

Dr. Mudasilir Ahmad Ganaie

Google-Scholar Link, GitHub Link

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RESEARCH INTERESTS Machine Learning, Ensemble Learning, Support Vector Machines, Ensemble Deep Learning, Neuroimaging, Image Forensics, Optimization, Image Processing

ACADEMIC PROFILE

University of Michigan, Ann Arbor, USA

Postdoctoral Research Fellow at Department of Robotics **Aug. 2022 - Present**

Indian Institute of Technology (IIT) Indore

Research Associate

January 2022 - July 2022

- Advisor: Dr. M. Tanveer, Associate Professor

Indian Institute of Technology (IIT) Indore

Doctor of Philosophy (Ph.D.)

July 2019 - Aug. 2022

- Advisor: Dr. M. Tanveer, Associate Professor

Indian Institute of Technology (IIT) Indore

July 2018 - June 2019

Junior Research Fellow (JRF)

- Advisor: Dr. M. Tanveer, Associate Professor

Aligarh Muslim University, Aligarh, India

2016-2018

Master of Technology, Computer Science & Engineering

CGPA: 9.444

- Advisor: Dr. Saiful Islam, Professor

University of Kashmir, J&K, India

2011-2015

Bachelor of Technology, Computer Science & Engineering

Marks: 79.47%

J&K State Board of School Education, J&K, India

2010

Senior Secondary (12th)

Marks: 83.6%

J&K State Board of School Education, J&K, India

2008

Secondary (10th)

Marks: 84%

ACADEMIC

ACHIEVEMENTS

- Qualified UGC **National Eligibility Test(NET)** in November-2017.
- Qualified **GATE** 2016 with 92.97 percentile.
- Qualified **GATE** 2017 with 91.78 percentile.
- Qualified **GATE** 2018 with 91.23 percentile.
- Awarded All India Council of Technical Education (AICTE) PG (GATE/GPAT) Scholarship.
- Awarded Merit-cum-Means Scholarship from the Govt. of India.

PROJECTS
UNDERTAKEN

Diagnosis of Alzheimer’s disease using brain imaging data 01/2022 - 07/2022

Advisor: Dr. M. Tanveer, Associate Professor, IIT Indore

- To review the recent development in the area of Alzheimer’s disease diagnosis using brain imaging data.
- To develop optimization algorithms for Alzheimer’s disease diagnosis using brain imaging data.
- To develop the algorithms for brain age prediction in Alzheimer’s disease subjects using brain imaging data.

Optimization models and algorithms for non-parallel SVM 07/2018 - 06/2019

Advisor: Dr. M. Tanveer, Associate Professor, IIT Indore

- To review the recent development in the area of non-parallel SVM.
- To develop optimization algorithms for large scale least squares twin support vector machines.
- To develop robust and sparse algorithms for non-parallel SVM’s.
- To develop novel ensemble techniques for the classification problems.

Operator detection in digital images

07/2017 -- 06/2018

Advisor: Dr. Saiful Islam, Professor, Aligarh Muslim University

- In this project, the main goal was to authenticate the credibility of an image whether an image has been forged or not.
- Based upon the statistical fingerprints left by each operator applied, we analyze the integrity of an image.
- It is a classification problem, wherein we need to evaluate whether the image has been forged or not. If the image has been forged, we have to reveal the processing history the image has been through.

Inventory management system

01/2016 – 05/2016

Advisor: Prof. M. Sarosh Umar, Professor, Aligarh Muslim University

- This is a web application where the office work of the AMU, Computer Engineering Department has been automated.
- This application introduced the online processing of assignments and projects. We also added the functionality of student feedback system in the portal.
- The languages used are PHP, mySql, CSS.

Face recognition using hybrid approach

01/2015 -- 06/2015

Advisor: Er. Manzoor Ahmad Lone, Assistant Professor, University of Kashmir

- Given the query image, we have to identify the person based on the features extracted from the knowledge base.
- In this project, we used Principal Component Analysis (PCA) and Discrete Wavelet Transform (DWT) techniques for feature extraction of faces.
- We evaluated our results on ORL database.

TECHNICAL
SKILLS

Programming Languages: MATLAB, Python, C/C++, PHP, Asp.Net, HTML
Tools & Packages: $L_A T^E X$, Beamer, Weka, MS Office

RELEVANT
COURSES

Algorithm Design and Analysis, Operating System, Theory of Automata, Compiler Design, , Image Processing, Digital Image Forensics, Machine Learning.

