

Vishweshwar Tyagi

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RESEARCH INTERESTS

Probability and stochastic processes, Bayesian inference, Monte Carlo methods, machine learning, probabilistic programming

EDUCATION

Columbia University

New York, NY

MS Data Science (GPA 3.97 / 4.0)

Sep 2021 – Dec 2022

Courses: Statistical Inference, Algorithms, Machine Learning, Deep Learning, Computer Systems

Teaching Assistant: Analysis and Optimization, Reinforcement Learning, Applied Deep Learning

IIT Kanpur

India

MS Math (GPA 9.0 / 10.0)

Aug 2019 – May 2021

Courses: Several Variable Calculus, Linear Algebra, Partial Differential Equations, Topology, Set Theory

Honors: Academic Excellence Award 2019, 2020

University of Delhi

India

BS Math (GPA 9.4 / 10.0)

Aug 2016 – May 2019

Courses: Probability, Ring Theory & Linear Algebra, Riemann Integration & Series of Functions, Real Analysis

RESEARCH EXPERIENCE

Data Scientist

Jan 2023 – Present

Department of Neurology, Columbia University

New York, NY

- Developed hierarchical Bayesian models to estimate motor recruitment curves from sparse neurophysiological data, improving efficiency and reducing experiment duration
- Implemented mixture models to identify and downweight outlier observations, improving inference robustness
- Developed Bayesian mixed-effects models to detect significant changes in motor threshold in intervention studies, reducing required number of study participants compared to frequentist tests
- Released open-source Python package that formed basis of NIH grant for real-time adaptive stimulation, and supported preliminary analysis for \$1.25M CDMRP grant for optimizing stimulation parameters in human studies

PUBLICATIONS

Tyagi, V., Murray, L. M., Asan, A. S., Mandigo, C., Virk, M. S., Harel, N. Y., Carmel, J. B., McIntosh, J. R. (2025). *Hierarchical Bayesian estimation of motor-evoked potential recruitment curves yields accurate and robust estimates.* Brain Stimulation.

Under review

Pascual-Leone, A. *, **Tyagi, V.** *, Asan, A.S. *, Rocha-Flores, P.E., Rodriguez-Lopez, O., Voit, W.E., McIntosh, J.R.†, Carmel, J.B.† (2025). *Electrode position, size, and orientation determine efficacy of cervical epidural stimulation to recruit forelimb muscles in rats.* bioRxiv.

INDUSTRY EXPERIENCE

Data Science Intern

Summer 2022

Quartet Health

New York, NY

- Improved identification of high-risk patients for mental health conditions by fine-tuning large language model BERT on clinical notes using transfer learning in PyTorch, increased F2-score by 13% over XGBoost baseline
- Built data pipeline on Amazon Redshift using dbt and SQL to automate transformation of medical claims data and added unit tests to validate pipeline output
- Utilized data pipeline to evaluate insurance network quality and identify network gaps, reducing claim denial rates by 7% through outlier detection and saving \$20K in referral costs

SOFTWARE

Maintainer hbMEP ([hbmepe.github.io/hbmep/](https://github.com/hbmep/hbmep/))

TEACHING

Teaching Assistant, Columbia University

Applied Deep Learning (COMS W4995)	Fall 2022
Applied Machine Learning (COMS W4995)	Spring 2022
Analysis and Optimization (MATH V2500)	Spring 2022
Reinforcement Learning (ELEN E6885)	Fall 2021
Calculus I (MATH UN1101)	Fall 2021

TECHNICAL SKILLS

Programming	Python, R, C/C++, SQL (Postgres)
Bayesian	NumPyro, Pyro, Stan
Machine Learning	NumPy, scikit-learn, JAX, PyTorch, Hugging Face, XGBoost, OpenAI
Developer Tools	Git, Docker, Bash, Linux, SSH, Google Cloud Platform, VS Code
Data Tools	dbt, Spark, PostgreSQL, BigQuery, Redshift, MySQL

CONFERENCES

Hierarchical Bayesian estimation of motor-evoked potential recruitment curves yields accurate and robust estimates.
Society for Neuroscience (SfN) Nanosymposium on Analytical Computational Tools, October 2024, Chicago, Illinois.

OTHER PUBLICATIONS

Murray, L.M.^{*}, McIntosh, J.R.^{*}, Goldsmith, J.A., Wu, Y.-K., Liu, M., Sanford, S.P., Joiner, E.F., Mandigo, C., Virk, M.S., **Tyagi, V.**, Carmel, J.B.[†], Harel, N.Y.[†] (2025). *Timing-dependent synergies between noninvasive motor cortex and spinal cord stimulation in chronic cervical spinal cord injury.* Clinical Neurophysiology.