



The field of Machine Learning Operations (MLOps)

May 2024

Changing the World's Energy Future

Brandon S Biggs



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DevOps for Machine Learning

Battelle Energy Alliance manages INL for the
U.S. Department of Energy's Office of Nuclear Energy



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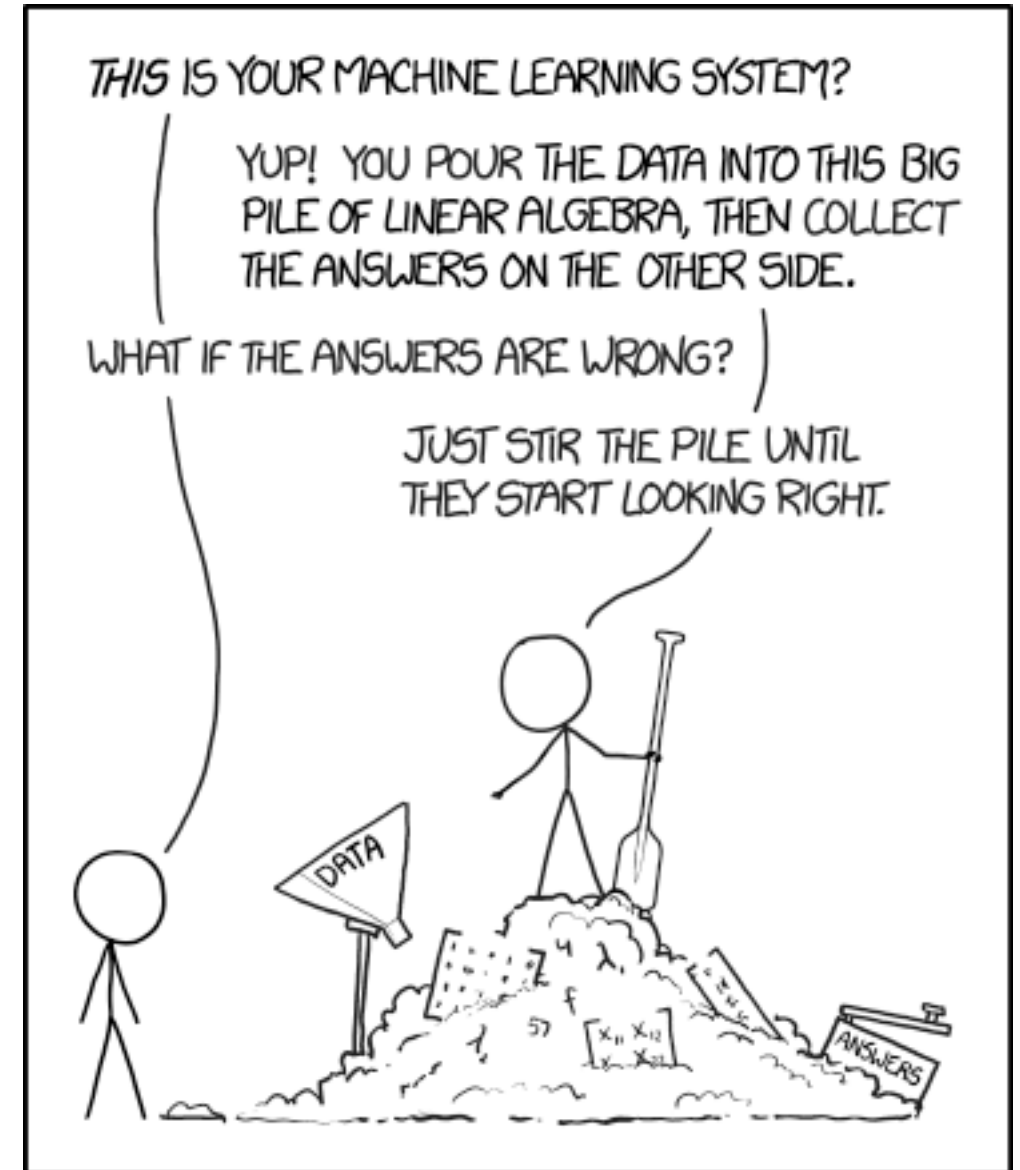


Introduction

- Problem
- Goals
- MLOps background
- How this helps
- Application
- MLOps levels

Problem

- Machine learning models get created
 - Funding dries up
 - Experts leave
 - Models are only ever run out of a Jupyter Notebook
 - Dependencies are too messy (or not available) for adoption later



