

■ Deep Dive into MLOps + MLflow

MLOps (Machine Learning + Operations) is the backbone of taking ML models from experimentation to production. It enables seamless collaboration between Data Scientists, ML Engineers, and DevOps. Below are detailed notes along with practical MLflow screenshots for better understanding – perfect for interview prep ■.

■ What is MLOps?

MLOps is the combination of Machine Learning (ML) and Operations (Ops). It's a practice to streamline the deployment, monitoring, and maintenance of ML models in production. It ensures that models are not just trained but also deployed, monitored, and continuously improved.

■ Why MLOps?

- Faster deployment of ML models ■ - Continuous monitoring of performance ■ - Collaboration between Data Science + Ops teams ■ - Retraining models with new data ■ - Handling Model Versioning (v1 → v2 → v3 ...) ■ - Preventing Model Degradation by rolling back if needed ■

■ Key Components of MLOps

1■■ Continuous Integration (CI) 2■■ Model Integration & Testing 3■■ Model Deployment (App Server / Production Server) 4■■ Continuous Monitoring & Logging 5■■ Model Updating with new data

■ MLOps Workflow

1. Data Collection ■ 2. Model Training ■ 3. Model Deployment ■ 4. Model Monitoring ■ 5. Continuous Updates ■

■ CI/CD Pipeline in MLOps

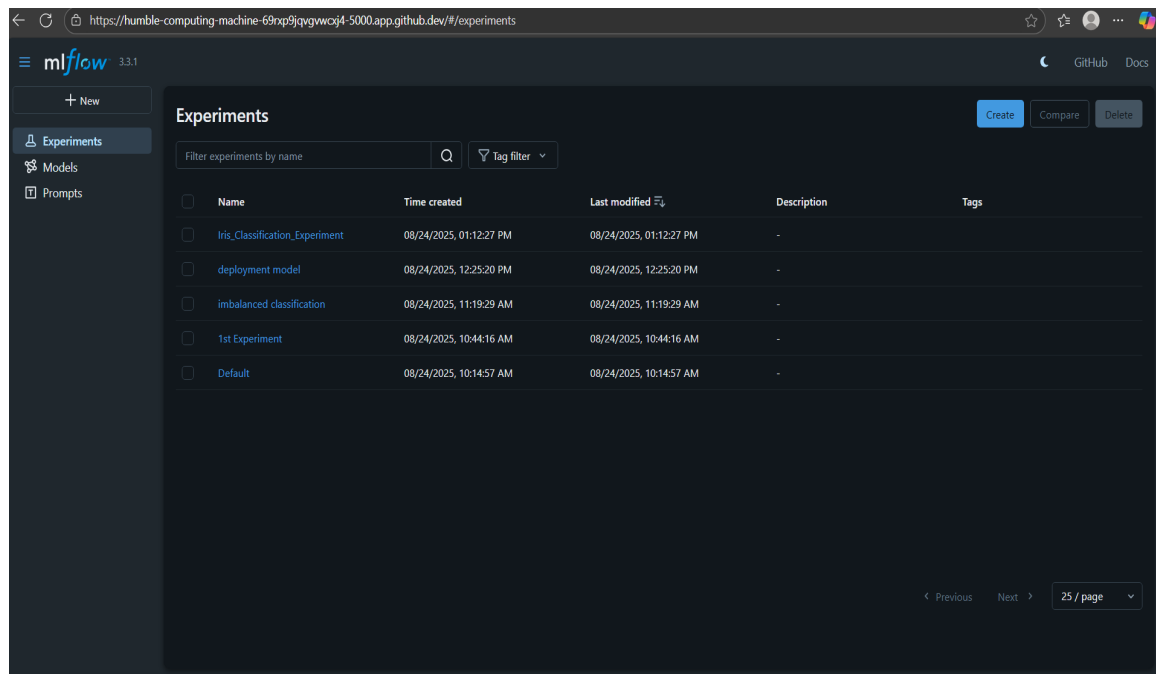
- **CI (Continuous Integration):** Code changes (data preprocessing, feature engineering, training pipeline) are automatically tested & versioned. - **CD (Continuous Deployment/Delivery):** Models are automatically deployed to production servers after validation. This ensures quick rollouts, rollback on failure, and minimal downtime (like Amazon, PhonePe, GPay – 24/7 uptime).

