

# Portfolio Overview

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An experienced engineer with a focus on applying Computer Vision and Machine Learning to solve real-world problems, transitioning into technical leadership roles. This portfolio highlights key projects demonstrating technical depth in ML/AI, practical application development, and experience leading teams through complex technical challenges.

## I. Computer vision/ML

### Similar Item Retrieval for Auction Items

This case study details the development of a prototype system to retrieve similar auction items using images when model numbers are unavailable, aiming to improve user experience and listing efficiency. The system employed CNN-generated image embeddings (EfficientNet B0) and k-NN search. Fine-tuning the CNN with a Siamese network and Triplet Margin Loss significantly boosted accuracy for a specific item category (Top-5 accuracy improved from 69% to 81%). Observed dataset label errors suggest the model's true performance is likely even higher.

### Estimation of Body Measurements from Personal Pictures

This 2018 case study explored using deep learning on user-submitted photos, along with self-reported height and approximate camera distance, to estimate body measurements for online sizing and avatar creation. Initial models trained on synthetic data and later on real 3D scans (CAESAR dataset) could generate plausible body shapes but consistently failed to produce accurate absolute measurements on real images. This highlighted key challenges in scaling from uncalibrated photos, anatomical ambiguities, image quality issues, and the significant gap between controlled datasets and unconstrained real-world images for precise metric extraction.

### Android Application for Kanken Preparation

This case study describes the creation of a custom Android application for Kanken (Kanji Aptitude Test) preparation. It was designed to address shortcomings of existing apps by including comprehensive question types, adaptive learning, and a strict handwriting recognition system trained on combined datasets (ETL and Traditional Chinese Handwriting). Although not publicly released due to data licensing issues, the app, built with Kotlin/Compose/MVVM, successfully helped the developer pass Kanken Level 4 by enabling targeted practice and enforcing accurate Kanji writing.

## II. Technical Leadership

### Leveraging AI for Japanese Language Learning Analytics from Video Data

This case study outlines a project (2023-2025) at GL Navigation where I led the design and development of an AI-driven system to analyze Japanese language lesson videos. The system successfully implemented speaker diarization, speech-to-text, and speaker identification using voice banks to extract linguistic metrics correlated with student proficiency, despite initial data challenges. We successfully transitioned the project from a local prototype (using an RTX 4080) to a production internal web application built with Kotlin Multiplatform on an asynchronous AWS pipeline (Lambda/SageMaker). The project established valuable analytics, demonstrated technical leadership in building a dedicated team, and has future plans including storage migration, evaluating managed AI services, and exploring LLMs/multimodal analysis.

## **Business Intelligence Platform Stabilization**

This document outlines the experience as a Senior Engineer initiating the stabilization of the DX-Force business intelligence platform since joining in March 2025. The complex Django/AWS system was inherited with severe technical debt, documentation gaps, security vulnerabilities, and a critical ~1.5-year deployment blockage. Key initial contributions involved leading the team to diagnose and fix the core deployment issues (enabling the first stable deployment since June 2023), resolving showstopper application bugs to restore approximately 20% of previously non-functional features, and establishing working local development environments despite significant initial challenges.

## **III. Miscellaneous**

### **Masters Thesis Description**

My master's thesis was the highlight of my time at MIT. As the topic is rather niche, even for technical audiences, I provide a one-page high-level explanation.

### **Performance Prediction of High School Student using Machine Learning Tools**

This graduate coursework report underscored the necessity of deep data familiarity and maintaining a critical perspective during analysis. While the original paper introducing the dataset aimed to predict exact grades or ranges, my analysis suggested the data was significantly more potent for identifying students at risk of dropping out, highlighting a different, potentially more impactful application.

### **Assembling a GPU Workstation**

This describes the process of assembling my personal dual RTX 2080Ti workstation. This setup proved invaluable for accelerating development and computation for numerous personal and client projects requiring significant GPU resources. [Accessible on Qiita \(in Japanese\)](#).