Sandhya Tripathi

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EXPERIENCE

Department of Anesthesiology, Washington University School of Medicine

Staff Scientist — Oct 2024 – Present

Epic EHR phenotype model deployment

- Led the successful deployment of the inflammatory phenotype classification model for sepsis patients across Barnes Jewish Hospital system, working closely with various stakeholders and the Epic team to ensure effective implementation.
- Coordinated efforts with academic institutions, including the University of Michigan, and the University of Colorado, to facilitate the deployment of a clinical classification model within their Epic EHR systems.

Phenotyping of critically ill patients

- Developed a code workflow to seamlessly phenotype critically ill patients, enhancing the efficiency and accuracy of data processing. The dataset sources included both retrospective Electronic Health Records (including MIMIC-IV) and prospective trials.
- Implemented this workflow for collaborators in the US (Vanderbilt University Medical Center, Cleveland Clinic, University of Wisconsin School of Medicine), the UK, Italy and Japan, promoting international interoperability and collaboration.

Development of biomarker-based phenotyping models

- Developed and validated an innovative, parsimonious phenotyping model for sepsis patients, incorporating previously unused biomarkers and leveraging advanced medical expertise.

Statistical analysis

- Utilized statistical tools to examine the relationship between baseline inflammatory phenotypes and mortality outcomes on various days in the ICU.

Post Doctoral Research Scholar — Feb 2020 – Sep 2024

Clinical Model Development and Deployment

- Developed solutions for the problem of merging patient medical records from different hospitals or health recording systems using state-of-the-art deep learning techniques.
- Queried large open-source medical dataset MIMIC in *PostgreSQL* for solution's performance demonstration.
- Validated these techniques by implementing self-designed *PyTorch* models on high-performance computing platforms in portable *Docker* containers to demonstrate improvement over existing methods.
- Developed tailor-made code in *R* using statistical techniques to process intra-operative medication data for manual entry or drug unit mismatch errors.
- Designed supervised prediction models for post-surgical complications (such as in-hospital mortality, cardiac arrest etc) in *Python* to inform clinicians of individualized patient risk. Utilized LSTM and attention-based deep networks to process intra-operatively recorded medications and vitals for model deployment using *torch serve*.

Evaluation of clinically deployed models

- Designed risk prediction explanation methods using machine learning interpretability techniques while collaborating with domain expert colleagues on *GitHub*.
- Evaluated the deployed machine learning models that were being used in a telemedicine centre as part of a large randomized control trial for racial, sex-based or age-based discrimination.
- Conducted interviews with the clinicians to understand the impact of AI-generated risk predictions along with explanations on their decisions.

Impact of social vulnerability on surgery outcomes

- Quantified zipcode based social economic status for patients from St Louis area using *GIS* tools.
- Conducted statistical analysis to study the effect of social vulnerability on the post-surgical complications.

Industrial Engineering & Operations Research (IEOR), Indian Institute of Technology Bombay

Research Scholar — Jul 2014 – Jan 2020

Learning in the presence of label/annotation noise

- Developed algorithms for learning with label noise (due to crowdsourcing or sensor breakdown) in cost-sensitive binary classification.
- Proposed a modified squared loss function with theoretical guarantees, showing improved performance on real-world datasets for equal-rate label corruption.
- Adapted Generative Adversarial Networks (GANs) to handle different rates of label corruption, demonstrating robustness on corrupted MNIST and Fashion-MNIST image datasets.

Scalable classifiers based on exponential loss function

- Developed a theoretical framework using exponential loss for scalable binary classifiers.
- Demonstrated performance improvements in terms of accuracy and time across a large number of varying feature and sample-sized datasets.

Interpretability in classification via Shapley value of a cooperative classification game

- Modelled a novel classification game for explainable & interpretable feature selection.

