

# **CAPSTONE PROJECT**

## **POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE LEARNING**

**Presented By:**

**1. Mihir Ravat-SIES College of Management Studies–Master of Computer Applications(MCA)**

# OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

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# PROBLEM STATEMENT

Faults in power distribution systems threaten grid stability and service reliability. This project develops a machine learning model to detect and classify faults using voltage and current phasor data. The model will distinguish between normal and fault conditions—such as LG, LL, and LLL faults—based on time-series analysis. This approach aims to enhance the speed and accuracy of fault diagnosis, improving grid resilience and operational efficiency.

# PROPOSED SOLUTION

- **Develop a machine learning model** that classifies power system faults using the dataset provided. The model will process electrical measurements to identify the type of fault rapidly and accurately. This classification will help automate fault detection and assist in quicker recovery actions, ensuring system reliability.
- **Key components:**
  - **Data Collection:** Use the Kaggle dataset on power system faults.
  - **Preprocessing:** Clean and normalize the dataset.
  - **Model Training:** Train a classification model (e.g., Decision Tree, Random Forest, or SVM).
  - **Evaluation:** Assess model performance using metrics such as accuracy, precision, recall, and F1-score.

# SYSTEM APPROACH

The "**System Approach**" section outlines the overall strategy and methodology for developing and implementing the **power system fault detection and classification model**. Here's a suggested structure for this section:

- **System requirements:**
- IBM Cloud (mandatory)
- IBM Watson Studio for model development and deployment
- IBM Cloud Object Storage for dataset handling

# ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**  
Random Forest Classifier (or SVM based on performance)
- **Data Input:**  
Voltage, current, and phasor measurements from the dataset
- **Training Process:**  
Supervised learning using labeled fault types
- **Prediction Process:**  
Model deployed on IBM Watson Studio with API endpoint for real-time predictions

# RESULT

- Step1: Open IBM Cloud login page with this link [cloud.ibm.com](https://cloud.ibm.com), enter your Gmail and password and click on **login**

IBM

## Log in to IBM

Password

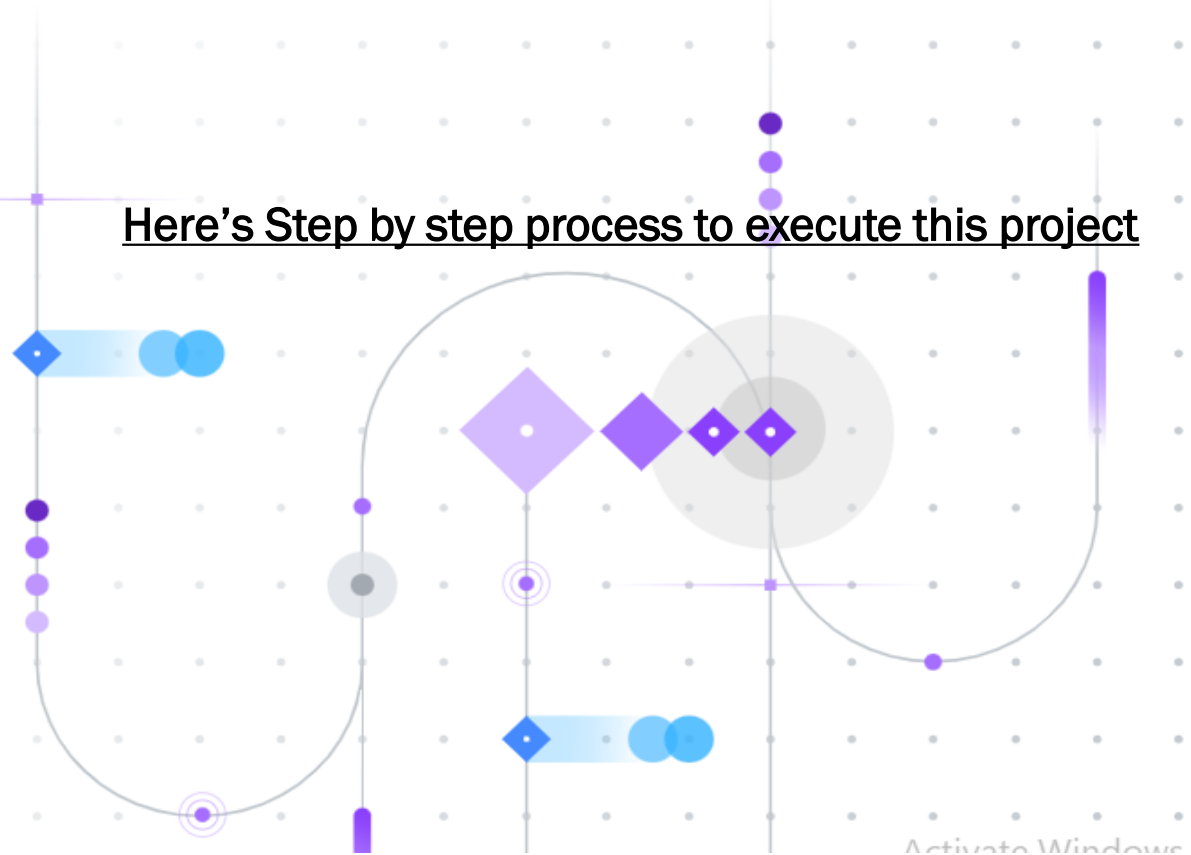
Logging in as mihirravat9901@gmail.com [Not you?](#)

