Ahla Ko

Operations Scientist | Data Scientist

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EDUCATION

Ph.D. Industrial Engineering
University of Arkansas | 2026

Dissertation: "From Data Digitization to Personalized Care: Deep Learning and Decision Analytics in Healthcare Systems"

BSc Chemistry Education
Pusan National University | 2011

SKILLS & PROFICIENCY

Python · PyTorch & TensorFlow · Pandas & NumPy · OpenCV · SQL · FastAPI & Django · Docker & AWS · Spark / Databricks

LANGUAGES

Korean (Native)
English (Professional)

INTERESTS

Yoga • Walking • Cooking

CAREER PROFILE

Operations Scientist and Data Scientist with hands-on experience across academic research and industry, building end-to-end ML pipelines from data digitization to production deployment. Proven track record of translating complex research (RL, MDP, Computer Vision) into operational tools that cut costs and drive measurable outcomes. Experienced across healthcare AI, supply chain analytics, revenue management, and defense analytics; comfortable owning full ML lifecycles independently.

EXPERIENCE

Research Assistant & Lead Developer **2018 - Present**
University of Arkansas, Fayetteville

[Preventive Breast Cancer: Multi-Modal Prevention Strategy Optimization]

- Built an RL-based decision support system (PPO) that personalizes cancer prevention strategies for high-risk patients (BRCA1/2, PALB2) by optimizing both intervention type (surgery vs. surveillance) and timing over a 45-year horizon, outperforming standard clinical guidelines by up to 4.33 quality-adjusted life years (QALYs).
- Identified strategic trade-offs between treatment aggressiveness and patient quality-of-life using Pareto analysis, revealing that guideline-based strategies underperform on both cancer prevention and patient utility when individual preferences are not accounted for.
- Delivered model interpretability using SHAP to surface key decision drivers (menopausal status, breast density, patient preferences), making model recommendations transparent and defensible for clinical decision-making.

[Metastatic Breast Cancer (mBC): Strategic Treatment & Sensitivity Analytics]

- Built a custom RL simulation environment (OpenAI Gymnasium) modeling multi-stage treatment transitions for metastatic cancer patients, optimizing the balance between overall survival and quality of life.
- Identified patient-centered thresholds for treatment escalation using Proximal Policy Optimization and executed Tornado Analysis to validate optimal policy robustness.
- Determined optimal timing to transition patients to supportive care, quantifying the survival-vs-toxicity trade-off to support evidence-based end-of-life treatment decisions.

[Medical Form Digitization: AI-Driven Healthcare Automation]

- Engineered an end-to-end OCR pipeline (YOLOv11 + Residual CRNN) for medical record digitization, achieving 99.67% accuracy (EMA) and reducing manual processing costs by over 90%.
- Established a "Human-in-the-Loop" validation system with an optimal confidence threshold, automating 91% of total data entries while maintaining a clinical-grade error rate below 0.2%.
- Implemented deterministic audit trails and rule-based consistency checks to ensure HIPAA-compliant data governance and traceability.

→ Related publication under review (IEEE TII) — see Publications

[Teaching & Mentorship]

- Served as Teaching Assistant for Applied Probability & Statistics for Engineers (INEG 2313 I & II); conducted grading and student evaluation across multiple semesters.
- Co-instructed introductory probability coursework during summer session, delivering lectures and supporting curriculum delivery.

Back-End Developer (Early Team) **2021**
Heroworks, Busan (South Korea)
Joined as an early engineer for "DatAmenity," a B2B Revenue Management System (RMS) for the hospitality industry (Seed-stage startup).

- Developed core web application and JSON APIs for real-time pricing across 20+ OTA platforms.
- Architected relational database schemas (PostgreSQL + SQLAlchemy).
- Built interactive dashboards and automated reporting systems using Flask.

Research Analyst **2016 - 2017**
Korea Institute for Defense Analysis (KIDA), Seoul (South Korea)
Applied mathematical optimization and quantitative analysis for national defense projects.

- Developed a facility location optimization model for military gunnery ranges, minimizing land costs while enforcing noise-impact constraints on residential areas.
- Collected and consolidated multi-source defense data across government agencies; prepared and presented strategic reports to senior officials (Deputy Directors, Administrative Officers) supporting ROK-U.S. cost-sharing negotiations.

PROJECTS

Technical implementations bridging ML research and production-grade applications.

Signal Matrix — Automated Equity Screening Pipeline

Designed and backtested multi-factor swing-trading screeners (MA/RSI/volume, EPS, candlestick patterns) across 500+ S&P 500 equities using vectorbt (2020–2024); operationalized into a production daily pipeline with FRED macro integration, GitHub Actions automation, Telegram alerts, and a FastAPI member API (Clerk JWT). Public snapshot: ahlako.me/signal-matrix

Real-time Anomaly Detection & Service Migration

Developed anomaly detection models on Azure Databricks with MLflow model management; re-engineered deployment to a local FastAPI server with a Streamlit web interface for real-time image prediction.

AI-Powered Custom Apparel Platform (MVP)

Built the backend for a custom t-shirt generation service transforming user keywords into AI-generated designs; architected a microservices backend (FastAPI + Django + Nginx) with Docker Compose, JWT authentication, and AWS S3 for image storage.

Binance MCP Server

Built a real-time cryptocurrency data server using FastMCP (Model Context Protocol); supports live price lookup, 24hr change tracking, and rolling window analytics via both STDIO and HTTP transports.

PUBLICATIONS

Research on Deep Learning and Decision Analytics in Healthcare Systems.

Deep Learning-Based Automated Recognition of Hand-Filled Forms for Medical Study Questionnaires in Moldova

Ahla Ko, Yanjun Pan, Donald Catanzaro, Valeriu Crudu, Shengfan Zhang
IEEE Transactions on Industrial Informatics (Submitted) — see Medical Form Digitization (Experience)