EDUCATION

Indian Institute of Technology Bombay, Mumbai, India

PhD in Operations Research (Machine learning focused) at IEOR Jul 2014 – Jan 2020
- Thesis: Label noise robustness and feature subset selection in classification: Discriminative and Generative approaches
- **IEOR Alumnus Endowment: Excellence in Doctoral Dissertation Award (2020-22)**

M.Sc. in Operations Research at IEOR (GPA: 4.0/4.0) Jul 2012 – Jun 2014

Delhi University, Delhi, India

B.Sc. (Honors) in Statistics at Lady Shri Ram College for Women Jul 2009 – Jun 2012
- Cumulative GPA: 84.37% (3.0/4.0 GPA)

PUBLICATIONS

1) Chanderraj, R., Bartek, B., Stringer, K. A., Tiba, M. H., Sjoding, M. W., He, Y., Nuppnau, M., Bongers, K. S., Adame, M. D., Lou, S. S., Kerchberger, E., Churpek, M. M., Calfee, C.S., **Tripathi, S.**, Foster, D. M., Dickson, R. P., and Sinha, P. (2026) Pathogen characteristics are key determinants of distinct host response phenotypes of sepsis. The Journal of Clinical Investigation, 136(6).

2) Monteiro, A. C., Bartek, B., **Tripathi, S.**, Calfee, C.S., Matthay, M. A., and Sinha, P. (2025). Short Stature Is an Independent Risk Factor for Ventilatory Inefficiency and Higher Mortality in ARDS. American Journal of Respiratory and Critical Care Medicine. doi: 10.1164/rccm.202502-0505RL. PMID: 41026832.

3) Bartek, B., **Tripathi, S.**, Maddali, M.V., Bellani, G., Laffey, J.G., Pham, T., Calfee, C.S. and Sinha, P., 2025. Heterogeneous Treatment Effects Observed in ARDS Patients Stratified by Vasopressor Use and PEEP Strategies. American Journal of Respiratory and Critical Care Medicine, 211(Abstracts), pp.A1221-A1221.

4) **Tripathi, S.**, Bartek, B., van Amstel, R. B. E., Bos, L. D. J., Neyton, L., Harhay, M. O., Li, F., Calfee, C.S. and Sinha, P. (2025). Prognostic Value of the Hyperinflammatory Phenotype Declines Over the Course of Critical Illness. American Journal of Respiratory and Critical Care Medicine, 211(Abstracts), pp.A3136-A3136.

5) King, C.R., Fritz, B.A., Gregory, S.H., Budelier, T.P., Abdallah, A.B., Kronzer, A., Helsten, D.L., Torres, B., McKinnon, S.L., **Tripathi, S.** et. al., (2025). Effect of telemedicine support for intraoperative anaesthesia care on postoperative outcomes: the TECTONICS randomised clinical trial. British Journal of Anaesthesia, 134(3), pp.671-680.

6) Fritz, B.A., King, C.R., Abdelhack, M., Chen, Y., Kronzer, A., Abraham, J., **Tripathi, S.**, Abdallah, A.B., Kannampallil, T., Budelier, T.P. and Helsten, D. et. al., (2024). Effect of machine learning models on clinician prediction of postoperative complications: the Perioperative ORACLE randomised clinical trial. British Journal of Anaesthesia, 133(5), pp.1042-1050.

7) Abdelhack, M.*, **Tripathi, S.***, Chen, Y., Avidan, M. S., and King, C. R. (2024). Social vulnerability and surgery outcomes: A cross-sectional analysis. BMC Public Health, 24(1), 1907. *Equal contribution.

8) **Tripathi, S.**, Fritz, B. A., Abdelhack, M., Avidan, M. S., Chen, Y., and King, C. R. (2024). Multi-view representation learning for tabular data integration using inter-feature relationships. Journal of Biomedical Informatics 2024 Feb 10;151:104602. doi: 10.1016/j.jbi.2024.104602.

