Vishweshwar Tyagi

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Curriculum Vitae
Last Updated: *January 5, 2025*

Education

2021–2022 **MS in Data Science**, *Columbia University*
GPA: 3.97/4

2019–2021 **MS in Mathematics**, *IIT Kanpur*
GPA: 9/10

2016–2019 **BS in Mathematics**, *University of Delhi*
GPA: 9.4/10

Experience

Research Experience

2023–Present **Data Scientist**, *Department of Neurology, Columbia University*, New York

- Developed hierarchical Bayesian models to improve estimation of motor recruitment curves and motor threshold from sparse neurophysiological data of brain and spinal cord stimulation
- Integrated mixture modeling to automatically detect and handle outlier observations, including fasciculations, improving robustness of curve estimates
- Designed hierarchical Bayesian mixed-effects models for intervention studies, demonstrating increased statistical power for detecting small changes in motor threshold compared to frequentist testing
- First-authored paper and released open-source Python package `hbMEP`
  - Formed basis of successful NIH R03 grant for real-time adaptive stimulation using `hbMEP`
  - Used in preliminary analysis of successful $1.25M CDMRP grant on optimization of stimulation parameters in human and rodent studies

Industry Experience

Summer 2022 **Data Science Intern**, *Quartet Health*, New York

- 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
  - Identified network gaps, saving $20K in referral costs

Publications

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.*

Python Software

Maintainer `hbMEP` (hbmep.github.io/hbmep/)

Awards and Honors

2019, 2020 Academic Excellence Award, IIT Kanpur

2019 All India Rank 113 (top 0.3%), IIT JAM Mathematics

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 Languages

Proficient Python, C++, R, SQL

Frameworks & Libraries

Bayesian Pyro, NumPyro, Stan, TensorFlow Probability

ML & DL scikit-learn, PyTorch, Hugging Face, Transformers, XGBoost

CLI Tools Git, Bash, Linux, SSH, Docker

Data Infrastructure

Databases PostgreSQL, MySQL

Cloud BigQuery, Redshift