■ Tools in MLOps

- MLflow (Tracking, Experimentation, Deployment) - Kubeflow (Orchestration) - Docker (Containerization) - Cloud Platforms (AWS, Azure, GCP) - Databricks (Data + ML pipelines) - ZenML (Pipeline automation)

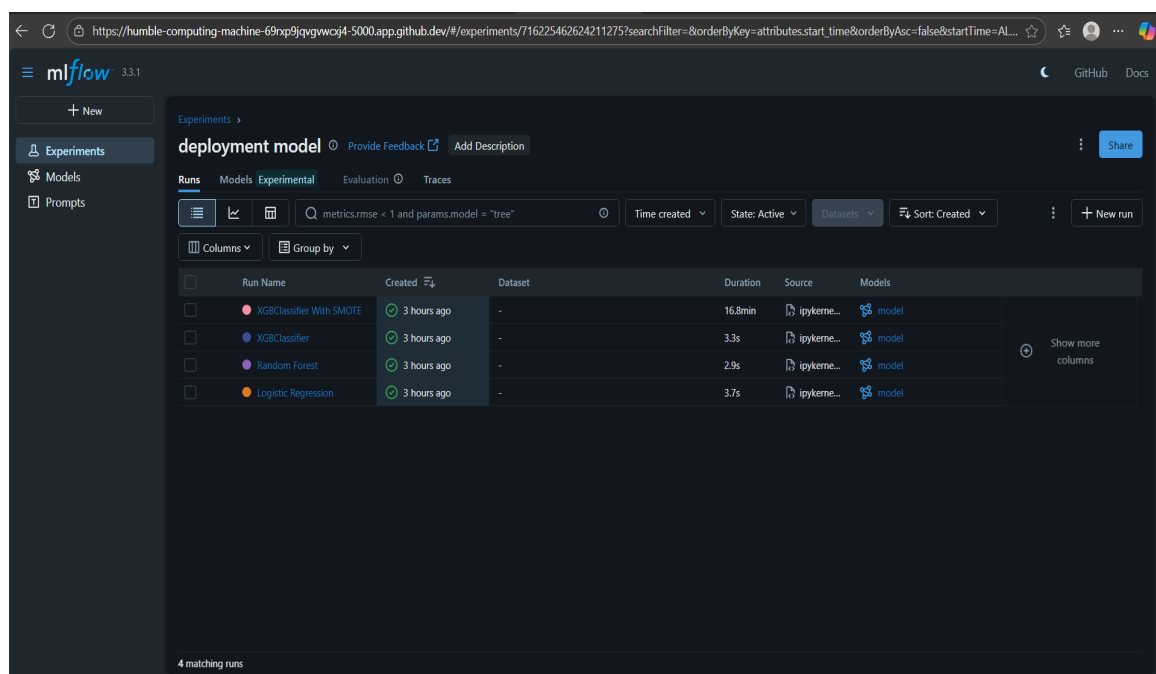
■ MLflow in Action

Here are the MLflow experiment tracking and model registry screenshots showcasing: - Running multiple experiments (Logistic Regression, Random Forest, XGBoost) - Comparing metrics (accuracy, F1-score, recall) - Versioned models stored in MLflow registry - Production-ready model deployment ■