Log in



[Forgot password?](#)

Here's Step by step process to execute this project



Activate Windows

# RESULT

This is IBM cloud dashboard

The screenshot displays the IBM Cloud dashboard. At the top, a dark navigation bar contains the 'IBM Cloud' logo, a search bar with the placeholder 'Search resources and products...', and links for 'Catalog', 'Manage', and the user account 'MIHIR RAVAT's Account'. On the left, a vertical sidebar lists various service categories with icons. The main content area is titled 'Dashboard' and includes links to 'Edit dashboard' and 'Upgrade account', along with a prominent blue 'Create resource' button. Below this, a 'For you' section features a horizontal carousel of five cards. The first card, 'Build', is highlighted with a blue-to-purple gradient. The other four cards are 'Track emissions with Carbon Calculator' (Recommended, 1 min), 'Use Watson Assistant' (Popular, 2 min), 'Use Watson Studio' (Popular, 2 min), and 'Build with Watson' (Popular, 3 min). Each card provides a brief description of the service and a 'Select an option' link. A horizontal scrollbar is visible at the bottom of the carousel.

IBM Cloud

Search resources and products...

Catalog Manage MIHIR RAVAT's Account

Dashboard

Edit dashboard Upgrade account Create resource +

For you

Select an option

**Build**  
Explore IBM Cloud with this selection of easy starter tutorials and services.

**Track emissions with Carbon Calculator**  
View estimated greenhouse gas emissions for your IBM Cloud account and export data for ESG reporting.  
Recommended 1 min

**Use Watson Assistant**  
Watson Assistant lets you build conversational interfaces into any application, device, or channel.  
Popular 2 min