TEACHING
EXPERIENCE

1. Linear Algebra tutorial classes to the B.Tech students at Indian Institute of Technology Indore. 2019-2020
2. MATLAB tutorial classes to the M Sc Students in Department of Mathematics, Indian Institute of Technology Indore. 2018-2019

3. Taught C-programming to undergraduate students at Computer Programming Lab, Department of Computer Engineering, AMU Aligarh. 2016-2018

RESEARCH EXPERIENCE

1. Postdoctoral Research Fellow in the Department of Robotics, University of Michigan on the project entitled, "Using artificial intelligence to broaden and diversify outdated standards for the determination of skeletal maturation in growing children" under the supervision of Prof. Anouck Girard. [August 2022 - Present]
2. Research Associate in the Department of Mathematics, IIT Indore on the project entitled, "Diagnosis of Alzheimer's disease using brain imaging data" under the supervision of Dr. M. Tanveer. [January 2022 - July 2022]
3. Junior Research Fellow (JRF) in the Department of Mathematics, IIT Indore on the project entitled, "Optimization models and algorithms for non-parallel support vector machines" under the supervision of Dr. M. Tanveer. [July 2018 - June 2019]

PUBLICATIONS: JOURNALS

1. M. Tanveer, **M. A. Ganaie**, Iman Beheshti, Tripti Goel, Nehal Ahmad, Kuan-Ting Lai, Kaizhu Huang, Yu-Dong Zhang, Javier Del Ser, Chin-Teng Lin "Deep Learning for Brain Age Estimation: A Systematic Review" *Information Fusion, Elsevier* (2023) (**I.F=17.564**).
2. **M. A. Ganaie**, M. Tanveer, C.T. Lin "Large scale fuzzy least squares twin support vector machines for class imbalance learning" *IEEE Transactions on Fuzzy Systems* (2022) DOI: 10.1109/TFUZZ.2022.3161729 (**I.F=12.253**).
3. M. Tanveer, **M. A. Ganaie**, A Bhattacharjee, C.T. Lin "Intuitionistic fuzzy weighted least squares twin SVMs" *IEEE Transactions on Cybernetics* (2022) DOI: 10.1109/TCYB.2022.3165879 (**I.F=19.118**).
4. **M. A. Ganaie**, M. Tanveer, ADNI "Ensemble of deep random vector functional link network using privileged information for Alzheimer's disease diagnosis" *IEEE/ACM Transactions on Computational Biology and Bioinformatics* (2022) DOI:10.1109/TCBB.2022.3170351 (**I.F.=3.702**).
5. M. Tanveer, Jatin Jangir, **M. A. Ganaie**, Iman Beheshti, M. Tabish, Nikunj Chhabra "Diagnosis of Schizophrenia: A comprehensive evaluation" *IEEE Journal of Biomedical and Health Informatics* (formerly known as *IEEE Transactions on Information Technology in Biomedicine*) (2022) DOI: 10.1109/JBHI.2022.3168357 (**I.F.=7.021**).
6. **M. A. Ganaie**, M. Tanveer, Iman Beheshti "Brain age prediction with improved least squares twin SVR" *IEEE Journal of Biomedical and Health Informatics* (formerly known as *IEEE Transactions on Information Technology in Biomedicine*) (2022) DOI: 10.1109/JBHI.2022.3147524 (**I.F.=7.021**).
7. A. K Malik, **M. A. Ganaie**, M. Tanveer, P.N. Suganthan "Extended features based random vector functional link network for classification problem" *IEEE Transactions on Computational Social Systems* (2022) DOI: 10.1109/TCSS.2022.3187461 (**I.F.=4.747**).