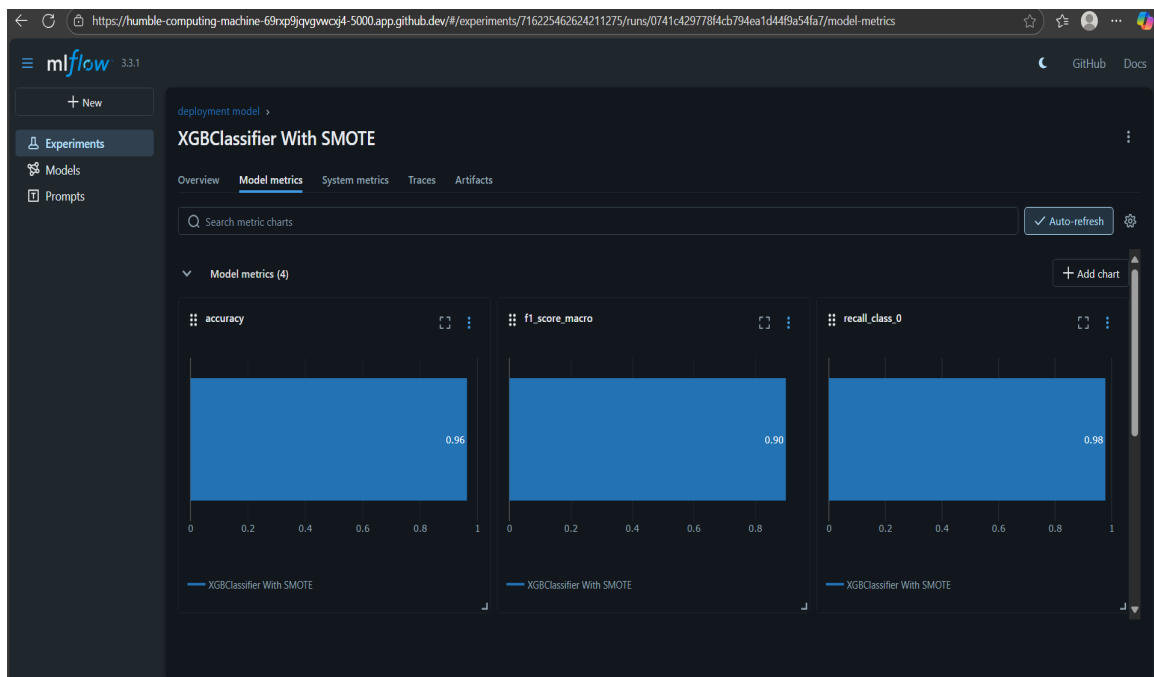
The screenshot shows the MLflow Experiments page. The left sidebar has a menu with 'Experiments', 'Models', and 'Prompts'. The main area is titled 'Experiments' and contains a table of experiments. The table has columns for Name, Time created, Last modified, Description, and Tags. There are 6 experiments listed: Iris_Classification_Experiment, deployment model, imbalanced classification, 1st Experiment, and Default. At the bottom right, there are navigation links for 'Previous', 'Next', and a page indicator '25 / page'.

<input type="checkbox"/>	Name	Time created	Last modified	Description	Tags
<input type="checkbox"/>	Iris_Classification_Experiment	08/24/2025, 01:12:27 PM	08/24/2025, 01:12:27 PM	-	
<input type="checkbox"/>	deployment model	08/24/2025, 12:25:20 PM	08/24/2025, 12:25:20 PM	-	
<input type="checkbox"/>	imbalanced classification	08/24/2025, 11:19:29 AM	08/24/2025, 11:19:29 AM	-	
<input type="checkbox"/>	1st Experiment	08/24/2025, 10:44:16 AM	08/24/2025, 10:44:16 AM	-	
<input type="checkbox"/>	Default	08/24/2025, 10:14:57 AM	08/24/2025, 10:14:57 AM	-	



The screenshot shows the MLflow Runs page for the 'deployment model' experiment. The left sidebar is the same as the previous screenshot. The main area is titled 'deployment model' and has tabs for 'Runs', 'Models', 'Experimental', 'Evaluation', and 'Traces'. The 'Runs' tab is active. There is a search bar with the query 'metrics.rmse < 1 and params.model = "tree"'. Below the search bar, there are filters for 'Time created', 'State: Active', 'Datasets', and 'Sort: Created'. A table of runs is displayed with columns: Run Name, Created, Dataset, Duration, Source, and Models. There are 4 runs listed: XGBClassifier With SMOTE, XGBClassifier, Random Forest, and Logistic Regression. At the bottom left, it says '4 matching runs'.

