Som Tripathi

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Education

Iowa State University, Ames, IA — Expected Graduation: May 2028
Bachelor of Science in Software Engineering; Minors in Artificial Intelligence and Data Science

Experience

AI Institute for Resilient Agriculture (AIIRA), Computer Vision Research Intern, Ames, IA — Jun 2026 - Present

- Building computer vision pipelines for agricultural phenotyping, converting drone- and phone-recorded RGB tassel videos from field data collection into 3D point clouds for maize analysis.
- Supporting Structure-from-Motion and NeRF-based reconstruction workflows using COLMAP, Nerfstudio, OpenCV, Open3D, CloudCompare, CUDA, and Jetstream2.
- Developing data-processing pipelines for raw video, frame extraction, camera pose estimation, NeRF training, point-cloud export, and individual tassel .ply extraction.

Translational AI Center (TrAC), Machine Learning Research Intern, Ames, IA — Aug 2025 - Present

- Expanded a D-ICL benchmark for tabular foundation models by adding 5 public regression datasets, large synthetic regression tasks, and OpenML Yolanda dataset 42705 to the evaluation pipeline.
- Ran TabPFN and TabICL experiments across IID/non-IID partitions, 120k-sample large-regression settings, and paper aligned seeds, reporting RMSE, MAE, R^2, and mean/standard-deviation summaries.
- Implemented batched regression inference to resolve CUDA memory limits on large test sets and generated reproducible JSON/CSV summaries supporting a paper currently under review at NeurIPS.

Iowa State University, Undergraduate Research Assistant, Ames, IA — Jan 2025 - Jul 2025

- Improved LPBF spatter-tracking accuracy by ~20% over manual methods by building a Python computer-vision pipeline with NumPy, Pandas, SciPy, OpenCV, and scikit-learn.
- Applied feature extraction and statistical modeling to analyze spatter velocity, size, and ejection angle across LPBF high speed imaging experiments.
- Visualized 30,000 fps high-speed imaging data with Matplotlib, supporting reproducible large-scale ML experiments.

Projects

RunScope - LPBF Process Monitoring Dashboard (github.com/somtri/run_scope.git) — Jun 2026

- Built a research-inspired Rust/React MVP for LPBF process monitoring app with real-time telemetry, recipe sequencing, rule-based anomaly detection, SQLite backed run history, and process simulations for oxygen, temperature, recoater, laser, and spatter behavior.
- Developed an async Rust/Axum/Tokio backend with REST APIs, SQLx, and 300 ms WebSocket updates, plus a React/TypeScript dashboard with live charts, alerts, run controls, experiment history, and automated tests.

SmartSignal - Stock Movement Forecasting Pipeline (github.com/somtri/smart_signal.git) — Dec 2025

- Built a Random Forest stock-direction pipeline using 26 engineered price, volume, volatility, momentum, and sentiment features with automated yfinance ingestion, preprocessing, and model persistence.
- Implemented leakage-aware chronological holdout and expanding-window validation, achieving 63.3% walk-forward accuracy on a deterministic market simulation, with Streamlit dashboards for ROC AUC, equity curves, confidence, and feature importance.

Technical Skills

Languages: Python, C++, Java, Rust, TypeScript/JavaScript, SQL, R
Frameworks & Tools: PyTorch, scikit-learn, NumPy, Pandas, OpenCV, React, Streamlit, Axum, Tokio, SQLx, SQLite, Docker, Git, Linux, CUDA, pytest, GitHub Actions
Core Competencies: Machine Learning, Computer Vision, Time Series Forecasting, Statistical Modeling, Feature Engineering, Regression, Classification, Tabular Foundation Models, REST APIs, WebSockets, Batched Inference, Anomaly Detection, Reproducible ML Experiments