

Vishweshwar Tyagi

vt2353@columbia.edu | <https://vishu.ai/> | 917-293-4910 | 500 Riverside Dr., New York, NY 10027

RESEARCH INTERESTS

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

EDUCATION

Columbia University

MS Data Science (GPA 3.97 / 4.0)

New York, NY

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

MS Mathematics (GPA 9.0 / 10.0)

India

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

BS Mathematics (GPA 9.4 / 10.0)

India

Aug 2016 – May 2019

Courses: Probability & Statistics, Real Analysis, Metric Spaces, Riemann Integration & Series of Functions

RESEARCH EXPERIENCE

Data Scientist

Jan 2023 – Present

Movement Recovery Lab, 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 number of study participants required to assess treatment effects
- Published open-source Python package to secure NIH R03 grant for optimizing adaptive stimulation and support data analysis for \$1.25M CDMRP grant for optimizing stimulation parameters

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.

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 (Under review).

Tyagi, V., Carmel, J.B., McIntosh, J.R. (2026). *Bayesian adaptive design for construction of motor-evoked potential recruitment curves*. Expected 2026 (In preparation).

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 (<https://hbtep.github.io/hbtep/>)

TEACHING

Teaching Assistant, Columbia University

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

TECHNICAL SKILLS

Programming: Python, R, C/C++, SQL (Postgres)

Machine Learning: NumPy, scikit-learn, JAX, PyTorch, XGBoost, Hugging Face, OpenAI

Bayesian: NumPyro, Pyro, Stan

Big Data: dbt, Spark, BigQuery, Redshift

Developer Tools: Git, Bash, Linux, SSH, Vim, VS Code, Docker, Google Cloud Platform

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.