<input type="checkbox"/>	Run Name	Created	Dataset	Duration	Source	Models
<input type="checkbox"/>	XGBClassifier With SMOTE	3 hours ago	-	16.8min	ipykerne...	model
<input type="checkbox"/>	XGBClassifier	3 hours ago	-	3.3s	ipykerne...	model
<input type="checkbox"/>	Random Forest	3 hours ago	-	2.9s	ipykerne...	model
<input type="checkbox"/>	Logistic Regression	3 hours ago	-	3.7s	ipykerne...	model



https://humble-computing-machine-69xp9jqvgwcoj4-5000.app.github.dev/#/models

mlflow 3.3.1

+ New

Experiments

Models

Prompts

Registered Models

Share and manage machine learning models. [Learn more](#)

Filter registered models by name or tags

Name	Latest version	Aliased versions	Created by	Last modified	Tags
Logistic_Regression_Model	Version 2			08/24/2025, 01:18:36 ...	—
Random_Forest_Model	Version 2			08/24/2025, 01:18:39 ...	—
XGB-Smote	Version 3	@ appserver : Version 3		08/24/2025, 12:49:22 ...	—
finalproduction	Version 1			08/24/2025, 12:51:35 ...	—
log_reg_model	Version 1	@ prodserver : Version 1		08/24/2025, 12:50:16 ...	—

New model registry UI

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ExperimentsModelsPrompts

deployment model >

Comparing 4 Runs from 1 Experiment

Run details

Run ID:	0741c429778f4cb794ea1d44f9a54fa7	27a7b6af00dc46ed87d4330035fc3...	fd0a8894394f46979ac219be2bc0ea...	eeb8dd6bfe541e5a910d2d6ee86a...
Run Name:	XGBClassifier With SMOTE	XGBClassifier	Logistic Regression	Random Forest
Start Time:	08/24/2025, 12:25:30 PM	08/24/2025, 12:25:27 PM	08/24/2025, 12:25:20 PM	08/24/2025, 12:25:24 PM
End Time:	08/24/2025, 12:42:17 PM	08/24/2025, 12:25:30 PM	08/24/2025, 12:25:24 PM	08/24/2025, 12:25:27 PM
Duration:	16.8min	3.3s	3.7s	2.9s

Parameters

Show diff only

C	1			
eval_metric	logloss	logloss		
max_depth			3	
n_estimators			30	

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n_estimators	30			
solver	lbfgs			
use_label_encoder	False	False		

Metrics

Show diff only

accuracy	0.963	0.977	0.92	0.967
f1_score_macro	0.9	0.93	0.756	0.895
recall_class_0	0.978	0.996	0.967	0.996
recall_class_1	0.833	0.8	0.5	0.7

Artifacts

No common artifacts to display.

Tags

Show diff only

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Experiments

Models

Prompts

Registered Models

Random_Forest_Model

Created Time: 08/24/2025, 01:12:33 PMLast Modified: 08/24/2025, 01:18:39 PM

Description

Edit

Tags

Versions

Compare

New model registry UI

Version	Registered at	Created by	Tags	Aliases	Description
<div>Version 2</div>	08/24/2025, 01:18:39 PM		<div>Add</div>	<div>Add</div>	
<div>Version 1</div>	08/24/2025, 01:12:33 PM		<div>Add</div>	<div>Add</div>	

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■ With MLOps + MLflow, you can confidently take models from experimentation → deployment → monitoring → continuous improvement. This is exactly what companies expect when they say ****“We need production-ready ML systems.”**** ■ Mastering this workflow makes you stand out in interviews!