

# Mushir Akhtar

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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

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- [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.  $R^2$ VFL: 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)

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- [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

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- 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

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

## Talks and Invited Presentations

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- 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

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- **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

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

## Teaching Experience

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- 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