Hannah A. Burkhardt

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EDUCATION

Biomedical and Health Informatics, Ph.D. — University of Washington, Seattle

FALL 2018 – FALL 2022

Advisor: Trevor Cohen, MBChB, PhD, FACMI

- NLM Predoctoral Fellow (2018-2021)
- Advanced Data Science Option
- Mentored several students

Courses taken: Data Visualization; Mathematical Statistics

Graduate level coursework — University of Wisconsin, Madison

FALL 2016 - FALL 2018

Courses taken: Database Systems; Human-Computer Interaction; Machine Learning

Bioinformatics, B.S. — University of California, San Diego

SEPTEMBER 2011 - JUNE 2014

RESEARCH EXPERIENCE

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Matthew Thompson)

SPRING 2021 – SUMMER 2022

- Analysis and visualization of clinical data collected during routine care (i.e. EHR data) to characterize lung cancer diagnosis pathways at the UW
- Comparative study of symptom data sources (clinical notes/NLP vs. structured EHR data) for predicting lung cancer
- Biostatistics and NLP consulting for an ancillary project investigating the predictive power of weight loss for subsequently developing lung cancer

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Trevor Cohen)

WINTER 2018 - PRESENT

- Modeling of drug interactions using observational pharmacovigilance data sources
  - o Resulted in first-authored publication in the Proceedings of the Journal of the American Medical Informatics Association's Annual Symposium (2019)
- Contributions to open-source software package SemanticVectors (for Java and Python)
- Statistical analysis and machine learning for detecting cognitive impairment from verbal fluency lists
- Analysis of changes in the language used by depression and anxiety patients to monitor and optimize treatment
- Analysis of language used by suicidal patients for clinical decision support in the context of suicide prevention interventions

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Kari Stephens)

SPRING 2020 – FALL 2020

- Analysis and visualization of clinical data collected during routine care (i.e. EHR data) to characterize COVID-19 symptom presentation and equity in care delivery

- Work directly with the UW enterprise data warehouse (SQL)

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Bill Lober)

SUMMER 2019 – FALL 2020

- Design and development of a cross-platform, FHIR-backed mobile application for patient reported outcomes collection
    - o Resulted in first-authored manuscript (2020)
    - o Using Flutter, Gitlab for CI/CD
- Research on standards-based, offline-first software architectures

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Reza Hosseini Ghomi)

SPRING 2019 – SUMMER 2020

- Analysis of voice recordings of neuropsychological testing batteries from the Cognitive Aging Cohort in the Framingham Heart Study
- Development of a machine learning model for prediction of cognitive status from linguistic and acoustic features of speech
- Resulted in co-first-authored publication in the Journal of Alzheimer's Disease (2020)

Graduate Research Assistant — University of Washington, Seattle (PI: Dr. Adam Wilcox)

SPRING 2019

- Statistical analysis and data visualization of PHQ-9 survey data for visual discovery of clinical subgroups of depressed patients based on patterns in symptoms

Graduate Research Assistant — University of Wisconsin, Madison (PI: Dr. Eneida Mendonça)

FALL 2017

- Descriptive statistics of Electronic Health Record data extracted from UW Madison's health system databases
- Exploration of predictive modeling for fracture risk in children due to oral corticosteroid use

Undergraduate Researcher — Division of Biomedical Informatics, UC San Diego (PI: Dr. Lucila Ohno-Machado)

JANUARY 2013 - JANUARY 2014

- Worked in a small team on variant analysis of Kawasaki's Disease patient genomes
- Review of published research work for techniques and relevant research findings
- Development of a genomic variant analysis pipeline for Unix shell

Bioinformatics Intern — SG Biofuels, San Diego, CA

JUNE 2013 - AUGUST 2013

- Small start-up
- Error profiling and data mining for the company's own genome sequencing machine
- In-silico prediction and modeling of biological experiments
- Presentation of results to company leadership

CONFERENCE AND JOURNAL PUBLICATIONS

Submitted

Prado, M. G., Kessler, L. G., Au, M. A., **Burkhardt, H. A.**, Suchsland, M. Z., Kowalski, L., Otr, L., Walter, F. M., Lybarger, K., Turner, G., & Farjah, F. (2022). Symptoms and signs of lung cancer prior to diagnosis: Comparative study using electronic health records.

Accepted

Burkhardt, H. A., Laine, M., Kerbrat, A., Cohen, T., Comtois, K.A., & Hartzler, A. (n.d.). Identifying opportunities for informatics-supported suicide prevention: the case of Caring Contacts. *Proceedings of the AMIA Annual Symposium 2022.*

Muenzen K.M., **Burkhardt H.A.**, Reid N., Tarczy-Hornoch P., Tsuang D., Chen A.T., Jarvik G.P., Crosslin D.R. Considerations for embedding genomic discovery research in clinical settings: Perspectives from medical geneticists (Abstract #2022-A-4170-ASHG). Presented at the 72nd Annual Meeting of The American Society of Human Genetics, October 25-29, 2022 in Los Angeles, California.

