

Filter

overfitting (105 min)

Advanced ML models

- Neural networks (75 min)
- Embeddings (45 min)
- Large language models (LLMs) (45 min)

Real-world ML

- Production ML systems (70 min)
 - Introduction (2 min)
 - Static vs. dynamic training (10 min)
 - Static vs. dynamic inference (10 min)
 - When to transform data? (3 min)
 - Deployment testing (5 min)
 - Monitoring pipelines (15 min)
 - Questions to ask (10 min)
 - Test your knowledge (15 min)
 - What's next
- Automated machine learning (30 min)
- Fairness (110 min)



Home > Products > Machine Learning > ML Concepts > Crash Course

Was this helpful?

Production ML systems



Send feedback

Estimated module length: 70 minutes

Learning objectives

- Appreciate the breadth of components in a production ML system.
- Pick the ideal training paradigm (static versus dynamic).
- Pick the ideal inference paradigm (static versus dynamic).
- Test your machine learning deployment.
- Ask the right questions about your production ML system.
- Determine flaws in real-world ML models.
- Monitor the components in a production ML system.

Prerequisites:

This module assumes you are familiar with the concepts covered in the following modules:

- [Introduction to Machine Learning](#)
- [Linear regression](#)
- [Working with numerical data](#)
- [Working with categorical data](#)
- [Datasets, generalization, and overfitting](#)

So far, this course has focused on building machine learning (ML) models. However, as Figure 1 suggests, real-world production ML systems are large ecosystems and the model is just a single, relatively small part.

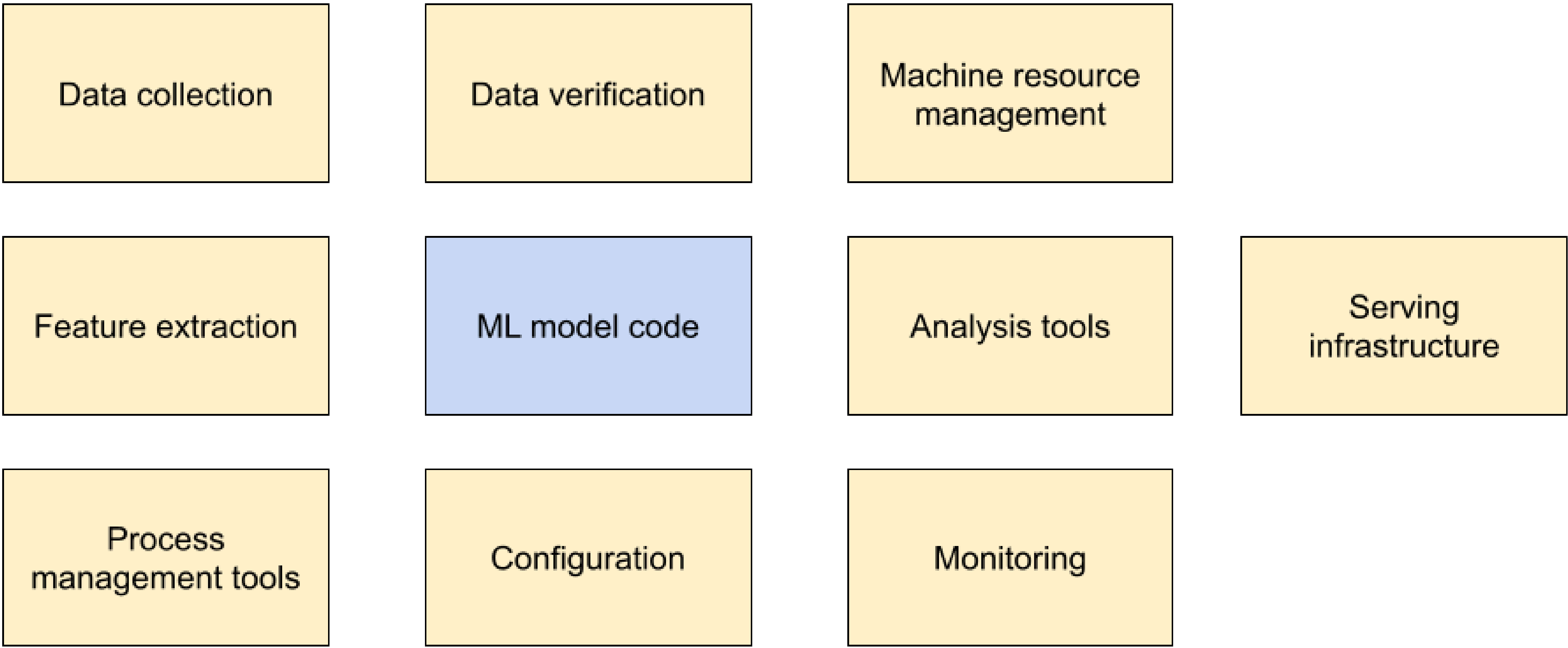


Figure 1. A real-world production ML system comprises many components.

At the heart of a real-world machine learning production system is the ML model code, but it often represents only 5% or less of the total codebase in the system. That's not a misprint; it's significantly less than you might expect. Notice that an ML production system devotes considerable resources to the input data: collecting it, verifying it, and extracting features from it.

Help Center

[Previous](#)
Test your knowledge (10 min)

[Next](#)
Static vs. dynamic training (10 min)

Was this helpful?



Send feedback

Except as otherwise noted, the content of this page is licensed under the [Creative Commons Attribution 4.0 License](#), and code samples are licensed under the [Apache 2.0 License](#). For details, see the [Google Developers Site Policies](#). Java is a registered trademark of Oracle and/or its affiliates.

Last updated 2024-10-09 UTC.

Connect

- Blog
- Instagram
- LinkedIn
- X (Twitter)
- YouTube

Programs

- Google Developer Groups
- Google Developer Experts
- Accelerators
- Women Techmakers
- Google Cloud & NVIDIA

Developer consoles

- Google API Console
- Google Cloud Platform Console
- Google Play Console
- Firebase Console
- Actions on Google Console
- Cast SDK Developer Console
- Chrome Web Store Dashboard
- Google Home Developer Console