<https://xkcd.com/1838/>

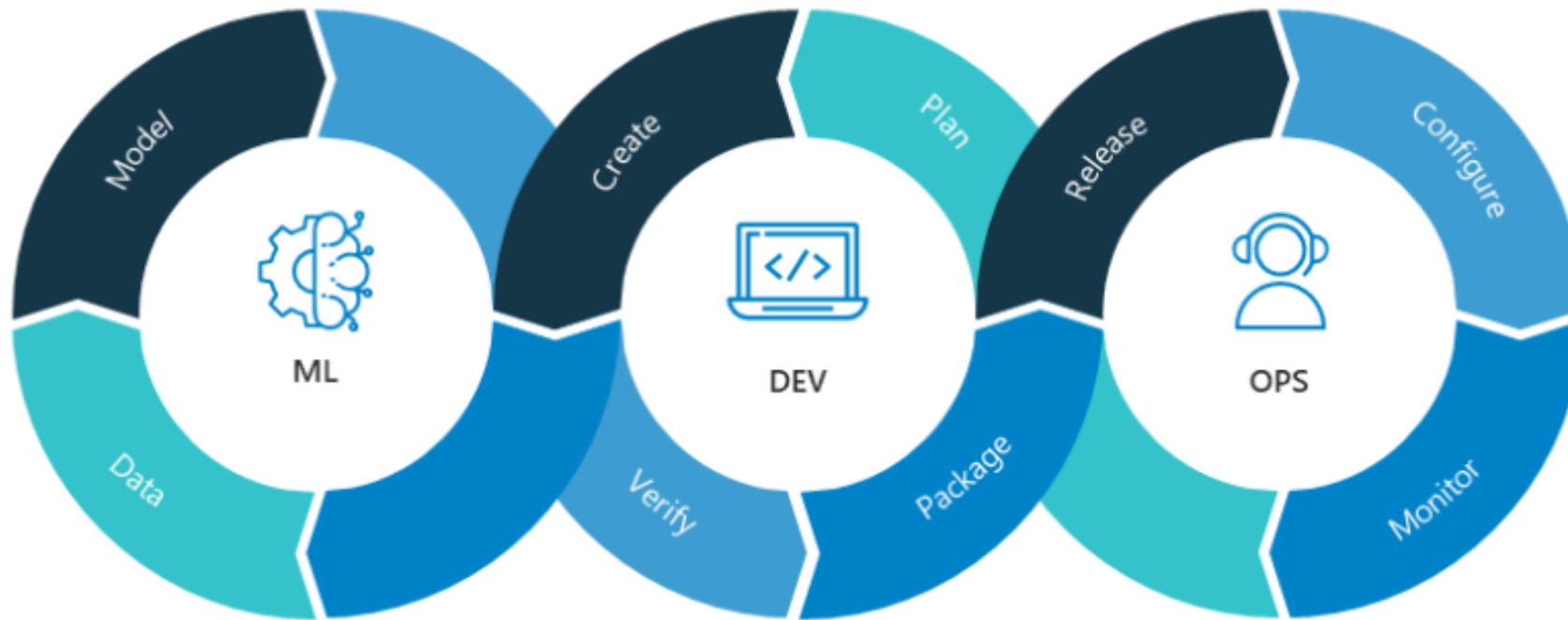


Goals

1. Lower the barrier to entry for using AI/ML in everyday research work
2. Simplify the production process for AI/ML engineers and data scientists
3. Enable collaboration and visibility via a central platform for uploading and sharing models
4. Reduce repeated work by eliminating the need to recreate models from scratch to reproduce results
5. Increase impact, longevity, and reach of models created at INL through an accessible model hosting platform

What is MLOps?

- “Like Dev Ops but need to be a data scientist and know about hardware”
 - John Lockman from Dell

