Nate Gillman
nategillman1@gmail.com nategillman.com www.linkedin.com/in/ngillman

EDUCATION

Brown University, Providence, RI
- **PhD** (Artificial Intelligence, Machine Learning, Generative AI) *2020 – present*
- **ScM** (Mathematics) *2022*

Wesleyan University, Middletown, CT
- **BA** (Mathematics, Computer Science, Hebrew; Class rank 1/748, Barry Goldwater Scholar) *2020*

SELECTED PREPRINTS/PUBLICATIONS/PATENTS (see personal site for all, as well as list of coauthors)

- Self-Correcting Self-Consuming Loops for Generative Model Training. *ICML 2024.*
  - *Project page:* https://nategillman.com/sc-sc.html
- IsoScore: Measuring the Uniformity of Embedding Space Utilization. *ACL 2022*.
  - *Project page:* https://github.com/bcbi-edu/p_eickhoff_isoscore
- Methods and Systems for Dynamically Generating a Plurality of Machine Learning Systems During Processing of a User Data Set. Pub. No. US 2024/0028312 A1, January 25, 2024. *US Patent Application Publication.*

RELEVANT WORK/PROJECT/RESEARCH EXPERIENCE

Artificial Intelligence PhD Research, Brown University *2020-present*
- *Generative AI:* invented theoretical technique for stabilizing self-consuming generative model training; applied it in practice to fix model collapse for case of human motion generation using diffusion models
- *Computer Vision:* developed novel architectures for pedestrian intention forecasting using generative AI; working with Honda self-driving datasets, collaborated with researchers at Honda Research Institute
- *Natural Language Processing, Machine Learning:* invented rigorous mathematical method for measuring uniformity of spatial utilization of word embedding spaces; designed and executed numerical experiments using Numpy to evaluate properties of competing metrics

Machine Learning Internships during PhD leave of absence, New York City *June 2022 – June 2023*

1) **NLP Data Scientist**, American Express AI Labs *June 2022 – August 2022*
   - Created chatbot using open-source software; improved customer UX when disputing fraudulent charges
   - Managed end-to-end data science pipeline: data procurement, model design, testing/validation
2) **Machine Learning Engineer**, Akkio *August 2022 – January 2023*
   - Seed-stage no-code AI startup; designed and executed experiments to evaluate model shortcomings
   - Revamped PyTorch time series models, improved forecasting performance by 30%; patent pending
3) **Machine Learning Engineer**, Captions *March 2023 – June 2023*
   - ML research and development across our iOS app's audio processing stack; cleaned user production data
   - Trained PyTorch audio models (speaker separation, speaker diarisation, voice cloning) from scratch

Pure Mathematics Research, Brown, Emory, Wesleyan, Budapest Semesters in Math *2016-2022*
- Conjectured and proved theorems about distribution of primes, and distribution of geometric invariants
- Published five peer-reviewed journal articles, presented technical results at five professional venues

RELEVANT TECHNICAL SKILLS

- *Programming languages:* Python, C, Cython, Standard ML, R, LaTeX, SageMath, HTML, JavaScript
- *Data science/tooling:* PyTorch, Tensorflow, Jax, Numpy, Pandas, Matplotlib, AWS, GCP, Cuda, Docker
- *Expertise/interests:* deep learning, generative modeling, computer vision, natural language processing

LEADERSHIP/TEACHING EXPERIENCE

- *Seminar organization:* Brown math PhD student seminar (2021), arithmetic dynamics seminar (2020)
- *Teaching:* PhD student teacher training (2021), mentored a directed reading program in cryptography (2021), course assistant for algebra, analysis, calculus, discrete math, number theory (2017-2022)
- *Outreach:* organized activities "Numbers in Nature with Nate" and "Math Yoga" at youth summer camps