8. A. K Malik, **M. A. Ganaie**, M. Tanveer, P.N. Suganthan “*Alzheimer’s disease diagnosis via intuitionistic fuzzy random vector functional link network*” [IEEE Transactions on Computational Social Systems](#) (2022) DOI: 10.1109/TCSS.2022.3146974 (**I.F.=4.747**).
9. I. Beheshti, **M. A. Ganaie**, V. Paliwal, A. Rastogi, I. Razzak, M. Tanveer (2021). “*Predicting brain age using machine learning algorithms: A comprehensive evaluation*” [IEEE Journal of Biomedical and Health Informatics](#) (formerly known as [IEEE Transactions on Information Technology in Biomedicine](#)) (DOI: 10.1109/JBHI.2021.3083187) (**I.F.=7.021**)
10. M. Tanveer, A. H. Rashid, **M. A. Ganaie**, M. Reza, I. Razzak, K. L. Hua “*Classification of Alzheimer’s disease using ensemble of deep neural networks trained through transfer learning*” [IEEE Journal of Biomedical and Health Informatics](#) (formerly known as [IEEE Transactions on Information Technology in Biomedicine](#)) (2021) DOI: 10.1109/JBHI.2021.3083274 (**I.F.=7.021**)
11. **M. A. Ganaie**, M. Tanveer, P.N. Suganthan and V. Snasel “*Oblique and rotation double random forest*” [Neural Networks](#) 153 (2022): 496-517 DOI: 10.1016/j.neunet.2022.06.012 (**I.F.=9.657**).
12. Hossein Moosaei, **M.A. Ganaie**, Milan Hladík, and M. Tanveer “*Inverse free reduced universum twin support vector machine for imbalanced data classification*” [Neural Networks](#) (2022) (**I.F.=9.657**).
13. M. Tanveer, A. Tiwari, R. Choudhary, **M. A. Ganaie** “*Large-scale pinball twin support vector machines*” [Machine Learning](#) (2021) DOI: 10.1007/s10994-021-06061-z (**I.F.=5.414**)
14. **M. A. Ganaie**, M. Tanveer “*KNN weighted reduced universum twin SVM for class imbalance learning*” [Knowledge-Based Systems](#) (2022) DOI: 10.1016/j.knosys.2022.108578 (**I.F.=8.139**).
15. **M. A. Ganaie**, J. Jangir, M. Tanveer “*EEG signal classification via pinball universum twin support vector machine*” [Annals of Operations Research](#) (2022) 1-42 DOI: 10.1007/s10479-022-04922-x (**I.F.=4.82**).
16. M. Tanveer, T. Rajani, R. Rastogi, Y.H. Shao, **M. A. Ganaie** “*Comprehensive review on twin support vector machines*” [Annals of Operations Research, Springer](#) (2022) DOI: 10.1007/s10479-022-04575-w (**I.F.=4.82**).
17. **M. A. Ganaie**, A. Kumari, A.K. Malik, M. Tanveer “*EEG signal classification using improved intuitionistic fuzzy twin support vector machines*” [Neural Computing and Applications](#) (2022) 1-17 DOI: 10.1007/s00521-022-07655-x (**I.F.=5.102**).
18. **M. A. Ganaie**, M. Tanveer, ADNI “*Fuzzy least squares projection twin support vector machines for class imbalance learning*” [Applied Soft Computing](#) 113 (2021): 107933. (**I.F.=8.263**)
19. M. Tanveer, **M. A. Ganaie**, P. N. Suganthan. “*Ensemble of classification models with weighted functional link network*” [Applied Soft Computing](#) 107 (2021): 107322. (**I.F.=8.263**)
20. **M. A. Ganaie**, M. Tanveer “*LSTSVM classifier with enhanced features from pre-trained functional link network*” [Applied Soft Computing](#) (2020): 106305. (**I.F.=8.263**)

21. **M. A. Ganaie**, Minghui Hu, A.K. Malik, M. Tanveer, P. N. Suganthan “*Ensemble deep learning: A review*” *Engineering Applications of Artificial Intelligence* (2022) DOI: 10.1016/j.engappai.2022.105151 (**I.F.=7.802**).
22. **M. A. Ganaie**, I. Beheshti, M. Tanveer “*Brain age prediction using improved twin SVR*” *Neural Computing and Applications* (2021): 1-11. (**I.F.=5.102**)
23. **M. A. Ganaie**, M. Tanveer, P. N. Suganthan “*Oblique decision tree ensemble via twin bounded SVM.*” *Expert Systems with Applications* 143 (2020): 113072. (**I.F.=8.665**)
24. **M. A. Ganaie**, S. Ghosh, N. Mendola, M. Tanveer, S. Jalan “*Identification of chimera using machine learning.*” *Chaos: An Interdisciplinary Journal of Nonlinear Science* 30.6 (2020): 063128. (**I.F.=3.642**)

UNDER REVISION

25. A.K. Malik, R. Gao, M.A. Ganaie, M. Tanveer, P.N. Suganthan “*Random vector functional link network: recent developments, applications, and future directions*” arXiv preprint arXiv:2203.11316 [Submitted after first revision to Applied Soft Computing, Elsevier.] (I.F.=8.263)