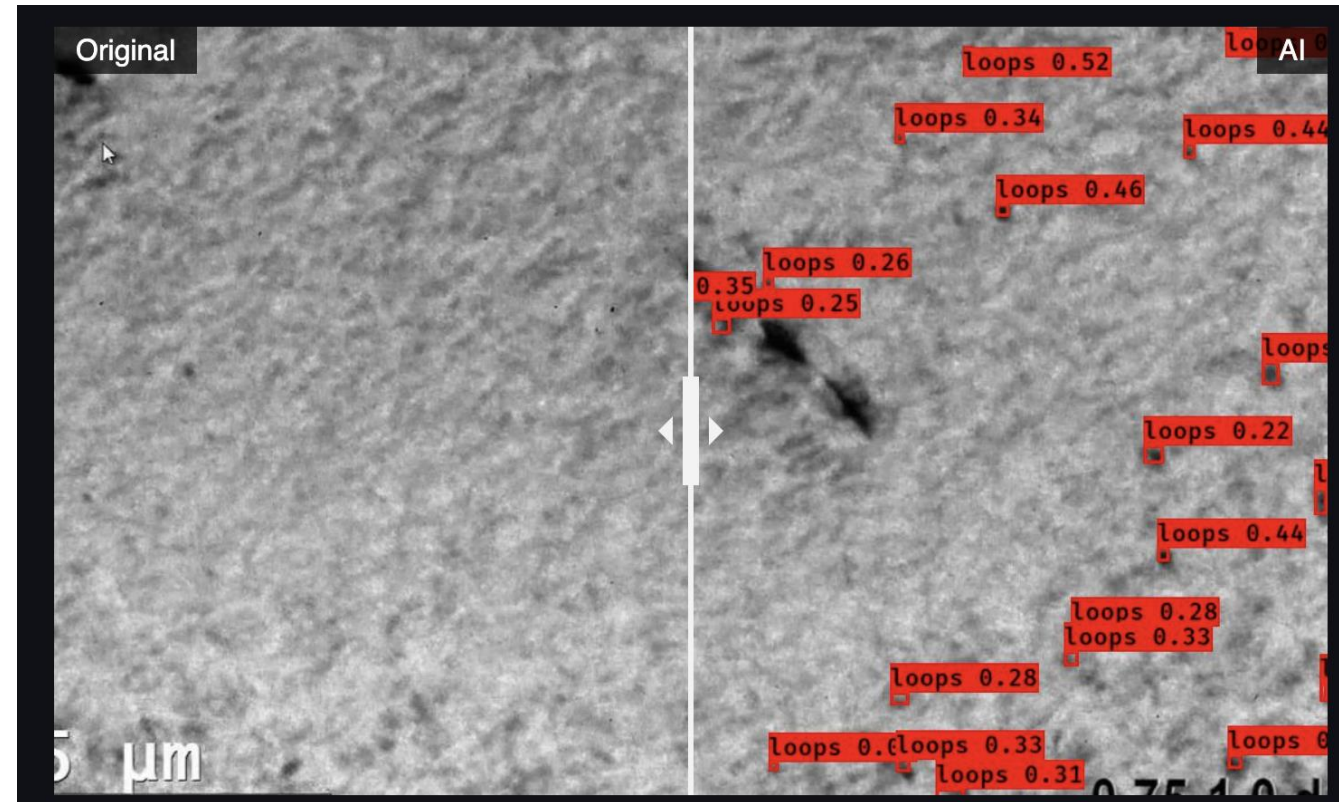
