

ML Ops

Professor Kartik Hosanagar

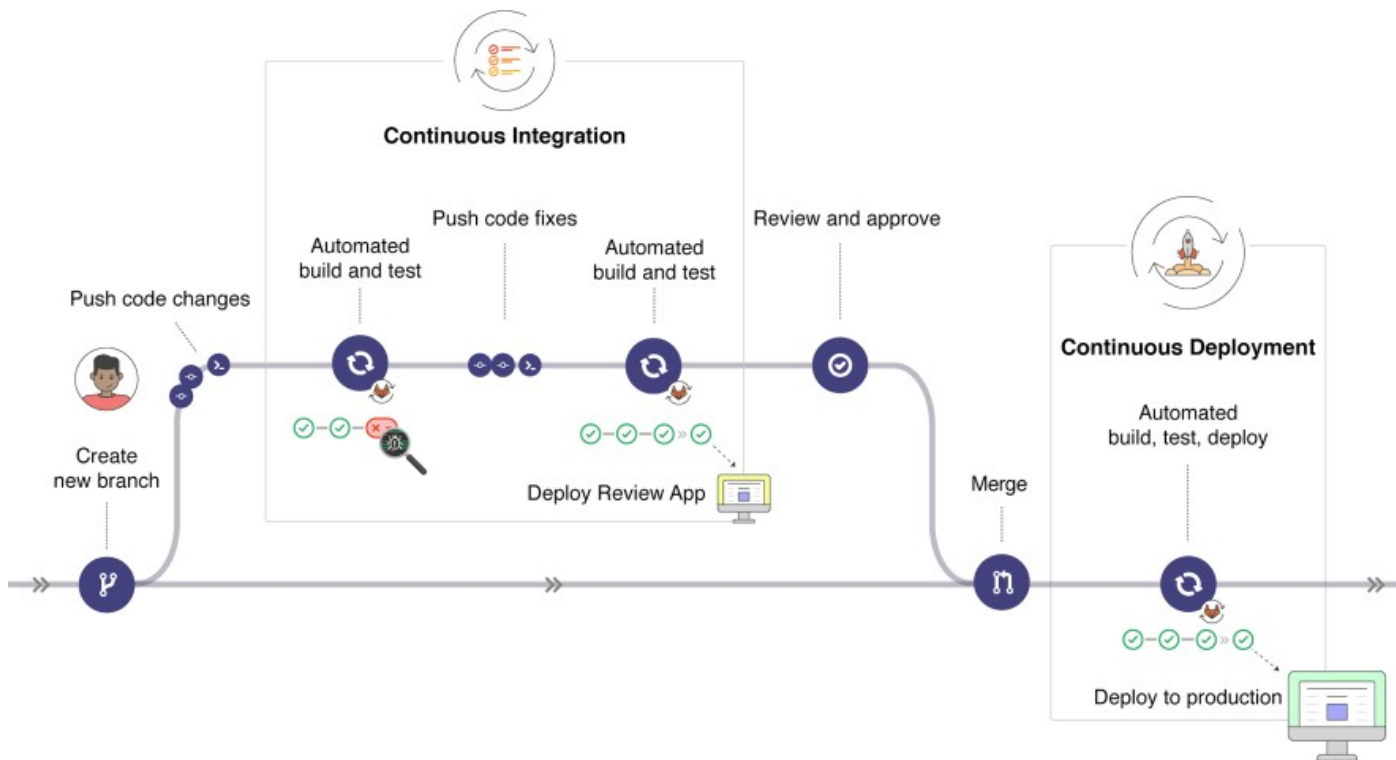


Agenda

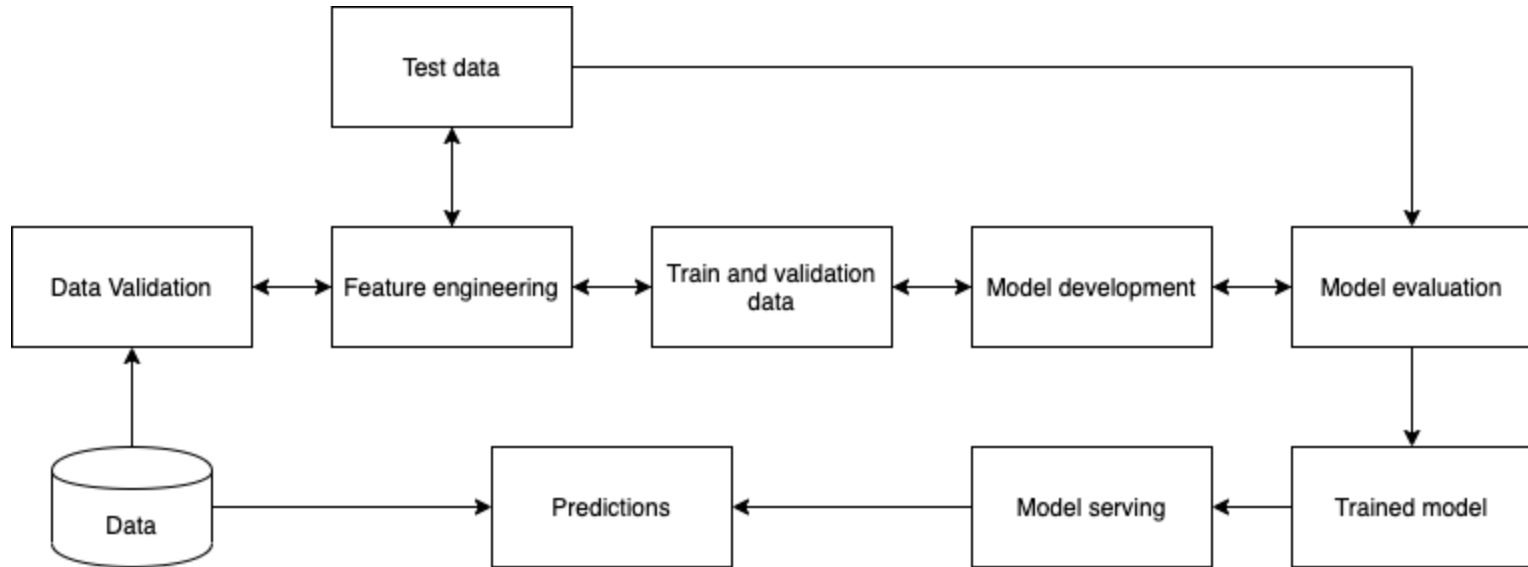
- Overview of traditional DevOps
- Overview of machine learning workflow
- Challenges in CI/CD for ML
- Existing MLOps tools in the market

