Arishi Orra

Ph.D. Scholar · Indian Institute of Technology Mandi, India

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Deep reinforcement learning researcher with expertise in developing intelligent agents for sequential decision-making in complex environments with a strong focus on financial applications. Experienced in designing and implementing advanced DRL algorithms for tasks such as portfolio optimization, algorithmic trading, and risk-sensitive decision-making. Proficient in Python and modern ML frameworks like PyTorch with hands-on experience running scalable experiments in dynamic, data-rich environments.

Professional Experience

Project Associate | *IIT Mandi* — *Oct. 2020 – May 2021*

Responsible for the development of decision support systems integrating parallel adaptive heuristic algorithms of large-scale multi-objective optimization problems.

Systems Engineer-CTO | *TCS* — *Sep. 2020 – Oct. 2020*

Worked as an AI and ML Researcher in the Incubation team at Tata Consultancy Services.

Education

8.5/10 **PhD in School of Mathematical and Statistical Sciences**, *Indian Institute of Technology Mandi* — *Aug 2021 – Present*

9.03/10 **Master (M.Sc.) in Applied Mathematical**, *Indian Institute of Technology Mandi* — *2018 – 2020*

75% **Bachelor (B.Sc.) Honours in Mathematics**, *University of Delhi* — *2014 – 2017*

–Key PhD and Master Courses: Applied Mathematical Programming • Probability and Statistics • Matrix Theory • Topology and Functional Analysis • Optimization Techniques • Soft Computing • C-Programming • Programming Practicum (Python) • Pattern Recognition • Computer Vision • Remote Sensing • Deep Learning (Coursera) • Computational Finance Modelling • Advanced Topics in Deep Learning

–Achievements and Activities: Qualified IIT JAM - 2018 (Joint Admission Test for M.Sc.) in Mathematics | Qualified GATE Mathematics - 2021 | Received Academic Excellence Award during M.Sc. at IIT Mandi | Student coordinator of Career and Placement cell for M.Sc Applied Mathematics branch at IIT Mandi | Served as Resident Warden for Parashar hostel at IIT Mandi

Research Publications

- **Orra, A.**, Bhambu, A., Choudhary, H., & Thakur, M. (2024, November). Dynamic Reinforced Ensemble using Bayesian Optimization for Stock Trading. In Proceedings of the 5th ACM International Conference on AI in Finance (pp. 361-369). (Link to Paper)
- **Orra, A.**, Bhambu, A., Choudhary, H., Thakur, M., & Natarajan, S. (2025). Deep Reinforcement Learning for Investor-Specific Portfolio Optimization: A Volatility-Guided Asset Selection Approach. Advances in Financial AI Workshop, ICLR 2025. (Link to Paper)
- **Orra, A.**, Sahoo, K., & Choudhary, H. (2023). Machine Learning-Based Hybrid Models for Trend Forecasting in Financial Instruments. In Soft Computing for Problem Solving: Proceedings of the SocProS 2022 (pp. 337-353). Singapore: Springer Nature Singapore. (Link to Paper)
- Choudhary, H., Sahoo, K., & **Orra, A**. (2022, September). Modified Iterative Shrinkage Thresholding Algorithm for Image De-blurring in Medical Imaging. In Congress on Intelligent Systems (pp. 463-479). Singapore: Springer Nature Singapore. (Link to Paper)
- **Orra, A.**, Choudhary, H., Sharma, A., & Thakur, M. (2025). Enhancing Deep Reinforcement Learning for Stock Trading: A Reward Shaping Approach via Expert Feedback. (Revision submitted).
- **Orra, A.**, Bhambu, A., Choudhary, H., & Thakur, M. (2025). A Meta-Learning Approach to Policy Ensemble in Deep Reinforcement Learning for Financial Trading. (Under review).
- Choudhary, H., **Orra, A.**, & Thakur, M. (2025). FinXplore: An Adaptive Deep Reinforcement Learning Framework for Balancing and Discovering Investment Opportunities. (Accepted at IJCNN 2025).
- Bhambu, A., **Orra, A.**, Suganthan, P.N., & Natarajan, S. (2025). Conformal Time Series Forecasting with Deep Reinforcement Learning (Under Review).

Conferences and Workshops Attended

International Conference on Learning Representations (ICLR) 2025 | *Poster Presentation* | Singapore — *Apr. 24 – Apr. 28, 2025*

Indian Symposium on Machine Learning (IndoML) 2024 | *Poster Presentation* | Goa, India — *Dec. 21 – Dec. 23, 2024*

Winter School on Deep Learning | *Attendee* | ISI Kolkata, India (Virtual) — *Jan. 24 – Mar. 10, 2024*

GIAN course on Risky Asset Models with Dependence | *Attendee* | IIT Ropar, India — *Feb. 27 – Mar. 03, 2023*

IEEE CIS 2022 Summer School on Deep Learning and Computational Intelligence | *Attendee* | IIT Indore, India (Virtual) — *Dec. 12 – Dec. 16, 2022*

Oxford Machine Learning Summer School (OxML) 2022 | *Attendee* | University of Oxford, UK (Virtual) — *Aug. 11 – Aug. 14, 2022*

Summer School on AI 2022 | *Attendee* | IIIT Hyderabad, India (Virtual) — *Jul. 18 – Aug. 19, 2022*

International Conference on Soft Computing for Problem Solving (SocProS) 2022 | *Paper Presentation* | IIT Mandi, India (Virtual) — *May. 14 – May. 15, 2022*

Projects

Financial Decision making using Machine Learning | *Masters thesis*
The project aims to design and implement variants of "Support Vector Machines" for financial trend forecasting. Technical indicators are incorporated with variants of SVM to enhance the performance of the classifiers. The model makes a decision by predicting the stock's next day's price movement. Profit-loss trading strategies are then applied to make a profit from the results of directional forecasting.

A Deep Reinforcement Learning based ensemble strategy for Automated Trading
An ensemble strategy that employs various Deep RL algorithms namely, A2C, DDPG, TD3, PPO, and SAC, is employed for making automated trading decisions.The ensemble strategy inherits and integrates the best features of the five algorithms, thereby robustly adjusting to different market situations.

Temporal Analysis in Reservoir Area
The temporal change in the water spread area of the Pong reservoir, located on the Beas River in the foothills of the Himalayas, India, is analyzed to evaluate the sediment deposition pattern. Multiple dates of Landsat-8 satellite images were used to calculate the water spread area of the reservoir using the NDVI and NDWI indices.

Sparse MRI: The Application of Compressed Sensing for Rapid MR Imaging
The sparsity which is implicit in MR images is exploited to significantly undersample k-space. In this project, Sparse MR images are reconstructed using random sampling. The reconstruction is performed by minimizing the l^1 norm of a transformed image.

Skills and Other

Programming	Python (advanced) | C/C++ (intermediate) | Matlab (beginner)
Technical skills	Microsoft Office (Word, Excel) | ENVI | LaTeX
Languages	English (Fluent) | Hindi (Fluent)
Soft Skills	Time Management | On-site coordination | Social gatherings | Active physical workouts
Interests	Stock Market Trading | Reading | Mountain Biking | Hiking and Trekking
Citizenship	Indian
Current Residence	Mandi, India
Age	October, 1998