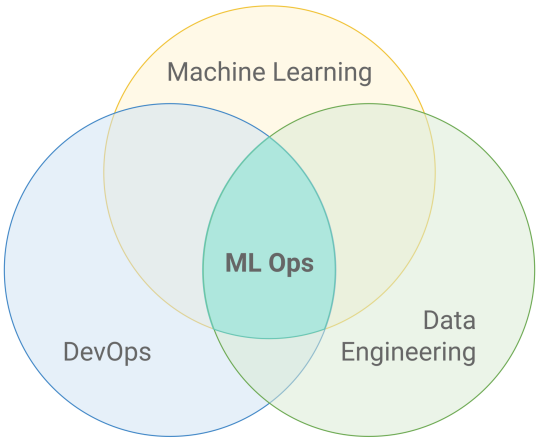
MLOps: Overview

> - 연구개요
>   - MLOps의 정의
>   - As-is 대비 차별점
>   - 연구범위

연구개요

MLOps의 정의

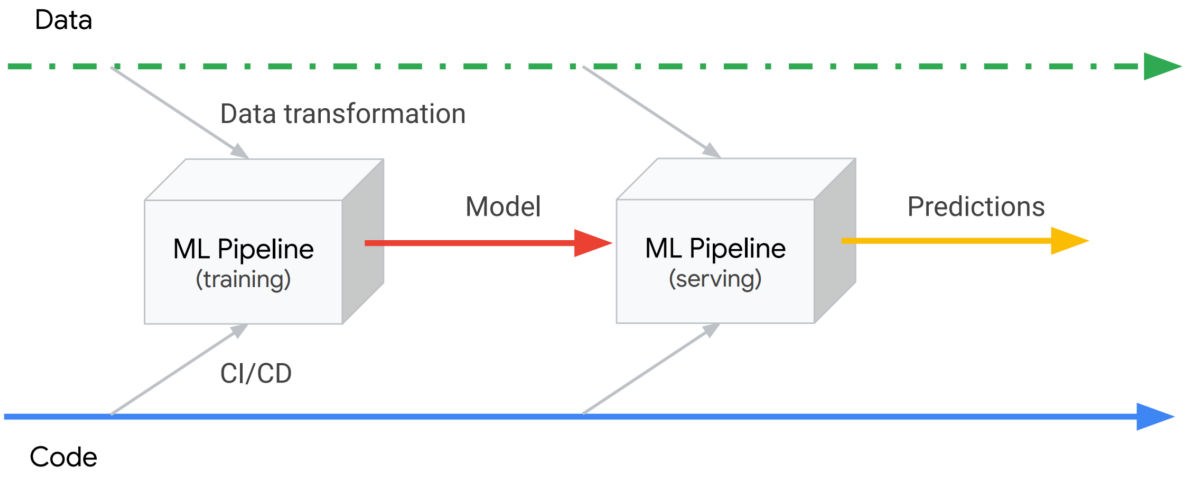
- Machine Learning
- `"MLOps" = "DevOps" + "ML" = "Code" + "Data" + "Model"`



- 필수요소
  - Reproducibility(재현성)
    - 디버깅: 추적 가능한 오류
    - 균일한 결과 보장
    - 재사용성: 컴포넌트 모듈화, Library 추상화
    - Version Control
  - Orchestration(배치/정렬 자동화)
    - Production 단계의 Model Serving 복잡도를 다룸(CI/CD, Monitoring과 유사하지만 다른 개념)
    - Monotoring
      - Short-term: Anomalies, Bias, Model Validation
      - Long-term: Errors, Outages, Performance
    - Compliance
      - 언제, 무엇이, 왜, 어떻게 발생했는지
      - Guidelines for and properties of compliant ML
      - Debugging, Error Reporting
    - Resource 할당
      - 유연한 관리(Auto-scaling, Serverless)
      - 지원 Software
        - ETL Frameworks

- HDFS-based Services
- Kubernetes cluster
- Distributed Frameworks

ML Pipeline



As-is 대비 차별점: `DevOps` & `Legacy Data Engineering`

Practice	DevOps	Data Engineering	ML Ops
Version control	Code version control	Code version control Data lineage	**Code version control + Data versioning + Model versioning (linked for reproducibility)**
Pipeline	n/a	Data pipeline/ETL	**Training ML Pipeline, Serving ML Pipeline**
Behavior validation	Unit tests	Unit tests	**Model validation**
CI/CD	Deploys code to production	Deploys code to data pipeline	**Deploys code to production + training ML pipeline**
Data validation	n/a	Format and business validation	**Statistical validation**
Monitoring	SLO-based	SLO-based	**SLO + differential monitoring, statistical sliced monitoring**

mlops-comparison