Traditional Dev Ops

Practices and tools used to build, test, and deploy code to production

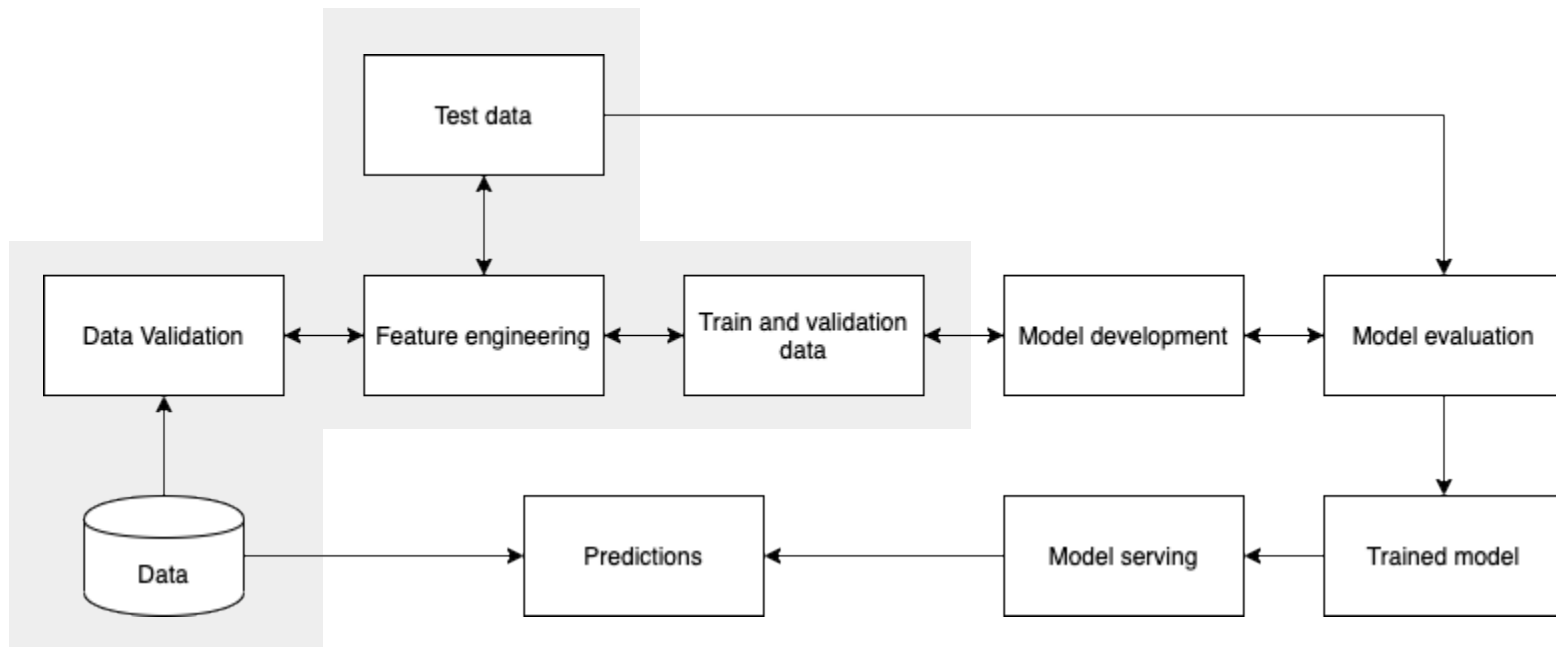


Machine learning workflow



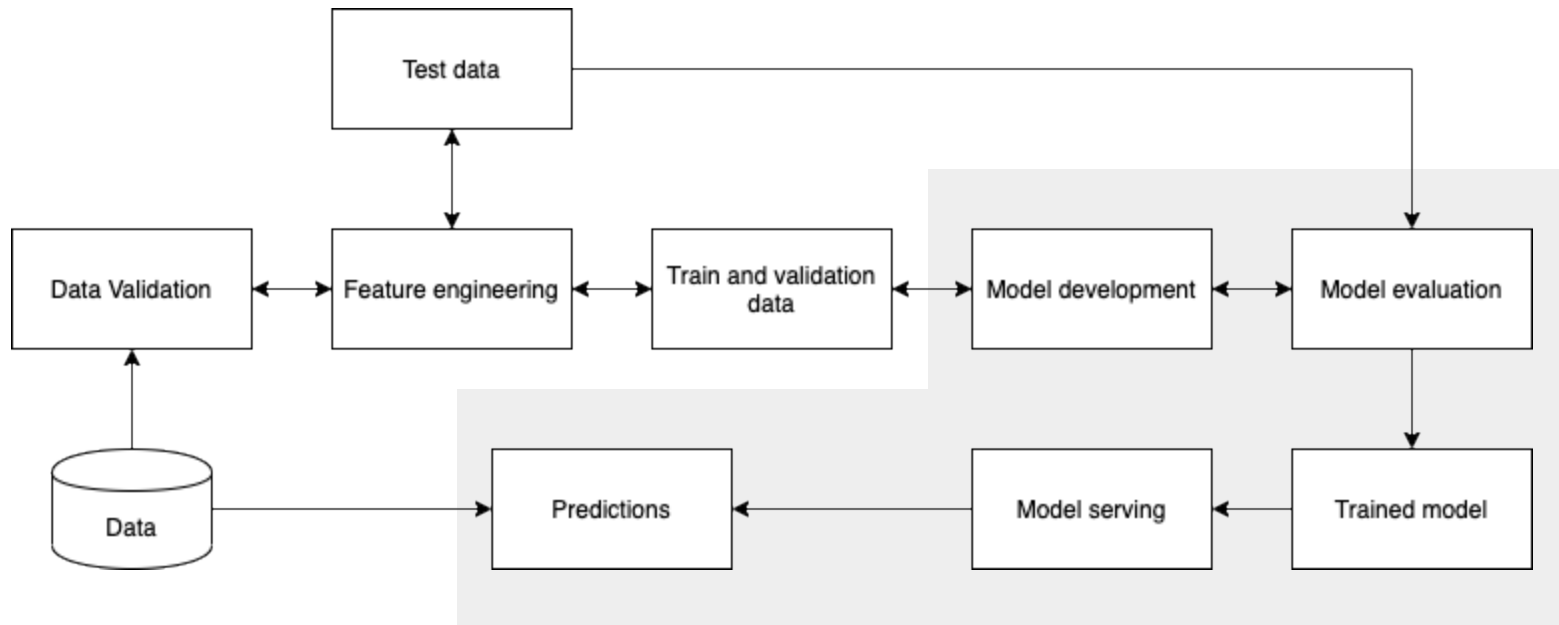
Challenges in ML Ops

Code is not the only variable - data can also change



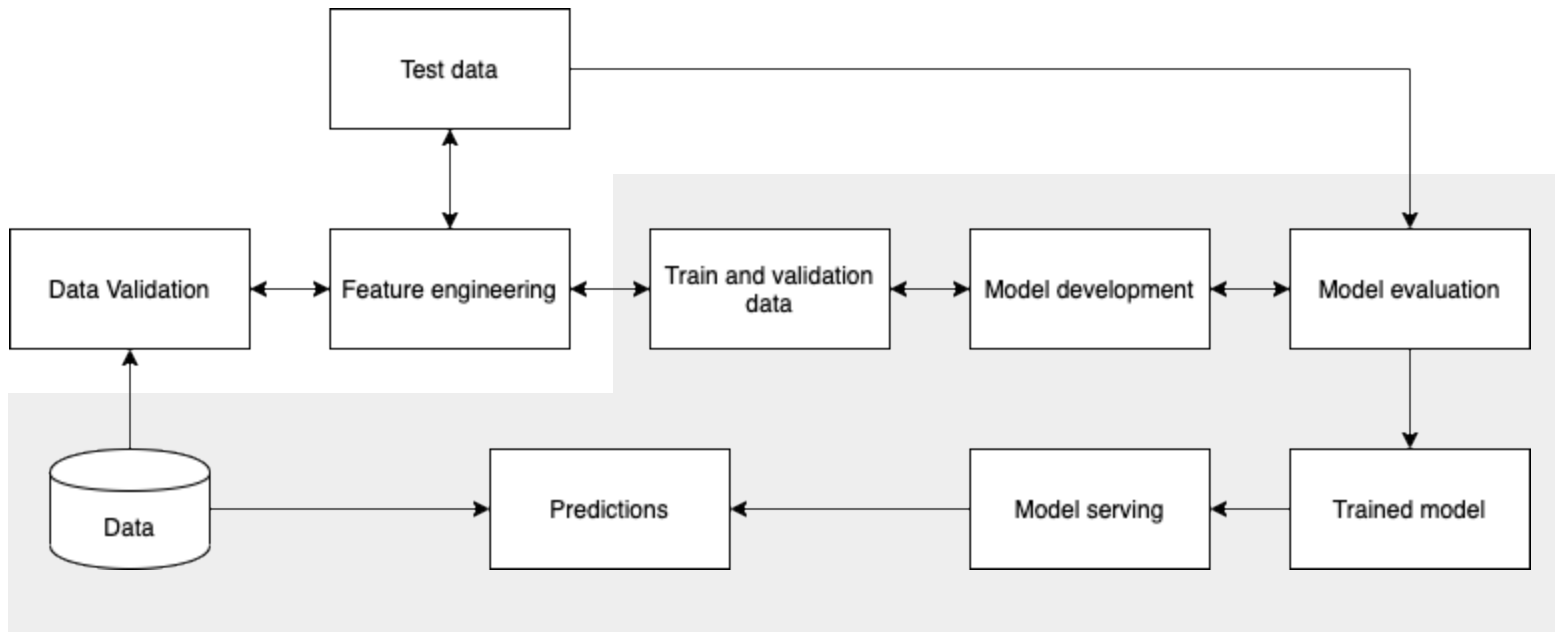
Challenges in ML Ops

Testing and performance monitoring become much more complex



Challenges in ML Ops

Computing resources may be heterogeneous (GPUs, TPUs, etc.)



Existing ML Ops Tools

Infrastructure
Management

Data
Management

Model
Management

Deployment

Monitoring

End-to-End ML Platform



Amazon
SageMaker



Paperspace

