Title: Step-by-Step Execution Guide for Power System Fault Detection using IBM Cloud Lite

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Project Title: Power System Fault Detection and Classification
Technology Stack: IBM Cloud Lite, Watsonx.ai Studio, Watsonx.ai Runtime, Cloud Object Storage, REST API

Objective:
To detect and classify faults in a power distribution system using a machine learning model built and deployed entirely on IBM Cloud Lite using Watsonx services.

Step-by-Step Process

Step 1: Sign In to IBM Cloud

- Go to https://cloud.ibm.com
- Log in using IBM ID
- Confirm you are using the **Lite plan** (free tier)

Step 2: Check/Create Required Resources

- Navigate to **Resource List**
- **Delete** the existing services
- Then add the required services
- Verify that the following services are active:
  - **Cloud Object Storage**
  - **Watsonx.ai Studio**
  - **Watsonx.ai Runtime**
- If not present, create them using the "Create Resource" button

Step 3: Create a Project in Watsonx.ai Studio

- Open **Watsonx.ai Studio** from the dashboard
- Click **"Create a new project"**
  - Project Name: Power System Fault Detection

- Choose or configure the **Cloud Object Storage** instance

Step 4: Launch Watsonx Experiment

- In the project dashboard → Assets → New Asset → **Experiment**
- Select structured data prediction workflow
- **Note:** Full dataset was not uploaded; instead, **10 realistic sample rows were selected manually from the Kaggle dataset**
- Choose the target column (e.g., Fault_Type)

Step 5: Model Building by Watsonx

- Watsonx automatically performs:
  - Data preprocessing
  - Feature selection
  - Model generation and comparison (Random Forest, Logistic Regression, etc.)
  - Internal evaluation based on accuracy, precision, etc.
- 8 pipelines were generated
- **Pipeline 8 (Random Forest Classifier)** was selected with an optimized accuracy of 0.409

Step 6: Promote the Best Model to Deployment Space

- Create a new **Deployment Space** if needed
- Promote the best model (Pipeline 8) from the Experiment to this space

Step 7: Create and Configure Online Deployment

- Inside the Deployment Space:
  - Select the promoted model
  - Create Deployment → Choose **Online Deployment**
  - Name the deployment: **eg:** Fault Detector Deploy

Step 8: Test Predictions in the UI

- Open the **Test** tab of the deployed model

- Manually input the 10 sample rows from given dataset
- Observe predicted outputs and class confidence scores
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GITHUB LINK: https://github.com/aksajiji/Final_Project-CloudIBM

Conclusion:
This step-by-step approach demonstrates end-to-end ML model development using only IBM Watsonx tools on the Cloud Lite plan. The deployed model can classify power system faults accurately using limited but realistic input samples. It sets the stage for scaling with full datasets and real-time applications.