NICHOLAS TAPP - HUGHES

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Machine Learning Engineer focused on building reliable, accurate, and effective end-to-end machine learning systems; experienced solving ambiguous problems, navigating complicated codebases, and working directly with end users.

EXPERIENCE

Software Developer *Epic Systems Corp., July 2023–July 2025*
- Improved screening follow-up workflows for 80+ hospital systems (according to customer feature requests) by architecting a configurable system that enables automatic follow-up care suggestions based on screening insights.
- Drove 20% performance gain (measured by realistic experimentation) and UX improvements (measured by user feedback) in 2 application components by migrating them from Visual Basic to .NET/C# and React.
- Wrote 2 technical designs, presented to customers, and collected user feedback for an LLM-extracted insights project which resulted in earlier diagnosis for 70% of lung cancer cases at The Christ Hospital.
- Shipped 62 bug fixes across the client, server, and databases to 500+ healthcare systems.
- Observed pain points, collected feedback, and facilitated installs during 20 days spent on-site with end users.

Graduate Student Researcher *UNC Computer Science, Aug 2021–May 2023*
- Published a 22% improvement in autism classification accuracy on a 3D mesh hippocampus dataset by developing new methods for extracting interpretable statistical features of 3D objects (Journal of Math. Imaging and Vision).
- Boosted research lab productivity by maintaining our Python repo, developing scripts for orchestrating experimentation, cleaning datasets, and introducing visualization tools.

Graduate Research Assistant *UNC Gillings School of Global Public Health, Aug 2021–June 2025*
- Improved policymakers' understanding of smoking behavior in the US adult population by building a microsimulation model that predicts year-over-year smoking behavior at the individual level.
- Accelerated the project team's productivity and synchronization by maintaining the codebase, building robust data pipelines, sharing regular results, recommending technologies, and onboarding new people.
- Published in PLoS One and Society for Research on Nicotine and Tobacco.

Software Engineering R&D Intern *Sila Nanotechnologies Inc., June 2022–Aug 2022*
- Improved physical measurement accuracy in chemical R&D processes by developing improvements to a proprietary computer vision pipeline, writing documentation, and advising future development strategy.

Medical Computing R&D Intern *Kitware Inc., June 2021–Aug 2021*
- Contributed to an on-device ultrasound (medical video) analysis application for anatomical reconstruction.
- Built a protoype (including pre-processing and neural net stages) targeting Surface Pro device.

PROJECTS & SYSTEMS BUILT

Evolutionary Skeletal Representations Algorithm
An algorithmic pipeline for determining salient statistical features of 3D mesh objects using skeletal representations and differential geometric processing. Implemented with Python, C++, and shell scripts.

NetSeg
A 3D convolutional neural network that I built and trained (using TensorFlow) to segment subcortical brain structures in MRI. Uses custom data preprocessing steps and loss functions, and comes with a CLI/GUI wrapper.

Smoking Behavior Microsimulation Model
A 2^{nd} order Markov chain multinomial logistic regression model simulating the smoking behavior of individuals over the course of their lifetimes, scaled up to the entire US adult population. Predicts smoking behavior, mortality, and incidence of disease based on individual and societal factors. Accompanied by large-scale data analysis.

SELECTED PUBLICATIONS

- Pizer, S. M., Liu, Z., Zhao, J., **Tapp-Hughes, N.**, Damon, J., Zhang, M., Marron, J. S., Taheri, M., Vicory, J., *Interior Object Geometry via Fitted Frames*, Journal of Mathematical Imaging and Vision. Available: https://rdcu.be/eFX0G.
- Mills, S. D., **Tapp-Hughes, N.**, Zhang, Y., Ribisl, K. M., Wiesen, C. A., Fan, J., & Hassmiller Lich, K., *Development and Validation of the Tobacco Use Individual-level Simulation and Tracking (TwIST) Model*, PLoS One. (in press)

SKILLS

Languages: Python, C++, Rust, Bash Scripting, SQL, TypeScript, C#, Java
Frameworks & Tooling: PyTorch, TensorFlow, OpenCV, CMake, Containerization, Hugging Face, AWS, AI-Assisted Dev
Other: Computer Vision, System Design, AI/ML Research, Linux, Data Cleaning, Orchestration, Math & Statistics

EDUCATION

University of North Carolina at Chapel Hill
B.S. Applied Mathematics, B.S. Computer Science *August 2017–May 2021*
- Cumulative GPA: 3.92/4, Math GPA: 3.87/4, CS GPA: 3.97/4

M.S. Computer Science *August 2021–May 2023*