chemistry. 68(1):218-229
- Joseph S., …, Friedman D. S. 2021. Investigation of the Accuracy of a Low-Cost, Portable Autorefractor to Provide Well-Tolerated Eyeglass Prescriptions: A Randomized Crossover Trial. Ophthalmology. 128(12):1672-1680
- **Dudgeon S. N.**, Wen S., …, Saltz J., Salgado R., Gallas B. D. 2021. A Pathologist-Annotated Dataset for Validating Artificial Intelligence: A Project Description and Pilot Study. J Pathol Inform. 12
- Marble H. D., Huang R., **Dudgeon S. N.**, …, Gallas B. D., Abels E., Lennerz J. K. 2020. A Regulatory Science Initiative to Harmonize and Standardize Digital Pathology and Machine Learning Processes to Speed up Clinical Innovation to Patients. J Pathol Inform. 11:22.

- Amgad M., Stovgaard E. S., …, Salgado R., Cooper L. A. D. 2020. Report on Computational Assessment of Tumor Infiltrating Lymphocytes from the International Immuno-Oncology Biomarker Working Group. NPJ breast cancer. 6(1):1-13
- **Dudgeon S. N.**, Marcotte K. M., Fox G. M., Alsup B. K. 2017. A Previously Unclassified Variant of Sternalis Muscle. Surg Radiol Anat. (12), 1417–1419
- **Dudgeon S. N.**, Alsup B. K., Fox G. M. 2016. Effectiveness of BlueLink Cadaveric Multimedia Resources in a Pre-professional Course. The FASEB Journal. 30:568.4
- **Dudgeon S. N.**, Fox G., Alsup K. LabLink: Journaling via Multimedia in Anatomical Dissections. 2015. The FASEB Journal. 29:549.2

Invited Talks:

- **Quantum Machine Learning Applications in Medical Data Analytics.** NetApp Insight 2023.
- **Regulatory Science for Medical Device Development.** Yale University – School of Engineering and Applied Science.
- **Regulatory Science for Diagnostics: Speaker Event featuring Lakshman Ramamurthy.** Pathology Informatics collaborative community, Trainee Working Group. https://www.youtube.com/watch?v=dQFWcpWa-P8
- **Algorithm Validation in Pathology: Understanding Variability to Develop Ground Truth.** Yale University & Yale New Haven Hospital.
- **Algorithm Validation in Pathology: Understanding Variability to Develop Ground Truth.** Harvard University & Massachusetts General Hospital.
- **Data as a Medical Device Development Tool; an Introduction to the High Throughput Truthing Project.** US Food and Drug Administration, Center for Devices and Radiological Health, Office of Science and Engineering Laboratories, Division of Imaging, Diagnostics, and Software Reliability.

Fellowships and Awards

- 2022-2023 T32 Teaching Fellowship Grant
- 2022 Pathology Informatics Summit Travel Scholarship
- 2021-2022 Venture Capital Associateship: Yale University Office of Cooperative Research: New Biotech Ventures
- 2018-2020 Machine Learning Research Fellowship: Oak Ridge Institute for Science and Education: United States Food and Drug Administration
- Winter 2018 Johns Hopkins Busines School Venture Capital Pitch Competition Award
- Winter 2017 Johns Hopkins Global Health Research Award
- 2016 Michigan Medicine internal grant, LabLink digital anatomy dissection guide
- 2016 Michigan Medicine Pitch and Development Competition – Medical Devices

Professional Memberships

- 2019-Present Member, Healthcare Information and Management Systems Society
- 2019-Present Founding member & Trainee workgroup lead, Pathology Innovations Collaborative Community
- 2018-Present Founding Member, Digital Pathology Association
- 2014-20117 Member, American Association for Anatomy

Volunteer Experience

- 2021-Pres. **Yale University, Medical Scientist Training Program**
  Mentor, Yale Mentorship for Minority Students in STEM
  Assist Yale undergraduate mentees from underrepresented communities in STEM to publish manuscripts and conduct scientific research.
- 2017-2019 **Baltimore Squashwise**
  Mentor
  Instructed students in Spanish, English, Math, and Coding in after school program for inner-city Baltimore High School students.
- 2014-2017 **Hope Clinic**
  Surgical scheduling
  Worked with patients in Spanish & English to schedule surgical procedures and navigate available social programs to receive optimal free care.
- 2010-2014 **University of Michigan, Counseling and Psychological Services Student Advisory Board**
  Board Member
  Created free student programs to provide services to more students, create spaces for mental health breaks around campus, educated prospective students and parents in the offerings of CaPS.