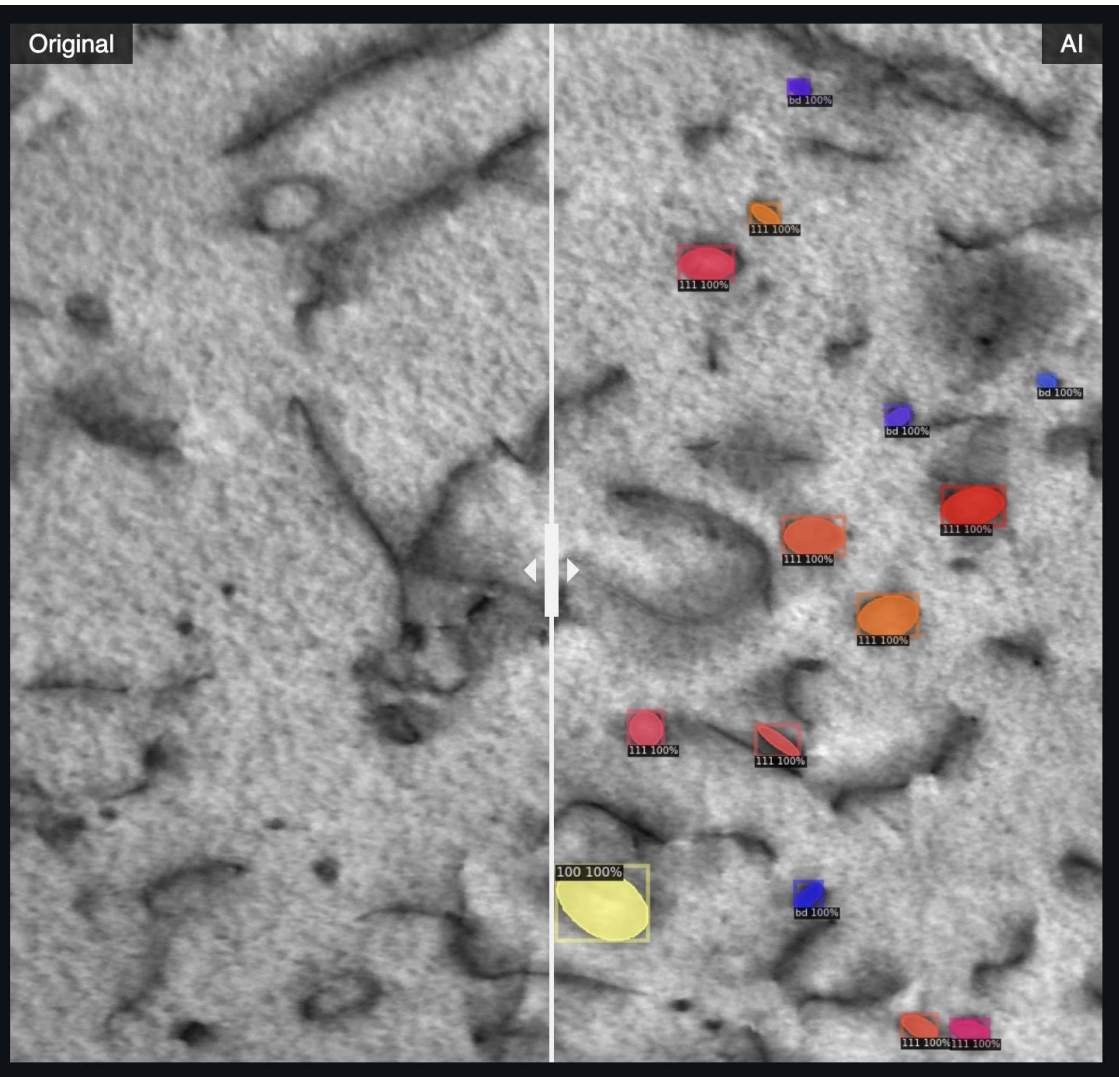