Published

Burkhardt, H. A., Pullmann, M. D., Hull, T. D., Areán, P. A., & Cohen, T. (2022). Comparing emotion feature extraction approaches for predicting depression and anxiety. *Proceedings of the Eighth Workshop on Computational Linguistics and Clinical Psychology.*

Burkhardt, H. A., Alexopoulos, G. S., Pullmann, M. D., Hull, T. D., Areán, P. A., & Cohen, T. (2021). Behavioral Activation and Depression Symptomatology: Longitudinal Assessment of Linguistic Indicators in Text-Based Therapy Sessions. *Journal of Medical Internet Research*, *23*(7), e28244. https://doi.org/10.2196/28244

Burkhardt, H.A., Brandt, P.S., Lee, J.R., Karras, S.W., Bugni, P.F., Cvitkovic, I., Chen, A.Y., Lober, W.B. (2021). StayHome: A FHIR-Native Mobile COVID-19 Symptom Tracker and Public Health Reporting Tool. *Online Journal of Public Health Informatics*, *13(1)*. https://doi.org/10.5210/ojphi.v13i1.11462

Zhang, L., Ngo, A., Thomas, J. A., **Burkhardt, H. A.**, Parsey, C. M., Au, R., & Hosseini Ghomi, R. (2021). Neuropsychological test validation of speech markers of cognitive impairment in the Framingham Cognitive Aging Cohort. *Exploration of Medicine*, *2*(3), 232–252. https://doi.org/10.37349/emed.2021.00044

Thomas, J. A.* & **Burkhardt, H. A.***, Chaudhry, S., Ngo, A. D., Sharma, S., Zhang, L., … Hosseini Ghomi, R. (2020). Assessing the Utility of Language and Voice Biomarkers to Predict Cognitive Impairment in the Framingham Heart Study Cognitive Aging Cohort Data. *Journal of Alzheimer's Disease : JAD*, *76*(3), 905–922. https://doi.org/10.3233/JAD-190783 (* indicates equal contributions)

Burkhardt, H. A., Subramanian, D., Mower, J., & Cohen, T. (2019). Predicting Adverse Drug-Drug Interactions with Neural Embedding of Semantic Predications. *Proceedings of the AMIA Annual Symposium 2019*. Winner of the Knowledge Discovery and Data Mining Student Innovation Award.

POSTER PRESENTATIONS (PEER REVIEWED)

Prado, M. G., Kessler, L. G., Au, M. A., **Burkhardt, H. A.**, Zigman Suchsland, M., Kowalski, L., Stephens, K. A., Yetisgen, M., Walter, F. M., Neal, R. D., Lybarger, K., Thompson, C. A., Achkar, M. Al, Sarma, E. A., Turner, G., Farjah, F., & Thompson, M. (2022). Signs and symptoms extracted from Electronic Health Records with AI predict lung cancer diagnosis at least 6 months in advance. The Early Detection of Cancer Conference.

Burkhardt, H.A., Portanova, J. (2021) Teaching issues of research reproducibility through first-hand experience. 17th Annual UW Teaching and Learning Symposium.

Burkhardt, H.A., Dobbins, N., Mollis, B., Au, M., Kwan Ma, K.P., Yetisgen, M., Singh, A., Thompson, M., Stephens, K.A. (2021). Extracting COVID-19 Related Symptoms from EHR Data: A Comparison of Three Methods. *AMIA Virtual Informatics Summit 2021.*

POSTER PRESENTATIONS (NON-PEER REVIEWED)

Burkhardt, H. A., Subramanian, D., Mower, J., & Cohen, T. Predicting Adverse Drug-Drug Interactions with Neural Embedding of Semantic Predications. *2019 NLM Training Conference (Indianapolis, IN).* June 25, 2019

ORAL PRESENTATIONS

Identifying opportunities for informatics-supported suicide prevention: the case of Caring Contacts. Burkhardt, H. A., Laine, M., Kerbrat, A., Cohen, T., Comtois, K.A., & Hartzler, A. Panel presentation: "Caring Contacts: Three Services and Implementation Research Approaches to Scaling an Evidence-Based but Novel Suicide Prevention Intervention." *25th NIMH Conference on Mental Health Services Research (MHSR).* August 2, 2022. Presented by Burkhardt, H. A.

Linguistic markers of behavioral activation predict changes in depression symptomatology. Burkhardt, H. A., Alexopoulos, G. S., Pullmann, M. D., Hull, T. D., Areán, P. A., & Cohen, T. *2021 NLM Training Conference* (Virtual, hosted by University of Washington). June 23, 2021. Presented by Burkhardt, H. A.

