

Ashley A. Holmes

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SUMMARY

Data scientist specializing in healthcare research, leveraging expertise in data analysis, machine learning, and process improvement. Proven track record of developing digital biomarkers and effectively communicating findings to stakeholders through publications and presentations. Passion for utilizing data to improve patient care, outcomes, and overall experience in the healthcare system.

SKILLS

Data: Python (scikit-learn, statsmodels, scipy, keras, tensorflow), R, SQL, MATLAB, Unix/Linux, Jupyter, mongoDB, Github/Gitlab/Bitbucket, Microsoft Excel, Microsoft Visio, Minitab, data mining, data analysis, data visualization, statistics, machine learning, deep learning

Technical writing: journal manuscripts, conference papers and posters, grants, technical reports, literature reviews

Communication: public speaking, teamwork, presentation of findings, cross-departmental project management, mentoring

EDUCATION

Doctor of Philosophy: Industrial Engineering

Northeastern University • US, MA, Boston • 2016 – 2017 (ABD)

Master of Science: Systems Science - Health Systems

State University of New York at Binghamton • US, NY, Binghamton • 2014 - 2016

Bachelor of Arts: Mathematics

Minor in Computer Science • State University of New York at Geneseo • US, NY, Geneseo • 2010 - 2014

EXPERIENCE

Senior Data Scientist

nQ Medical, Inc.

June 2019 – June 2023 US, MA, Cambridge

- Proficiently employed Python and MongoDB to extract, integrate, and manipulate data from diverse sources, facilitating the construction of comprehensive datasets for analysis, model testing, and validation purposes.
- Effectively communicated research findings to stakeholders across the healthcare industry, including medical practitioners, surgeons, researchers, and scientists, facilitating knowledge transfer and promoting collaboration among interdisciplinary teams.
- Published a first-authored peer-reviewed journal article in Brain Communications and submitted draft manuscripts (currently under review) to esteemed publications such as Movement Disorders Clinical Practice, Computer Methods and Programs in Biomedicine, and the ACM International Conference on Bioinformatics, Computational Biology, and Health Informatics.
- Spearheaded the development of a novel digital biomarker utilizing a convolutional neural network to enable the detection of people with cognitive impairment (MCI and Alzheimer's disease) from cognitively normal users using keystroke dynamics data and metadata from mechanical and touchscreen devices.

Contract Data Scientist

Manifest Medex

July 2020 - April 2021, US, CA, Emeryville

- Developed and executed a robust methodology to better understand trends in healthcare utilization before and during the COVID-19 pandemic in California, processing over 25 million medical claims from 2019 and 2020.
- Utilized SQL queries to combine disparate sources of data, including medical claims, insurance, and demographic data in order to define specific cohorts of users based on insurance coverage, CPT codes, and demographics.
- Conducted data analysis using Python, enabling evidence-based findings and shaping the conclusions presented in the report "[California Health Systems Tracking Project: Pandemic Aftershocks: Examining the decline in healthcare utilization in California during COVID-19](#)".
- Created impactful visualizations and figures using Python, distilling complex data into clear and concise visuals, enhancing understanding of trends and patterns in healthcare utilization during the pandemic.

Senior Data Engineer Associate (athenaResearch)

athenahealth

April 2018 - April 2019, US, MA, Watertown

- Created useful datasets combining medical records data (including ICD-10 codes), medical claims data (including CPT codes), physician practice data, and medication data using SQL and Perl.
- Applied statistical analysis techniques using R and research methodologies to process and interpret complex datasets containing millions of records to uncover meaningful insights, including a 5-year analysis of pediatric anxiety diagnosis and prescription trends.
- Conducted data analysis and developed data visualizations using R to support a total of 9 web articles published by the marketing team to promote research enabled by athenahealth's platform.
- Completed detailed analysis on a survey of 1,400 physicians to enhance the understanding of physician capability and burnout and its impact, of which key findings were communicated to the industry by the company's Chief Medical Officer at various conferences and symposiums.

Staff Engineer

Healthcare Systems Engineering Institute, Northeastern University

September 2017 - December 2017, US, MA, Boston

- Led the successful management of the Access to Care portfolio, overseeing multiple concurrent projects spanning diverse subject areas, demonstrating exceptional project management skills and the ability to drive results.
- Played a key role in business development efforts, contributing to the institute's growth by organizing impactful industrial engineering workshops tailored for clinicians.
- Fostered strong partnerships with industry leaders, collaborating closely with C-suite executives to present and communicate research findings, showcasing the ability to engage and influence stakeholders at the highest levels.
- Provided effective leadership as a manager and mentor, overseeing a team of undergraduate and graduate research assistants, effectively coordinating their efforts on various projects and ensuring high-quality deliverables.

