Mushir Akhtar

Ph.D. Scholar, Department of Mathematics
Indian Institute of Technology Indore, India

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Education

- **Ph.D. in Mathematics (Machine Learning)**, Indian Institute of Technology Indore, India — Dec. 2021 – Present
- **M.Sc. in Mathematics**, Chaudhary Charan Singh University, Meerut, India — 2018 – 2020
  (Gold Medalist)

PhD Supervisors

Prof. M. Tanveer
Department of Mathematics
Indian Institute of Technology Indore, India

Dr. Mohd. Arshad
Department of Mathematics
Indian Institute of Technology Indore, India

Research Interests

Kernel Methods	Randomized Neural Networks	Loss Functions
Tabular Machine Learning	Statistical Dependency Modeling	Copula Theory
Probabilistic Neural Networks	Interpretable and Trustworthy Machine Learning	Uncertainty-Aware Learning

Journal Publications

[J1] **Mushir Akhtar**, M. Tanveer and M. Arshad. RoBoSS: A Robust, Bounded, Sparse, and Smooth Loss Function for Supervised Learning. ***IEEE Transactions on Pattern Analysis and Machine Intelligence***, 47(1):149–160, 2025. doi:10.1109/TPAMI.2024.3465535. (Received Institute Best Research Paper Award, IIT Indore, 2025).

[J2] **Mushir Akhtar**, M. Tanveer, M. Arshad and Alzheimer's Disease Neuroimaging Initiative. Advancing Supervised Learning with the Wave Loss Function: A Robust and Smooth Approach. ***Pattern Recognition, Elsevier***, 155, 2024. doi:10.1016/j.patcog.2024.110637.

[J3] **Mushir Akhtar**, M. Tanveer and M. Arshad. HawkEye: A Robust Loss Function for Regression with Bounded, Smooth, and Insensitive Zone Characteristics. ***Applied Soft Computing, Elsevier***, 2025. doi:10.1016/j.asoc.2025.113118.

[J4] **Mushir Akhtar**, A. Kumari, M. Sajid, A. Quadir, M. Arshad, P. N. Suganthan and M. Tanveer. Towards robust and inversion-free randomized neural networks: The XG-RVFL framework. ***Pattern Recognition, Elsevier***, 2025. doi:10.1016/j.patcog.2025.112711.

[J5] A. Kumari, **Mushir Akhtar**, M. Tanveer and M. Arshad. Diagnosis of breast cancer using flexible pinball loss support vector machine. ***Applied Soft Computing, Elsevier***, 157, 2024. doi:10.1016/j.asoc.2024.111454.

[J6] A. Kumari, **Mushir Akhtar**, R. Shah and M. Tanveer. Support matrix machine: A review. ***Neural Networks, Elsevier***, 2024. doi:10.1016/j.neunet.2024.106767.

[J7] A. Quadir, **Mushir Akhtar** and M. Tanveer. Enhancing multiview synergy: Robust learning by exploiting the wave loss function with consensus and complementarity principles. ***Neural Networks, Elsevier***, 2025. doi:10.1016/j.neunet.2025.107433.

[J8] M. Tanveer, M. Sajid, **Mushir Akhtar**, et al. Fuzzy Deep Learning for the Diagnosis of Alzheimer's Disease: Approaches and Challenges. ***IEEE Transactions on Fuzzy Systems***, 2024. doi:10.1109/TFUZZ.2024.3409412.

[J9] M. Tanveer, A. Tiwari, **Mushir Akhtar** and C. T. Lin. Enhancing Imbalance Learning: A Novel Slack-Factor Fuzzy SVM Approach. ***IEEE Transactions on Emerging Topics in Computational Intelligence***, 2024. doi:10.1109/TETCI.2024.3524718.

Journal Manuscripts (Under Review / Revision)

[J10] **Mushir Akhtar**, A. Quadir, M. Tanveer, and Mohd. Arshad. *Dual-Center RAPID-LSSVM: Radius-Adaptive, Probability and Imbalance Driven Weighting for Alzheimer's Diagnosis.* ***Neural Networks, Elsevier.*** (Revision submitted).

[J11] **Mushir Akhtar**, M. Tanveer, and Mohd. Arshad. *RoBoTS: A Robust Bounded Twin SVM Based on RoBoSS Loss Function.* ***Pattern Recognition, Elsevier.*** (Revision submitted).