The Unreasonable Effectiveness of Naïve Bayes for Predicting Combinatorial Drug Effects. Burkhardt, H. A., Subramanian, D., Mower, J., & Cohen, T. *2020 NLM Training Conference* (Virtual, hosted by Oregon Health & Science University). June 24, 2020. Presented by Burkhardt, H. A.

StayHome: A FHIR-Native Mobile COVID-19 Symptom Tracker and Public Health Reporting Tool. Burkhardt, H. A., Brandt, P. S., Lee, J. R., Karras, S. W., Bugni, P. F., Cvitkovic, I., Chen, A. Y., Lober, W. B. *University of Washington FHIR Conference* (Seattle, WA). September 2020. Presented by Burkhardt, H. A.

Mobile PROs with FHIR. Burkhardt, H. A., Lober, W. B. *Seattle on FHIR Meetup*. Seattle, WA (October 2019). Presented by Burkhardt, H. A.

TEACHING

Software Carpentry Instructor, certified in 2019
Workshops taught & co-taught:
- Unix shell & Git. Winter 2022 Software Carpentries Workshop, eScience Institute, University of Washington. January 10, 2022.

Student Instructor, University of Washington

Course: BIME 591 FHIR and other data standards (2019)
Responsibilities: With two co-instructors and a faculty sponsor, prepared a curriculum and taught several weekly lessons and hands-on tutorials

Course: BIME 591 Reproducibility in research (2020)
Responsibilities: With a student co-instructor and a faculty sponsor, led a journal club-style seminar teaching techniques and issues in research reproducibility.

Instructor, Epic (2016-2018)

Course: Learn To Code – Introduction to programming for non-technical staff
Responsibilities: Developed and refined curriculum; taught 4 instances of the course, each consisting of 10 weekly lessons.

Tutor, University of California – San Diego (2013)

Course: BICD 100 Genetics
Responsibilities: One-on-one tutoring

SERVICE & LEADERSHIP

Peer Review
JAMIA Editorial Board (2022-2024)
IEEE Journal of Biomedical and Health Informatics (2021)
International Conference on Healthcare Informatics (ICHI) (2021)
AMIA Annual Symposium (2021)

JAMIA Student Editorial Board (2020-2022)
International Conference on Healthcare Informatics (ICHI) (2020)
AMIA Clinical Informatics Conference (2020)

Planning Committee Member, UW AI in Medicine Seminar Series (2020-2022)

Helped choose speakers from across the county, invited speakers and served as primary contact, hosted and moderated talks

JAMIA Student Editorial Board Member and Journal Club Manager, (2020-2022)

Helped choose national and international speakers, invited speakers and served as primary contact, managed and coordinated student editorial board member responsibilities

Professional Development Coordinator, Epic (2017-2018)

Helped in choosing technical books for the book club. Facilitated weekly book club meetings for the team. Facilitated development and refinement of best-practice guidelines for team.

On-site Visit Outreach, Epic (2016-2017)

Coordinated with point people at health systems (e.g. nursing informatics analysts) to arrange "immersion" trips for user research and product design purposes.

Undergraduate Bioinformatics Club (UBIC), University of California – San Diego (2013-2014)

As co-founder and president: conceived of, planned, and executed research, networking, and social activities. *Student leadership award.*

HONORS AND AWARDS

Certificate of Excellence for distinguished contributions to the peer review process. JAMIA, 2022.

AMIA 2022 Best Paper Award Nominee

Knowledge Discovery and Data Mining Student Innovation Award, AMIA Knowledge Discovery and Data Mining Working Group (2019)

NLM Predoctoral Fellowship, University of Washington (2018-2021)

Student Leadership Award, UC San Diego (2014)

PROFESSIONAL ASSOCIATIONS

American Medical Informatics Association (AMIA)
Association for Computational Linguistics (ACL)

WORK EXPERIENCE

Biomedical informatics consulting, Swedish Medical Center (Feb 2022-present)

- Advise Swedish Medical Center leadership on strategy for implementing a research-grade enterprise data warehouse
- Investigate research data and user needs and how they relate to technology options, and issue recommendations accordingly.

Software Developer, Epic (2014-2018)

- Developed and maintained a mobile application for inpatient clinical documentation (font-end: Android and iOS; back-end: C#, Cache)
- Owner of several functional areas

- Experience with FDA Medical Device Labeling processes
- Regular interaction with clinicians to determine product requirements and design
- Mentored new hires and interns
- Organized team-wide professional development activities
- Organized on-site observations for needs assessment and feedback collection
- Assisted with on-site EHR go-live support

Bioinformatics Intern — SG Biofuels, San Diego, CA (2013)

- Small start up
- Error profiling and data mining for the company's own genome sequencing machine
- In-silico prediction and modeling of biological experiments
- Presentation of results to company leadership

OTHER EXPERIENCE

- Contributor/Maintainer of myfitnesspal-python