AARON MACKENZIE MISQUITH

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RESEARCH INTERESTS

- High-performance machine learning and scalable model training
- Distributed and parallel computing for ML systems
- Large Language Models and optimization of training/inference pipelines
- Reinforcement learning and systems for large-scale experimentation

EDUCATION

Bachelor of Engineering in Information Science and Engineering
Nitte Meenakshi Institute of Technology, Bangalore, India — 2020–2024
Relevant Coursework: Machine Learning, Data Mining, Scalable Computing, Cloud Computing, Algorithms, Operating Systems, Computer Networks
Final-Year Project: "Trading Auto-Bot for Enhanced Financial Decision Making"
Advisors: Dr. Swarnalatha K.S. (2021–2023), Dr. Sumana Sinha (2023–2024)
(Related publication and patent listed in subsequent sections)

RESEARCH EXPERIENCE

Research Intern
Under Dr. Simone A. Ludwig, North Dakota State University, Fargo, USA — Feb 2024 – Jul 2024

- Designed and parallelized evolutionary algorithms (PSO, Glowworm Swarm Optimization, Genetic Algorithm, Ant Colony Optimization) using Apache Spark and HDFS for distributed optimization on synthetic and real datasets.
- Deployed a multi-node Spark cluster with HDFS for large-scale experimentation and workload distribution.
- Executed the first parallel implementation of the Bison algorithm for data classification.
- Proposed one novel and implemented two modified PSO-based feature-selection algorithms for high-dimensional data analysis across multiple benchmark datasets.
- Benchmarked algorithmic performance on standard test functions (Schwefel, Ackley), demonstrating measurable speedup and scalability improvements.
- Integrated classical feature-selection methods and ML models into a unified Spark-based experimentation framework using NumPy, Pandas, and scikit-learn.

Research Assistant
Under Dr. Swarnalatha K.S. (2021–2023) and Dr. Sumana Sinha (2023–2024), NMIT — Jan 2021 – Dec 2023

- Developed Trading AutoBot, an AI-driven automated trading system executing live and simulated trades based on algorithmic signal generation.
- Designed statistical and indicator-based trading strategies optimized for profitability and adaptive risk control.
- Performed large-scale backtesting using TradersView (online platform for testing trading algorithms and strategies)and historical datasets across multiple market conditions.
- Developed an algorithm to select and deploy trading models from a custom ML-driven strategy library based on asset-specific performance fit.
- Integrated brokerage and exchange APIs (Zerodha, Alpaca, Binance) for real-time and simulated order execution.
- Implemented autonomous risk-management, monitoring, and event-triggered notification pipelines to support end-to-end automated trading.

Intern
Revoseven (Tech Consultancy Startup), Bangalore, India — Jul 2023 – Sep 2023

- Developed TruthScore, a multimodal neural consistency engine for detecting mismatch between product descriptions, images, pricing, and user expectations (prototype delivered for a client).
- Designed a novel mismatch-scoring algorithm using multimodal embeddings and cross-modal consistency constraints.
- Built the full ML pipeline for data preprocessing, model training, and cross-modal similarity evaluation.

INDUSTRY EXPERIENCE

Data Engineer

Bhoruka Power Corporation Ltd., Bengaluru, India — Aug 2024 – Present

- Designed and deployed interactive Power BI dashboards for real-time monitoring and analytics across multiple energy plants.
- Built Python-based ETL pipelines for multi-source energy and financial datasets, automating data transformation and reporting.
- Implemented ensemble ML models (Random Forest, XGBoost) for energy-demand forecasting and anomaly detection.
- Optimized SQL queries and data-pipeline performance for high-volume production systems, improving end-to-end data throughput and reporting latency.

PUBLICATIONS

1. S. A. Ludwig, J. Al-Sawwa, and A. M. Misquith, "Parallelization of the Bison Algorithm Applied to Data Classification," Algorithms, vol. 17, no. 11, p. 501, Nov 2024. https://doi.org/10.3390/a17110501
2. S. Sinha, A. Mackenzie Misquith, U. A. Nayak, and A. Sridhar, "Trading Auto-Bot for Enhanced Financial Decision Making," Proc. IEEE SSITCON 2024, Tumkur, India, pp. 1–6, Oct 2024. doi: 10.1109/SSITCON62437.2024.10796849
3. K. S. Swarnalatha et al., "Introduction to Postpartum Depression," Book Chapter, Dept. of CSE, Amity University Bengaluru, in press (2025). (Health-informatics study; outside primary research domain.)

PATENTS

1. System and Method for Optimizing K-Means Clustering Using Particle Swarm Optimization for Trading Signal Generation
   Indian Patent App. No. 202541064287 | Filed & Published – Awaiting Examination (2025)
   • Introduced a PSO-based adaptive mechanism to determine optimal K values for trading cluster analysis and signal generation.
2. Adaptive Intelligence Process Model (AIPM) for Dynamic Planning, Deployment, and Evolution
   Indian Patent App. No. 202541070313 | Filed & Published – Awaiting Examination (2025)
   • Proposed a scalable adaptive-intelligence framework enabling autonomous system evolution in planning and deployment.