9) **Tripathi, S.** and King, C.R. (2024). Contrastive learning: Big Data Foundations and Applications. In Proceedings of the 7th Joint International Conference on Data Science and Management of Data (11th ACM IKDD CODS and 29th COMAD) (pp. 493-497).

10) Abdelhack, M., Zhang, J., **Tripathi, S.**, Fritz, B. A., Avidan, M. S., Chen, Y., and King, C. R. (2023). A Modulation Layer to Increase Neural Network Robustness Against Data Quality Issues, Transactions on Machine Learning Research.

11) **Tripathi, S.**, Fritz, B. A., Abdelhack, M., Avidan, M. S., Chen, Y., and King, C. R. (2022). Algorithmic bias in machine learning-based delirium prediction. (Extended Abstract) Machine Learning for Health (ML4H) symposium 2022, November 28th, 2022, New Orleans, United States.

12) Hemachandra, N., Patil, K., and **Tripathi, S.** (2020). Equilibrium points and equilibrium sets of some GI/M/1 queues. Queueing Systems, 96(3), 245–284.

13) Petety, A., **Tripathi, S.**, and Hemachandra, N. (2020). Attribute noise robust binary classification (Student Abstract). In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 34, pp. 13897–13898).

14) **Tripathi, S.**, Hemachandra, N., and Trivedi, P. (2020). Interpretable feature subset selection: A Shapley value based approach. In IEEE International Conference on Big Data (Big Data) (pp. 5463–5472). IEEE.

15) **Tripathi, S.**, and Hemachandra, N. (2019). Cost sensitive learning in the presence of symmetric label noise. In Advances in Knowledge Discovery and Data Mining (pp. 15–28). Springer International Publishing.

16) **Tripathi, S.**, and Hemachandra, N. (2018). Scalable linear classifiers based on exponential loss function. In Proceedings of the ACM India Joint International Conference on Data Science and Management of Data (pp. 190–200).

PREPRINTS & WORKING PAPERS

1) **Tripathi, S.**, Bartek, B., van Amstel, R. B. E., Bos, L. D. J., Neyton, L., Harhay, M. O., Li, F., Calfee, C.S. and Sinha, P. (2026). Prognostic Value of the Hyperinflammatory Phenotype Declines Over the Course of Critical Illness. Working paper.

2) **Tripathi, S.**, Fritz, B. A., Chen, Y., Avidan, M. S., and King, C. R. (2024). Are all clinical data modalities equally useful for post-surgical outcome prediction? Working paper.

3) **Tripathi, S.**, Fritz, B. A., Abdelhack, M., Avidan, M. S., Chen, Y., and King, C. R. (2020). (Un) fairness in post-operative complication prediction models. arXiv preprint arXiv:2011.02036.

4) **Tripathi, S.**, and Hemachandra, N. (2020). GANs for learning from very high class conditional noisy labels. arXiv preprint arXiv:2010.09577.

RESEARCH PRESENTATIONS & POSTERS

1) **ATS 2026, Orlando** Delivered an oral presentation of our abstract titled "Hypoinflammatory Phenotype in Critically Ill Patients Lacks Biological Subsets as Measured by Targeted Proteomics and Transcriptomics." at American Thoracic Society International Conference. May 2026.
2) **ATS 2026, Orlando** Presented our abstract titled "Development and Validation of an Improved Parsimonious Model for Hyperinflammatory Phenotype Classification." at Rapid Poster Discussion Session at American Thoracic Society International Conference. May 2026.
3) **ATS 2025, San Francisco** Delivered an oral presentation of our abstract titled "Prognostic Value of the Hyperinflammatory Phenotype Declines Over the Course of Critical Illness." at American Thoracic Society International Conference. May 2025.
4) **I2DB Scientific Symposium 2025, St Louis** Delivered an oral presentation on our project titled "Cirrhosis 6 Month Mortality: A deep dive in two end-to-end explainable prediction models " for I2DB Datathon: Causal Risk Prediction in Medicine. Feb 2025.
5) **ML4H 2022, New Orleans** Presented a poster about our extended abstract titled "Algorithmic bias in machine learning-based delirium prediction." at Machine Learning for Health Symposium. Nov 2022.