[J12] **Mushir Akhtar**, M. Sajid, M. Tanveer, and Mohd. Arshad. *Asymmetric Convex Loss and Graph Fusion for Stable and Geometry-Aware Randomized Neural Networks.* ***IEEE Transactions on Neural Networks and Learning Systems.*** (Under review).

[J13] **Mushir Akhtar**, M. Tanveer, and Mohd. Arshad. *Spectral Stability and Task-Adaptive Initialization for Randomized Neural Networks.* ***IEEE Computational Intelligence Magazine.*** (Under review).

[J14] A. Varshney, **Mushir Akhtar**, M. Arshad, and M. Tanveer. *Granular-Ball Flexible Skew Probabilistic Neural Network for Imbalance Learning.* ***Pattern Recognition, Elsevier.*** (Under review).

[J15] K. Ali, **Mushir Akhtar**, A. Zafar, and M. Tanveer. *Intuitionistic Fuzzy and Robust Loss Fused Framework for Stable and Efficient RVFL Learning.* ***IEEE Transactions on Fuzzy Systems.*** (Under review).

[J16] M. Noor, M. Malik, **Mushir Akhtar**, and M. Tanveer. *Orthogonal-Random Vector Functional Link Network Approach for Solving Coupled Emden–Fowler Equations.* ***Applied Soft Computing, Elsevier.*** (Under review).

Conference Publications

[C1] **Mushir Akhtar**, M. Tanveer and M. Arshad. CAWI: Copula-Aligned Weight Initialization for Randomized Neural Networks. ***International Conference on Artificial Intelligence and Statistics (AISTATS)***, 2026, Tangier, Morocco. url: https://openreview.net/forum?id=fwqydIjLn6.

[C2] **Mushir Akhtar**, M. Tanveer and M. Arshad. GL-TSVM: A Robust and Smooth Twin Support Vector Machine with Guardian Loss Function. ***International Conference on Pattern Recognition (ICPR)***, 2024.

[C3] **Mushir Akhtar**, R. Mishra, M. Tanveer and M. Arshad. Advancing RVFL Networks: Robust Classification with the HawkEye Loss Function. ***International Conference on Neural Information Processing (ICONIP)***, 2024.

[C4] R. Mishra, **Mushir Akhtar** and M. Tanveer. CI-RKM: A Class-Informed Approach to Robust Restricted Kernel Machines. ***International Joint Conference on Neural Networks (IJCNN)***, 2025.

[C5] M. Sajid, **Mushir Akhtar**, A. Quadir and M. Tanveer. RVFL-X: A Novel Randomized Network Based on Complex Transformed Real-Valued Tabular Datasets. ***International Joint Conference on Neural Networks (IJCNN)***, 2025.

[C6] A. Kumari, **Mushir Akhtar**, M. Tanveer and P. N. Suganthan. R^2VFL: A Robust Random Vector Functional Link Network with Huber-Weighted Framework. ***International Joint Conference on Neural Networks (IJCNN)***, 2025.

[C7] A. Quadir, M. Sajid, **Mushir Akhtar** and M. Tanveer. Twin Restricted Kernel Machines for Multiview Classification. ***International Joint Conference on Neural Networks (IJCNN)***, 2025.

[C8] M. Sajid*, **Mushir Akhtar***, M. Tanveer, S. Mitra. Fuzzy Learning at 60: Future of Trustworthy AI in Healthcare and LLM. ***IEEE International Conference on Fuzzy Systems (FUZZ-IEEE) - Celebrating 60 Years of Fuzzy Sets***, 2025. (* shows equal contribution).

Conference Manuscripts (Under Review / Revision)

[C9] **Mushir Akhtar**, M. Tanveer and M. Arshad. Residual-Guided Randomized Neural Networks. ***IEEE World Congress on Computational Intelligence (WCCI)***, 2026. (Under review).

[C10] **Mushir Akhtar**, A. Varshney, A. Quadir, A. Rahaman, M. Arshad and M. Tanveer. Robust Broad Learning System with Wave Loss for Classification under Data Uncertainty. ***IEEE World Congress on Computational Intelligence (WCCI)***, 2026. (Under review).

[C11] A. Varshney*, **Mushir Akhtar***, M. Arshad and M. Tanveer. Metric-Enhanced Hybrid Kernel Probabilistic Neural Networks for Robust Classification. ***IEEE World Congress on Computational Intelligence (WCCI)***, 2026. (Under review, * shows equal contribution).