CONFERENCES & PRESENTATIONS

1. Trading Auto-Bot for Enhanced Financial Decision Making — IEEE SSITCON 2024.
2. Performance Benchmarking of Distributed Reinforcement Learning Algorithms: A Case Study Using Spark and Ray— BMS Institute of Technology and Management, Feb 2025.
3. Parallelizing Data Mining Algorithms for Fraud Detection in Large-Scale Transaction Datasets — Manipal Academy of Higher Education, Mar 2025.
4. High-Performance Fraud Detection: Parallel Computing in Large-Scale Data Mining — Accepted for COMPUTINGCON 2025 (Paper ID 665).
5. High-Performance Fraud Detection: Parallel Computing in Large-Scale Data Mining — Under Revision for IC3IT 2025 (Paper ID 868).
6. Participant, Asia TechX 2022 — Singapore (Technology & Innovation Summit).
7. Participant, GeoTech Asia 2022 — Singapore (Emerging Tech & Digital Systems Conference).

TECHNICAL SKILLS

Programming & Scripting: Python (primary), C (primary), Kotlin (intermediate), C++ (strong fundamentals), Java (strong fundamentals), HTML & CSS (strong fundamentals), Bash/Shell (intermediate), SQL (strong fundamentals), JavaScript (basics), R (basics)

Machine Learning & Frameworks: PyTorch, TensorFlow, Ray RLlib, OpenAI Gym, scikit-learn, Matplotlib

Distributed Systems & HPC: PySpark, MapReduce, CUDA, TensorBoard, Ray, HDFS, MongoDB Atlas, Hive, OpenMP, MPI

Data Engineering & Visualization: Power BI, Pandas, NumPy

Mathematics & Optimization Theory: Reinforcement Learning, Evolutionary Algorithms, Linear Algebra, Calculus, Probability Theory, Distributed Optimization, Stochastic Methods

Tools & Experimentation: Git, Linux, macOS, Windows, Overleaf (LaTeX), GitHub Actions, SSH, Terminal (Bash/Shell), PyCharm, Visual Studio, Xcode, WordPress and Hostinger, Git Launch, Jupyter

AWARDS & HONORS

1. International B-Plan Finalist, Singapore, 2022
2. National B-Plan Runner-Up, IIT Bombay, 2021
3. Regional B-Plan Winner, LWT, NMIT Bangalore, 2021
4. Student Council President, NITTE PU College, 2019
5. Amateur Scientist Runner-Up, National Robotics Competition (Infosys, PES University Bangalore), 2015, 8th Grade

PROJECTS

1. **Parallelizing Evolutionary Algorithms in Apache Spark:** Built scalable distributed implementations of PSO, GSO, ACO, and GA using Spark and HDFS; benchmarked performance on high-dimensional optimization problems.
2. **Novel PSO-Based Feature Selection Algorithms:** Designed two modified PSO variants for dimensionality reduction; demonstrated improved accuracy and convergence on benchmark datasets.
3. **Trading AutoBot**: Developed an automated trading system integrating statistical and indicator-driven strategies; performed live execution via brokerage APIs; resulted in a publication and patent.
4. **TruthScore**: Real-Time Misinformation Detector for E-Commerce. Developed a multimodal model detecting inconsistencies between product images, text, reviews, and pricing; designed a novel mismatch-scoring algorithm.
5. **Distributed RL vs Data-Mining Benchmarking (Ray vs Spark):** Conducted comparative study on distributed training performance of RL and data-mining algorithms across Ray and Spark clusters.
6. **AIPM – Adaptive Intelligence Process Model:** Designed a dynamic planning and evolution framework for intelligent systems; filed as a patent for autonomous system adaptation.
7. **Adaptive Pricing Negotiator Agent:** Implemented a reinforcement learning agent capable of real-time price negotiation based on customer behavior patterns.
8. **Goal-Driven Search Engine:** Engineered an information-retrieval system that ranks information based on task progression rather than document similarity.

TEACHING & ACADEMIC ACTIVITIES

Project Mentor — Research Internship Program, North Dakota State University — Feb 2024 – Jul 2024

- Mentored a two-student team on parallelizing evolutionary algorithms using Spark.
- Guided a three-student team on feature-selection research, including implementation of a novel FS algorithm across multiple datasets.

Workshop Instructor — Research & Higher Education Pathways, ISE Department, NMIT — 2025

- Delivered a one-day workshop on research opportunities, internships, and postgraduate pathways for undergraduate students.

Expected Teaching Assignment — Placement Training Program, NMIT — Starting Jan 2026

- Confirmed to teach Data Structures & Algorithms, Data Base Management System, Object Oriented Programming, fundamentals of Python and C++ to pre-final year students.

SERVICE & LEADERSHIP

Student Council President, Nitte PU College — 2019

- Led student-body initiatives and coordinated academic and cultural events at the pre-university level.

Vice President — Music Club, NMIT — 2022–2023

- Organized college-level music events and coordinated club activities.

Project Representative — Final Year Project (Trading AutoBot), NMIT — 2023–2024

- Led a project team, coordinated deadlines, and supervised implementation phases.

Department Coordination Committee Member, NMIT — 2020–2024

- Assisted in organizing alumni meets, departmental competitions, and academic events.

College Fest Coordination Committee Member, NMIT — 2020–2024

- Supported logistics, scheduling, and event management for the annual college fest representing the music club.

Head Coordinator — Battle of Bands, NMIT — 2022 & 2023

- Oversaw event execution, participant coordination, and judging logistics during the annual cultural fest.