CONFERENCES

1. Anuradha Kumari, **M. A. Ganaie**, and M. Tanveer “*Intuitionistic fuzzy universum support vector machine.*” International Conference on Neural Information Processing (ICONIP 2022). (Core Rank A)
2. Nehal Ahmad, **M. A. Ganaie**, A.K. Malik, K.T. Lai and M. Tanveer “*Minimum variance embedded intuitionistic fuzzy weighted random vector functional link network.*” International Conference on Neural Information Processing (ICONIP 2022). (Core Rank A)
3. AK Malik, **M. A. Ganaie** and M. Tanveer “*Graph embedded intuitionistic fuzzy weighted random vector functional link network*” 2022 IEEE Symposium Series on Computational Intelligence. (Scopus Indexed)
4. AK Malik, **M. A. Ganaie**, M. Tanveer and P.N. Suganthan “*Support vector machine based models with sparse auto-encoder based features for classification problem*” 2022 International Conference on Neural Information Processing. (Core Rank A)
5. **M. A. Ganaie**, M. Tanveer, A. K. Malik and P. N. Suganthan. “*Minimum variance embedded random vector functional link network with privileged information*” 2022 International Joint Conference on Neural Networks, IJCNN. IEEE, 2022. (Core Rank A)
6. **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*Co-Trained random vector functional link network.*” 2021 International Joint Conference on Neural Networks, IJCNN. IEEE, 2021. (Core Rank A)
7. A. K Malik, **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*A novel ensemble method of RVFL For classification problem.*” 2021 International Joint Conference on Neural Networks, IJCNN. IEEE, 2021. (Core Rank A)
8. **M. A. Ganaie**, and M. Tanveer “*Energy based least squares projection twin SVM*” International Conference on Machine Intelligence and Signal Processing (MISP 2021). (Scopus Indexed)

9. **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*Minimum variance embedded random vector functional link network.*” International Conference on Neural Information Processing (ICONIP 2020). (Core Rank A)
10. **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*Regularized robust fuzzy least squares twin support vector machine for class imbalance learning.*” 2020 International Joint Conference on Neural Networks, IJCNN. IEEE, 2020. (Core Rank A)
11. M. Tanveer, T. Rajani, and **M. A. Ganaie** “*Improved sparse pinball twin SVM.*” 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC). IEEE, 2019. (Core Rank B)

BOOK CHAPTERS

1. **M. A. Ganaie**, and M. Tanveer. “*EEG signal classification using robust energy based least squares projection twin support vector machines.*” Medical Information Processing and Security: Techniques and Applications, IET publisher.
2. **M. A. Ganaie**, and M. Tanveer. “*Robust general twin support vector machine with pinball loss function.*” Machine Learning for Intelligent Multimedia Analytics. Springer, Singapore, 2021. 103-125.

AWARDS

- Received *Best Research Paper Award 2023* from Indian Institute of Technology Indore.
- Received best paper award in International Conference on Neural Information Processing (ICONIP 2022).

CONTRIBUTED TALKS

- Presented paper in MISP-2021: **M. A. Ganaie** and M. Tanveer “*Energy based least squares projection twin SVM.*” International Conference on Machine Intelligence and Signal Processing (MISP 2021).
- Presented paper in IJCNN-2021: **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*Co-Trained random vector functional link network.*” International Joint Conference on Neural Networks, IJCNN. IEEE, 2021.
- Presented paper in ICONIP-2020: **M. A. Ganaie**, M. Tanveer, and P. N. Suganthan. “*Minimum variance embedded random vector functional link network.*” International Conference on Neural Information Processing (ICONIP 2020).
- A contributed talk on “*Ensemble classifiers: A novel approach for classification problems*” at International Conference on Computational Mathematics in Nanoelectronics and Astrophysics (November, 2018) organized by IIT Indore.

PROFESSIONAL SERVICES

- National organizing committee member of IEEE Computational Intelligence Society (CIS) Summer School during December 12-16, 2022.
- Reviewer of various SCI indexed journals viz., IEEE Transactions on Fuzzy Systems, IEEE JBHI, Pattern Recognition, Neural Networks, Applied Soft Computing, Annals of Operations Research, Neurocomputing, Cognitive Computation, and so on.
- Provided secretarial and technical assistance in various events viz., IEEE Summer School, MISP conference, various workshops (ICONIP, CMA).

REFERENCES *Available on request*