Doctoral Research Assistant

Healthcare Systems Engineering Institute

August 2016 - September 2017, US, MA, Boston

- Led two Boston-based health system projects, funded by the Agency of Healthcare Quality and Research (AHRQ) Patient Safety Learning Laboratory (PSLL) \$4M grant in collaboration with Harvard School of Public Health. Applied advanced systems engineering and operations management theory and methodologies to drive successful outcomes.
- Authored technical papers, including manuscripts for journal submission, literature reviews, and grant proposals, showcasing strong technical writing skills and the ability to effectively communicate research findings to academic and professional audiences.
- Developed and conducted in-depth analysis using simulation models to optimize patient flow, utilizing advanced analytical techniques to identify process improvements and enhance healthcare delivery.

Healthcare Business Process Architect - Graduate Research Assistant

Montefiore Care Management Organization

June 2015 - May 2016, US, NY, Yonkers

- Secured a prestigious research assistantship at Montefiore Care Management Organization through the research funding awarded by Binghamton University's Watson Institute for Systems Excellence (WISE), where I served as a Healthcare Business Process Architect during the second year of my master's program.
- Conducted in-depth research on disenrolling patients from a diabetes chronic care management program, employing advanced data analysis techniques and data mining methodologies like artificial neural networks while ensuring the utmost sensitivity and compliance with patient health information privacy regulations.
- Documented existing processes within the organization and applied process improvement methodologies to redesign and optimize workflows, effectively enhancing efficiency and quality in care management processes. Presented research findings to stakeholders, demonstrating the ability to translate complex data into actionable insights.

CERTIFICATIONS

Lean Six Sigma Black Belt

Binghamton University • 2017

Demonstrates expertise in process improvement, data-driven decision-making, problem-solving, quality management, enhancing efficiency, productivity, and cross-disciplinary collaboration

Social and Behavioral Research Investigators

Collaborative Institutional Training Initiative (CITI), Harvard T.H. Chan School of Public Health • 2017

Demonstrates proficiency in ethical considerations, research compliance, protection of human subjects, ensuring adherence to regulatory standards and ethical practices in healthcare research

Responsible Code of Conduct for Engineers

Collaborative Institutional Training Initiative (CITI), Northeastern University • 2017

Validates commitment to ethical conduct, professional integrity, and responsible decision-making in research, ensuring adherence to ethical guidelines and promoting trustworthiness in research outcomes

PEER-REVIEWED PUBLICATIONS

Holmes, A. A., Tripathi, S., Katz, E., Mondesire-Crump, I., Mahajan, R., Ritter, A., Arroyo-Gallego, T., Giancardo, L. (2022). A novel framework to estimate cognitive impairment via finger interaction with digital devices. *Brain Communications*. 4(4).
<https://doi.org/10.1093/braincomms/fcac194>

Holmes, A. A., (2016). A data-driven approach to optimizing dis-enrollment for diabetes patients in care management (Master's thesis). Retrieved from ProQuest. (No. 10133956)

Holmes, A. A., Shan, S., Shan, X., Chou, C., Khasawneh, M. T., and Srihari, K. (2016). A data-driven approach to optimizing dis-enrollment for diabetes patients in care management. In H. Yang, Z. Kong, and M. D. Sarder (Eds.), *In Proceedings of the 2016 Industrial and Systems Engineering Research Conference*. Anaheim, CA: Institute of Industrial and Systems Engineers.

[Under Review]

Holmes, A. A., Matarazzo, M., Mondesire-Crump, I., Katz, E., Mahajan, R., Arroyo-Gallego, T. *Exploring asymmetric fine motor impairment trends in early Parkinson's disease via keystroke typing*. Movement Disorders Clinical Practice.

Ayala, A. A., Morales, A., Giancardo, L., Vera-Rodriguez, R., **Holmes, A. A.**, Fierrez, J., Arroyo-Gallego, T. *KeyGAN: Synthetic keystroke data generation in the context of digital phenotyping*. Computer Methods and Programs in Biomedicine.

Tripathi, S., Acien, A., **Holmes, A. A.**, Arroyo-Gallego, T., and Giancardo, L. (2023). Self-supervised learning with touchscreen typing: A generalizable strategy for Parkinson's disease detection across datasets. In *2023 Proceedings of the 14th ACM international conference on bioinformatics, computational biology and health informatics*. IEEE.