

Vishweshwar Tyagi

Curriculum Vitae

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Education

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|-----------|---|--------|
| 2021–2022 | MS in Data Science , <i>Columbia University</i> , USA | 3.97/4 |
| 2019–2021 | MS in Mathematics , <i>IIT Kanpur</i> , India | 9.0/10 |
| 2016–2019 | BS in Mathematics , <i>University of Delhi</i> , India | 9.4/10 |

Research Interests

hierarchical Bayesian models, probabilistic programming, Monte Carlo methods
statistical machine learning, stochastic processes

Experience

Research Experience

- 2023–
Present
- Data Scientist**, *Department of Neurology, Columbia University*, New York, USA
- Developed hierarchical Bayesian models to estimate motor recruitment curves from sparse neurophysiological data of brain and spinal cord stimulation
 - Implemented mixture models to detect and down-weight outlier observations, improving robustness of inference
 - Applied Bayesian mixed effects models in intervention studies to detect change in motor threshold with fewer participants compared to frequentist tests
 - Released open-source Python package hbMEP, which formed basis of funded NIH grant on real-time adaptive stimulation and supported preliminary analyses for \$1.25M CDMRP grant optimizing stimulation parameters in human and rodent studies

Industry Experience

- Summer
2022
- Data Science Intern**, *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 end-to-end pipeline on Amazon Redshift using dbt and SQL to automate transformation of medical claims data and added unit tests to validate pipeline output
 - Leveraged pipeline to evaluate insurance network quality, reduced claim denial rates by 7% through outlier detection, and identified network gaps, saving \$20K in referral costs

Publications

- 2025 **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

- 2025 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.

Software

Maintainer hbMEP (hbmeep.github.io/hbmeep/)

Teaching

Teaching Assistant, Columbia University

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

Conferences

- 2024 **Tyagi, V.**, Murray, L. M., Asan, A. S., Mandigo, C., Virk, M. S., Harel, N. Y., Carmel, J. B., McIntosh, J. R. (2024). *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.

Technical Skills

Programming Python, C++, R, SQL
Bayesian Pyro, NumPyro, Stan
ML scikit-learn, PyTorch, Hugging Face, XGBoost, OpenAI
Tools Git, Docker, Bash, Linux, SSH
Data dbt, PostgreSQL, BigQuery, Redshift, MySQL