[C12] A. Quadir, A. Rahaman, **Mushir Akhtar** and M. Tanveer. Robust Dual-Model Collaborative Random Vector Functional Link Network. ***IEEE World Congress on Computational Intelligence (WCCI)***, 2026. (Under review).

[C13] A. Rahaman, A. Quadir, M. Sajid, **Mushir Akhtar** and M. Tanveer. ECA-BLS: An Efficient Complex-Augmented Broad Learning System. ***IEEE World Congress on Computational Intelligence (WCCI)***, 2026. (Under review).

Awards and Honors

- Institute Best Research Paper Award, IIT Indore (2025)
- Gold Medalist, M.Sc. Mathematics, CCS University (2021)
- Qualified CSIR-NET JRF in Mathematics (2020)
- Qualified IIT-JAM in Mathematics (2019)

Technical Skills

- **Programming & Scientific Computing:** MATLAB, Python, R
- **Scientific Writing & Typesetting:** LaTeX
- **Productivity Tools:** Microsoft Office

Talks and Invited Presentations

- International Joint Conference on Neural Networks (IJCNN 2025), Rome, Italy – Presented 4 papers (2 Oral and 2 Poster).
- International Conference on Pattern Recognition (ICPR 2024), Kolkata, India – Poster presentation.
- Invited talk: Foundations of AI and ML: From Basics to Changing the World, IEEE CIS High School Outreach Program, 2025.

Academic Service and Leadership

- **Vice-Chair**, IEEE Computational Intelligence Society (CIS) Student Branch Chapter, IIT Indore April 2024 – Present
- **Treasurer**, IEEE Student Branch, IIT Indore May 2025 – Present
- **Joint Secretary**, IEEE Computational Intelligence Society (CIS) Chapter, Madhya Pradesh Section May 2025 – December 2025
- **Treasurer**, IEEE Computational Intelligence Society (CIS) Chapter, Madhya Pradesh Section April 2023 – March 2025
- **Member**, Academic Council (Postgraduate), IIT Indore May 2022 – December 2022
- **Organizing Committee Member**, IEEE CIS High School Outreach Program on *Foundations of Machine Learning & Artificial Intelligence and Its Impact on Society* September 27, 2025
- **Organizing Committee Member**, IEEE CIS Summer School on *Emerging Trends in Computational Intelligence, Deep Learning, and Large Language Models* July 23–25, 2025
- **Organizing Committee Member**, IEEE CIS Winter School on *Computational Intelligence and Generative AI* January 2025
- **Session Chair**, Poster Session on *Neural Networks for Bioinformatics and Biomedical Applications*, International Joint Conference on Neural Networks (IJCNN 2025), Rome, Italy
- **Program Committee Member**, 31st International Conference on Neural Information Processing (ICONIP 2024)
- **Organizing Committee Member**, IEEE CIS Workshop on *Innovation & Leadership in Artificial Intelligence* October 2024
- **Volunteer**, High-End Workshop (Karyashala) on *Statistical Modelling in Ranking and Selection* January 2024
- **Volunteer**, IEEE CIS Workshop on *Women in Artificial Intelligence* January 2024
- **Volunteer**, IEEE CIS Summer School on *Deep Learning and Computational Intelligence: Theory and Applications* December 2022
- **Volunteer**, The 29th International Conference on Neural Information Processing (ICONIP 2022)

Reviewing Activities

- **Journals:** IEEE TPAMI; IEEE TFS; Pattern Recognition; Neural Networks; Applied Soft Computing; Neurocomputing; Advanced Engineering Informatics
- **Conferences:** AAAI; AISTATS; ICASSP; ICPR; ICONIP

Teaching Experience

- Teaching Assistant for the Course CS 103(B) – Computer Programming, Department of Computer Science and Engineering, IIT Indore
- Teaching Assistant for the Course MA 102/104/106: Linear Algebra and Ordinary Differential Equations, Department of Mathematics, IIT Indore
- Teaching Assistant for the Course MA 101/103/105: Calculus, Department of Mathematics, IIT Indore
- Teaching Assistant for the Course MA 204: Numerical Methods, Department of Mathematics, IIT Indore
- Teaching Assistant in the High-End Workshop (Karyashala) on Statistical Modelling in Ranking and Selection, IIT Indore

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