How does this help?

Models get created

- Weights get saved to a central location and the model gets deployed
- Models get hosted in centralized location where they can be accessed from more than a Jupyter Notebook
- Dependencies can be containerized
- Performance of models can be tracked

Building Tools around the models

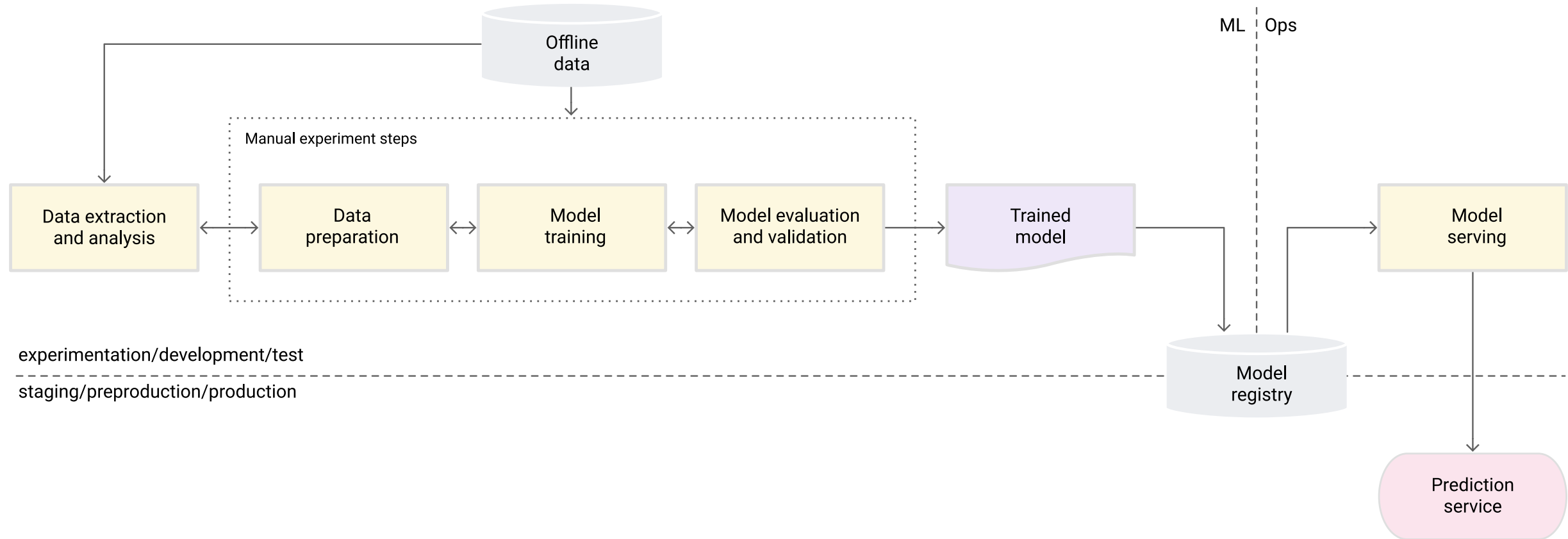


MLOps Levels

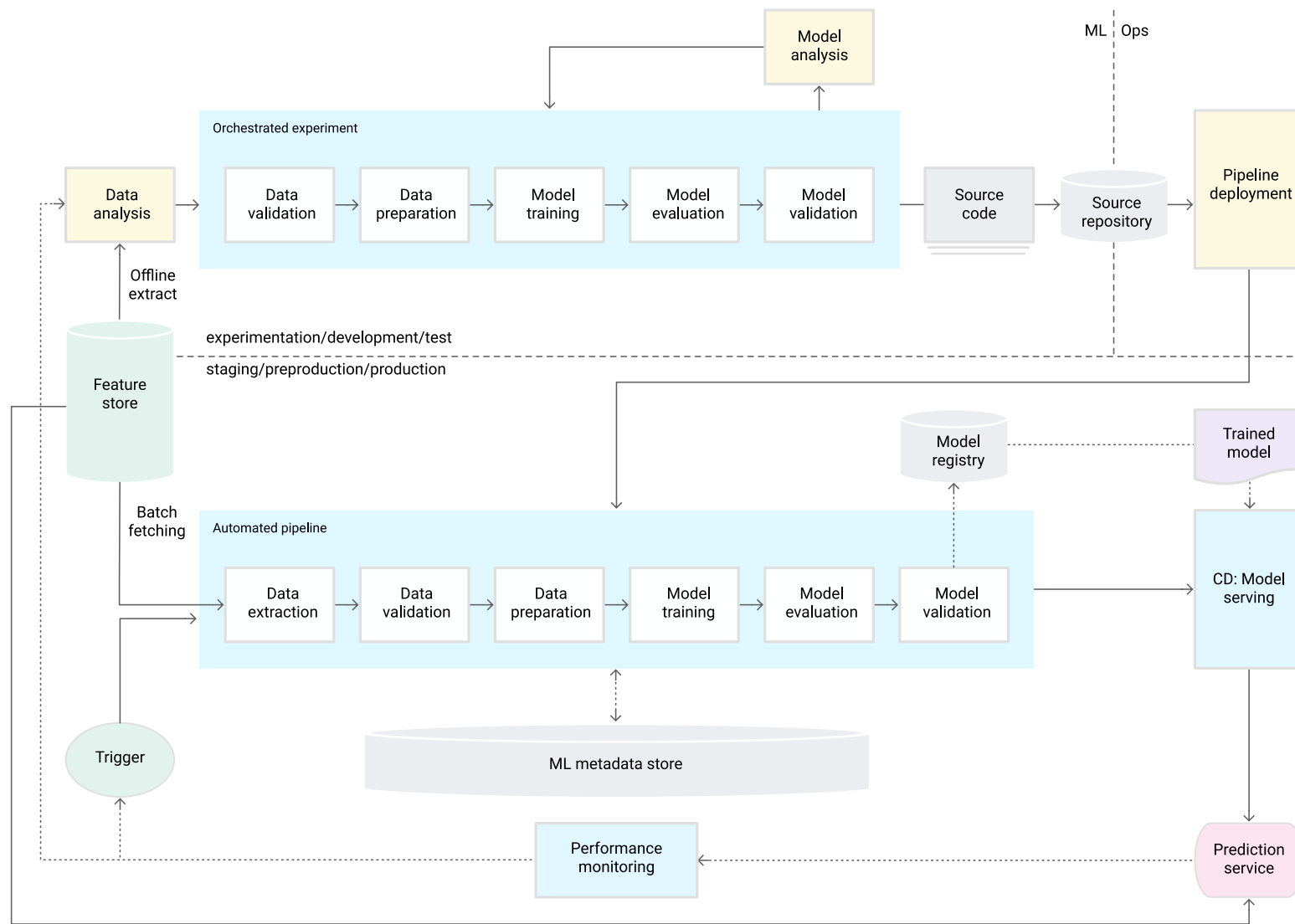
- Google defines 3 levels of MLOps
 - Level 0: Manual process
 - Level 1: ML pipeline automation
 - Level 2: CI/CD pipeline automation