6) **IEEE BigData 2020 (Virtual)** Delivered an oral presentation of our conference paper titled "Interpretable feature subset selection". Dec 2020.

7) **PAKDD 2019, Macau** Delivered an oral presentation of our conference paper titled "Cost-sensitive learning in the presence of symmetric label noise". Apr 2019.

8) **IRCN, University of Tokyo** Attended and presented a poster titled "GANs based label noise robust classification" in the Neuro-inspired Computation Course. Mar 2019.

9) **CoDS-COMAD 2018, Goa, India** Delivered an oral presentation of our conference paper titled "Scalable linear classifiers based on exponential loss function" in the Joint International Conference on Data Science and Management of Data. Jan 2018.

10) **WINE 2017, IISC Bengaluru, India** Presented a poster and delivered a lightning talk on our work titled "Shapley Value based Binary Classifiers" at International Conference on Web and Internet Economics. Dec 2017.

11) **ECQT 2016, Toulouse** Delivered an oral presentation of our abstract titled "Equilibrium sets of some $GI/M/1$ queues" in European Conference on Queuing Theory. Jul 2016.

12) **MLSS 2015, University of Kyoto** Attended and presented a poster titled "Some Equilibrium Prediction Problems in $M/M/1$ Queues" at International Machine Learning Summer School. Aug 2015.

INVITED TALKS

1) **IEOR IIT Bombay, India** Delivered a seminar titled "What, Why, and How of Clinical Risk Prediction Using Electronic Health Records" to an audience comprising both students and faculty members. Jun 2025.

2) **Department of Mathematics, LSR, India** Presented a virtual lecture on "How Normal is the Normal Distribution?" accessible to the entire department. Oct 2024.

TECHNICAL SKILLS & CERTIFICATIONS

Programming Skills: Python, Pytorch, AMPL, Docker (Proficient).
Statistical and Simulation Tools: R, SPSS, Anylogic, Scilab, Mathematica (Intermediate).
Databases & Version control: MySQL, PostgreSQL, Github.
Certifications: AI for Medicine, AI for Good specialization from Coursera, Longitudinal Data analysis using R.

TEACHING & MENTORING

1) Organized and taught a tutorial, 'Contrastive learning: Big Data Foundations and Applications' to the researchers from both academia and industry at **ACM CODS-COMAD 2024, Bengaluru, India**. Jan 2024
2) Conducted a tutorial, 'Contrastive learning: Big Data Foundations and Applications' at **IEEE BigData 2023, Sorrento, Italy**. Dec 2023
3) Mentored an international group of four graduate students during the **Neuromatch Academy Deep Learning** course, providing guidance from project ideation to final presentation on a sarcasm detection research project. Jul 2023
4) Jointly mentored a master's student from the WUSTL-CS program (Shuting Cui) to solve the problem of merging medical records that are structured in a time-dependent way and are very sparse. Jan 2022-Feb 2023
5) Organized and taught an online tutorial on 'Label noise: Problems and solutions' at **IEEE DSAA 2020**. Oct 2020
6) Jointly mentored an undergraduate summer student from NISER Bhubaneswar (Aditya Petety) on the problem of learning in the presence of feature noise (sensor failures etc) leading to a student abstract presentation at AAAI 2020. May 2019-Jul 2019
7) Teaching Assistantship: Conducted tutorials, designed assignments, and evaluated exams for many courses including Engineering statistics, Optimization techniques, Topics in Machine learning, and Online learning. Jan 2015-May 2018

