Ajeenckya Mahadik

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Education

University of Wisconsin–Madison May 2026
Masters in Industrial & Systems Engineering - Machine Learning & AI Focused
Coursework: Advanced Deep Learning, Natural Language Processing, Machine Learning, Computer Vision, AI Agents

Shivaji University, India May 2020
Bachelors in Mechanical Engineering

Skills

- **Machine Learning:** Model training & evaluation, Feature Engineering, Probabilistic Modeling, Bayesian Inference, Uncertainty Quantification, Cross-Validation, Monte-Carlo Simulations, Supervised Learning, Meta Learning.
- **Deep Learning & LLMs:** PyTorch, TensorFlow, CNNs, Vision Transformers, Transfer learning, Hybrid Models, Large Language Models (LLMs), Hugging Face, Neural Networks.
- **ML Systems & Optimization:** End-to-end ML Pipelines, Reinforcement Learning, Model Calibration, Stochastic & Mixed-integer Optimization, Dynamic Programming, Gurobi, Pyomo.
- **Programming & Data:** Python, Pandas, NumPy, Data Pre-processing, Data Validation.

Research Experience

Graduate Research Assistant 2025–Present
UW-Madison—Prof. Laura Alberts's Lab

- Built an end-to-end probabilistic forecasting system integrating LLM-derived event signals, weather features and historical data into a unified ML pipeline.
- Deployed a **3B–7B parameter** LLM inference microservice to transform real-time news into structured behavioral features, improving probability calibration by **12%**.
- Designed a weather-impact modeling layer using **Mixture Density Networks** across temperature, humidity, wind, rainfall, and elevation, reducing scenario variance by **17%**.
- Extended the baseline neural model with a **Bayesian architecture** and Monte Carlo sampling, achieving a **Brier score of 0.286**, **66% accuracy**, and a **12% improvement in calibration**.
- Improved dominant-outcome detection by increasing recall from **82% to 84%** while reducing overconfidence in high-variance prediction regimes.

Projects

Adaptive Two-Stage Stochastic Routing

- Built a two-stage stochastic routing model with scenario-dependent recourse using mixed-integer optimization to handle travel-time uncertainty and downstream operational risk.
- Reduced expected operational cost by **20%** compared to static, non-adaptive routing baselines by incorporating constant, linear, and quadratic time-window penalties.
- Improved robustness across high-variance demand regimes by applying penalty-based reward shaping and sensitivity-driven policy tuning during scenario simulation.

Facial Expression Detection

- Built and compared four deep-learning architectures for facial emotion recognition, improving test accuracy from **55%** to **80%** on held-out evaluation data.
- Reduced overfitting and class-imbalance impact using transfer learning, weighted cross-entropy, and targeted data augmentation for low-resolution grayscale inputs.
- Implemented **5-fold** cross-validation to reduce performance variance and ensure evaluation results were not dependent on a single data split.

Multimodal Route Optimization

- Designed a multimodal routing optimizer using mixed integer programming across multiple transportation modes.
- Solved 2,040 origin–destination routes, achieving **$47.6M** net gain while keeping transportation costs under $90K.
- Deployed operational constraints in **Pyomo** to produce optimal and interpretable decision-support routes.

Professional Experience

Graduate Apprentice Trainee 2023–2024
Fiat India Automobiles Pvt. LTD.

- Optimized powertrain launch operations using structured cycle-time data analysis and constraint-driven line balancing, improving assembly efficiency by **9%**.
- Designed data-ready digital procedures and a full engine assembly workflow, enabling traceable process metrics and stronger compatibility with automation and analytics systems.