<https://cloud.google.com/architecture/mlops-continuous-delivery-and-automation-pipelines-in-machine-learning>

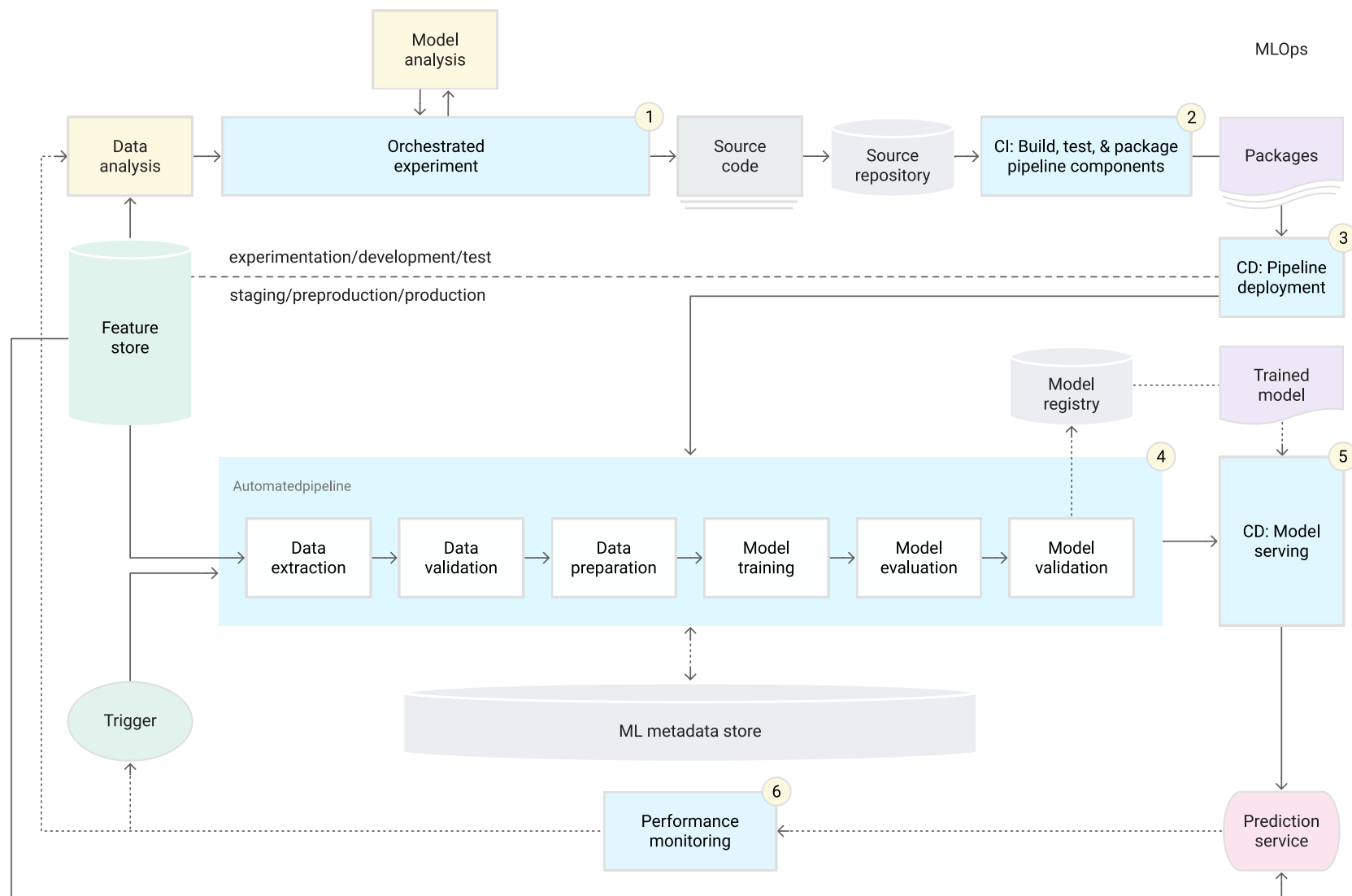
MLOps level 0: Manual process



MLOps level 1: ML pipeline automation



MLOps level 2: CI/CD pipeline automation





Questions?

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