E. Benjamin Randall, Ph.D.

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Summary

Applied data science leader with 10+ years delivering scalable AI/ML solutions in healthcare, physiology, and geospatial domains. Expert in modeling, ML, and LLM integration, with a record of deploying cloud-native pipelines and leading cross-functional teams to translate complex data into actionable insights

Areas of Expertise and Tools

- **Modeling & ML**: Statistical and mathematical modeling, supervised/unsupervised learning, neural networks, transformers, explainable AI; Python, MATLAB, R, SQL; PyTorch, JAX, HuggingFace, Ollama
- **Data Engineering & Deployment**: Pipeline development, MLOps, containerization, cloud infrastructure; CUDA, Docker, Kubernetes, AWS, Terraform, GitLab, Fortify, Grype
- **CV, NLP, & LLMs**: Object detection, NLP, multimodal integration, LLM applications (RAG, LangChain, MCPs)
- **Data Analysis & Knowledge Representation**: Exploratory data analysis, dimensionality reduction (PCA, tSNE, UMAP), time series, ontologies, multimodal fusion, knowledge graph search

Experience

Applied Research Associates, *Staff Scientist* Nov 2022-present
Analytical Spatial Intelligence Research & Technologies (ASIRT) Directorate Raleigh, NC

- Directed research task forces of 3–7 scientists to deliver algorithmic and multimodal imagery extraction software, including 4 CI/CD Python modules deployed for government clients
- Delivered multimodal vision-text algorithms for scene classification, improving query triage accuracy by >200%, and reducing downstream processing time
- Developed ML/CV algorithms to detect and localize geolocatable features in photos, automating map cross-referencing and minimizing geolocation workload
- Implemented MCP tools using Ollama to establish in-house AI agents, and engineered a reusable, Docker-containerized framework adopted across teams to accelerate agent development
- Optimized production-grade codebases through collaborative development, rigorous testing, and scalable architecture, enabling faster integration across cross-functional teams
- Enhanced cloud-native MLOps infrastructure by containerizing workflows and deploying on AWS, improving efficiency, scalability, and consistency of production deployments
- Communicated progress and effectiveness of analytic workflows to government clients and stakeholders, managing expectations and ensuring solutions delivered maximum operational impact
- Mentored 5 junior scientists to strengthen problem-solving and critical thinking skills
- Developed 5 internal seminars and instructional guides to cross-train colleagues and management on embedding frameworks, MCPs, and pipeline organization for scalable deployment

University of Michigan, *Postdoctoral Fellow* Sep 2019-Oct 2022
Department of Molecular and Integrative Physiology Ann Arbor, MI

- Developed a novel physiology-informed ML approach using hierarchical and k-means clustering of patient-specific model parameters, enabling improved subclassification and risk stratification of heart failure patients
- Extended PhD research, integrating mathematical parameter sensitivity and estimation with random forests to improve categorization of dysautonomia patients and uncover novel clinical insights into autonomic disorders
- Co-authored 7 peer-reviewed publications (4 first-author) spanning mathematics, bioengineering, and physiology, including 3 produced through direct mentorship of graduate and undergraduate students
- Delivered 25+ presentations advancing interdisciplinary collaboration and broadening research impact for academic, professional, and public audiences
- Collaborated with clinical leaders, engineers, and researchers to translate data analyses into operational strategies that guided decision-making and improved resource allocation

Education

Certificate	**Massachusetts Institute of Technology (MIT)**, Applied Data Science	2022
Ph.D., M.S.	**North Carolina State University (NCSU)**, Applied Mathematics	2019
B.S.	**University of North Carolina, Charlotte**, Mathematics	2014
B.S.	**University of North Carolina at Chapel Hill**, Chemistry	2011