
Table of Contents

1. The Need for Machine Learning Design Patterns

- What Are Design Patterns?
- Machine Learning Terminology
 - Models and Frameworks
 - Data and Feature Engineering
 - The Machine Learning Process
 - Data and Model Tooling
 - Roles
- Common Challenges in Machine Learning
 - Data Quality
 - Reproducibility
 - Data Drift
 - Scale
 - Multiple Objectives
- Machine Learning Systems
 - ML Lifecycle
 - AI Readiness

2. Data Representation Design Patterns

- Simple Data Representations
 - Numerical Inputs
 - Categorical Inputs
 - Design Pattern 1: Hashed Feature
 - Problem
 - Solution
-

Why It Works

Tradeoffs and Alternatives

Design Pattern 2: Reframing

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 3: Feature Cross

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 4: Multimodal Input Representations

Problems

Solution

Tradeoffs and Alternatives

Summary

3. Problem Representation Design Patterns

Design Pattern 5: Reframing

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 6: Multilabel

Problem

Solution

Trade Offs

Design Pattern 7: Ensembles

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 8: Cascade

Problem

Solution

Tradeoffs and Alternatives

Design Pattern 9: Neutral Class

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 10: Rebalancing

Problem

Solutions

Tradeoffs and Alternatives

Summary

4. Patterns That Modify Model Training

Typical Training Loop

Stochastic Gradient Descent

Keras Training Loop

Training Design Patterns

Design Pattern 11: Useful Overfitting

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 12: Checkpoints

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 13: Transfer Learning

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 14: Distribution Strategy

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design Pattern 15: Hyperparameter Tuning

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Summary

5. Design Patterns for Resilient Serving

Design pattern 16: Stateless Serving Function

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design pattern 17: Batch Serving

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design pattern 18: Continued Model Evaluation

Problem

Solution

Why It Works

Tradeoffs and Alternatives

Design pattern 19: Two Phase Predictions

Problem

Solution

Tradeoffs and Alternatives

Design pattern 20: Keyed Predictions

Problem

Solution

Tradeoffs and Alternatives

Summary