AWARDS & SCHOLARSHIPS

1) Competition award: Awarded $300 for securing 2nd position in I2DB Datathon: Causal Risk Prediction in Medicine. Feb 2025
2) Travel Scholarship: Full sponsorship for attending IRCN at University of Tokyo. Mar 2019
3) Travel Scholarship: Registration and accomodation waiver to present at ECQT 2016 in Toulouse, France. Jul 2016
4) Travel Scholarship: Financial support of 65000¥ to attend and present a poster at MLSS2015 held in Kyoto, Japan. Aug 2015

ACADEMIC SERVICES

PC member: ECML2020, IEEE BigData'20 Special Track-XAI, IJCAI-21,-22,-23, ML4H-21,-22,-23,-24, TS4H@ICLR 2024, AMIA-21,-22,-25, Socio-NLP @ PETRA 2024, MLHC-25

- Top Reviewer Award at ML4H 2021. Given to only 10 out of hundreds of reviewers.

Reviewer: Journal of Biomedical Informatics, Neural Networks, Engineering Applications of Artificial Intelligence, Journal of Combinatorial Optimization, Knowledge-Based Systems, Health Science Reports, npj Digital Medicine, Computer methods and programs in biomedicine, BioData Mining.

OUTREACH & ADVOCACY

Postdoctoral Advocacy & Engagement at National Postdoc Association Annual Conference

- Concurrent Session Speaker (2025): Co-presented "Rapid Fire to Podcast: The Washington University Postdoc Society Outreach Experience Cultivating Belonging Among Postdocs at WashU", sharing strategies to build postdoc community and foster inclusion through innovative outreach.
- Poster Presenter (2025): Presented "From Guidelines to Requirements: A Collaborative and Data-Driven Approach to Postdoctoral Policy Design", showcasing efforts to formalize equitable hiring practices.
- Poster Presenter (2022): Presented "How a Salary Policy Meant to Improve Postdoc Equality Led to Inequity", highlighting unintended disparities caused by standardized pay scales.

Volunteer STEM Pen Pal, Letters to a Pre-Scientist (LPS): Supported STEM engagement for middle and high school students through year-long pen pal mentorship. Sep 2023-Present

Local community outreach

- Volunteer Mock Interviewer for the EMPOWER Program for Immigrants and Refugees in St Louis, assisting students with low-stakes job interview practice. Nov 2024.
- Volunteer at Gateway Pet Guardians, East St. Louis: Assisted with animal care, participated in community events, and supported fundraising initiatives. Sep 2020-Present.
- Volunteer at Abhyasika (IIT Bombay Initiative): Taught children from low-income families in Phulenagar area (Mumbai, India) and motivated them to continue their education. Sep 2017-Dec 2017.
- Volunteer at Muskaan (NSS, IIT Bombay): Helped kids explore their theater and dance hobbies and provided a stress-relief outlet from academics. Jan 2015-Apr 2015.

Awards:

- Career Development Award from the Graduate Center, WashU: An award of $500 in recognition of role as a mentor to graduate students in science communication Aug 2024
- 2024 OPA Career Development Award: An award of $2,400 in recognition of contributions to the data collection, analysis, and interpretation for the upcoming policy on postdoctoral hiring, retention, and termination. Jun 2024
- Presented with President's Volunteer Service Award in recognition and appreciation for commitment to Gateway Pet Guardians through volunteer service. Jan 2022
- Member of Indian Youth Delegation to China organized by Government of India. Jun 2016

EXTRACURRICULAR ACTIVITIES

1) Participated in ExCELS Program organized by Office of Postdoctoral affairs at Washington University in St Louis. Oct 2022
2) Winner of Table Tennis Tournament at PG SPORTS 2013 at IIT Bombay. Apr 2013
3) Winner of Dance and Dramatics events at PG CULT 2013 at IIT Bombay. Feb 2013
4) Awarded NCC 'C' grade senior division certificate. Jun 2011

LANGUAGES

Native: Fluent in speaking, writing, reading

- Hindi, English

Classroom module learning

- Japanese (4 semesters certification issued by Koo International Co. Ltd, Japan)
- Italian (2 semesters certification endorsed by University of Pavia.).