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Lab Assignment 2

1. Problem Statement

Tracking Experiments using MLflow or Weights & Biases

2. Theory

MLflow

MLflow is an open-source platform for managing the **ML lifecycle**, including:

- **Experiment tracking**: Log metrics, hyperparameters, and artifacts.
- **Model management**: Save and load models easily.
- **Reproducibility**: Keep track of code versions and environments.

Key Features:

1. mlflow.start_run() – Start a new run.
2. mlflow.log_param() – Log hyperparameters.
3. mlflow.log_metric() – Log metrics.
4. mlflow.log_artifact() – Log files such as plots or models.
5. mlflow ui – Launch the MLflow tracking UI.

Weights & Biases (W&B)

W&B is a powerful tool for experiment tracking, visualization, and collaboration. It provides:

- **Interactive dashboards** for real-time experiment monitoring.
- **Hyperparameter tuning** and sweeps.
- **Model performance comparison** across different runs.

Key Steps:

1. Initialize W&B: wandb.init(project="my-project")
2. Log parameters: wandb.config
3. Log metrics: wandb.log({"loss": value, "accuracy": value})
4. View results on the W&B dashboard.

Why Experiment Tracking Matters

- Helps track **what was done, how, and why**.
- Makes models **reproducible and comparable**.

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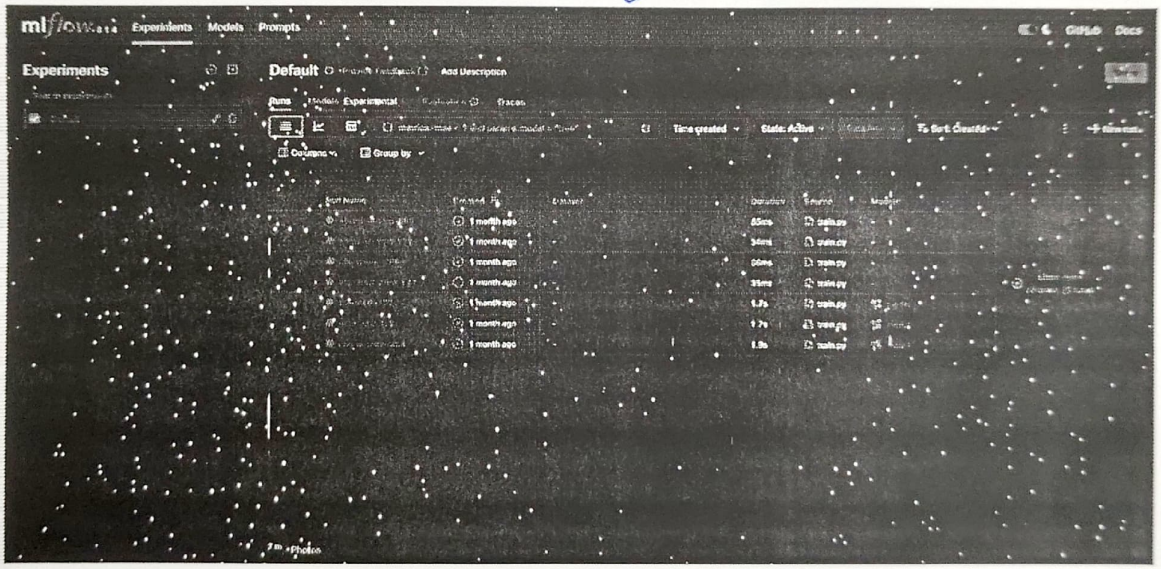
- Improves team collaboration by sharing results easily.

3. Execution

We will use **MLflow** for this example.

Install dependencies: pip install mlflow
Run command : mlfow ui
After this run the model training python script consisting of mlflow code for logging.
Again run the command mlflow ui

Now you should see results given below



4. Conclusion

In this lab, we implemented **experiment tracking** using **MLflow**

We learned how to:

- Log parameters, metrics, and artifacts.
- Compare multiple experiment runs.
- Visualize and manage experiments via an intuitive UI.

This process helps data scientists maintain **reproducibility**, **transparency**, and **efficiency** when building and improving machine learning models.

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