Data Gov. & Version Control



Pachyderm

Open Source Framework

mlflow



Kubeflow

Marketplace & Deployment



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<p>Libraries / Frameworks</p> <p> </p>			<p>Languages</p> <p> </p>			<p>Notebooks</p> <p> </p>								
<p>Pipeline Opt.</p> <p> </p>			<p>Workflow</p> <p> </p>			<p>Config Management</p> <p> </p>			<p>Orchestration</p> <p> </p>			<p>Data Services</p> <p> </p>		
<p>Database</p> <p> </p>			<p>Data Transfer</p> <p> </p>			<p>Data Version Control</p> <p> </p>			<p>Data Formats</p> <p> </p>			<p>ML Platform</p> <p> </p>		
<p>App</p> <p> </p>			<p>Feature Engineering</p> <p> </p>			<p>Synthetic Data</p> <p> </p>			<p>Synthetic Data</p> <p> </p>			<p>Synthetic Data</p> <p> </p>		
<p>Social</p> <p> </p>			<p>Data Store</p> <p> </p>			<p>Data Labeling</p> <p> </p>			<p>Data Labeling</p> <p> </p>			<p>Data Labeling</p> <p> </p>		
<p>Storage</p> <p> </p>			<p>Data Prep</p> <p> </p>			<p>Data Store</p> <p> </p>			<p>Data Labeling</p> <p> </p>			<p>Data Labeling</p> <p> </p>		
<p>Web</p> <p> </p>			<p>Data Transfer</p> <p> </p>			<p>Synthetic Data</p> <p> </p>			<p>Synthetic Data</p> <p> </p>			<p>Synthetic Data</p> <p> </p>		
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<https://medium.com/memory-leak/introducing-redpoints-ml-workflow-landscape-312ca3c91b2f>