**Use Watson Studio**  
Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.  
Popular 2 min

**Build with Watson**  
Chatbots, insights, recognizers, and more. Explore the AI platform for business.  
Popular 3 min



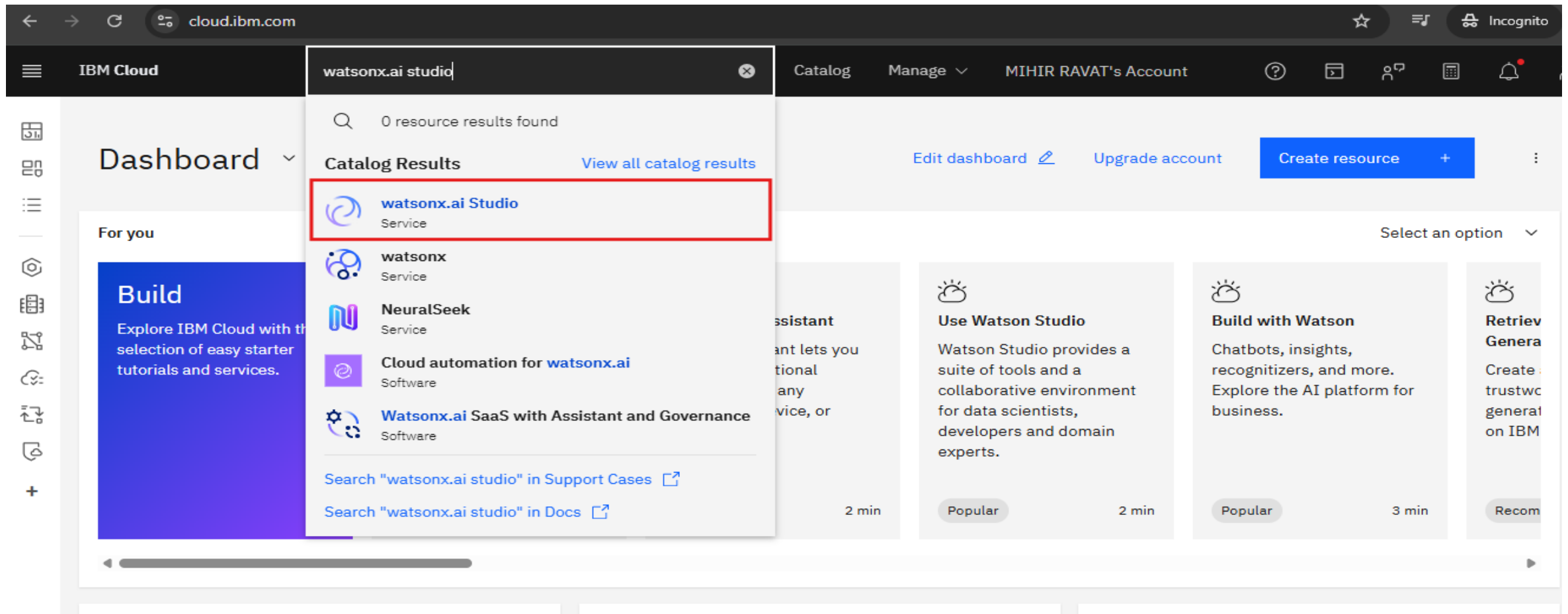
# RESULT

Step2 : Click on Navigation menu, go to **Resources list** and clear all the resources

The screenshot displays the IBM Cloud user interface. At the top, a dark navigation bar contains the 'IBM Cloud' logo, a search bar, and links for 'Catalog', 'Manage', and the user's account 'MIHIR RAVAT's Account'. Below this, a light gray sidebar on the left lists various navigation options: 'Dashboard', 'Projects', 'Resource list' (highlighted with a red rectangle), 'Containers', 'Databases', 'Infrastructure', 'Observability', 'Platform Automation', 'Security', 'API Management', 'Cloud Pak for Data', 'Partner Center', and 'SAP'. The main content area features a header with 'Edit dashboard', 'Upgrade account', and a prominent blue 'Create resource' button. Below the header, a horizontal scrollable list of resource cards is visible, including 'Track emissions with Carbon Calculator', 'Use Watson Assistant', 'Use Watson Studio', 'Build with Watson', and 'Retrieve Genera'. Each card includes an icon, a title, a brief description, and a 'Recommended' or 'Popular' badge with a time indicator (e.g., '1 min', '2 min'). At the bottom of the page, there are links for 'View all', 'Recent support cases', 'Planned maintenance', 'Activate Windows', and another 'View all' link.

# RESULT

Step 3: Click on search icon and type “**Watsonx.ai studio**”. Select Watsonx.ai studio(Service).



# RESULT

## Step 4: Click on the check box and Create

IBM Cloud

Search resources and products...

Catalog

Manage

MIHIR RAVAT's Account

Catalog /

watsonx.ai Studio

(Formerly known as Watson Studio) Develop powerful AI solutions with an integrated collaborative studio and industry-standard APIs and SDKs.

Create

About

Type  
Service

Provider  
IBM

Last updated  
05/06/2025

Category  
AI / Machine Learning

Compliance  
HIPAA Enabled  
IAM-enabled

Select a location

Sydney (au-syd)

Select a pricing plan

Prices shown are for country or location: [United States](#)

Plan	Features and capabilities	Pricing
Lite	1 authorized user	Free

Summary

watsonx.ai Studio

Free

Location: Sydney (au-syd)

Plan: Lite

Service name: watsonx.ai Studio-2o

Resource group: Default

☒ I have read and agree to the following license agreements:

[Terms](#)

Create

Add to estimate

edunet  
foundation

# RESULT

Step 5: Click on the Launch in

IBM Cloud

Search resources and products...

Catalog

Manage


MIHIR RAVAT's Account

Resource list /

watsonx.ai Studio-2o ✓ [Add tags](#) [Details](#) [Actions](#)

Manage


Plan



### watsonx.ai Studio in Cloud Pak for Data and watsonx

Build and deploy machine learning models on either platform. Work with foundation models on watsonx as a Service.

Launch in ▼



IBM watsonx.ai Studio in Cloud Pak for Data and watsonx

IBM Cloud Pak for Data, watsonx Unifying platforms

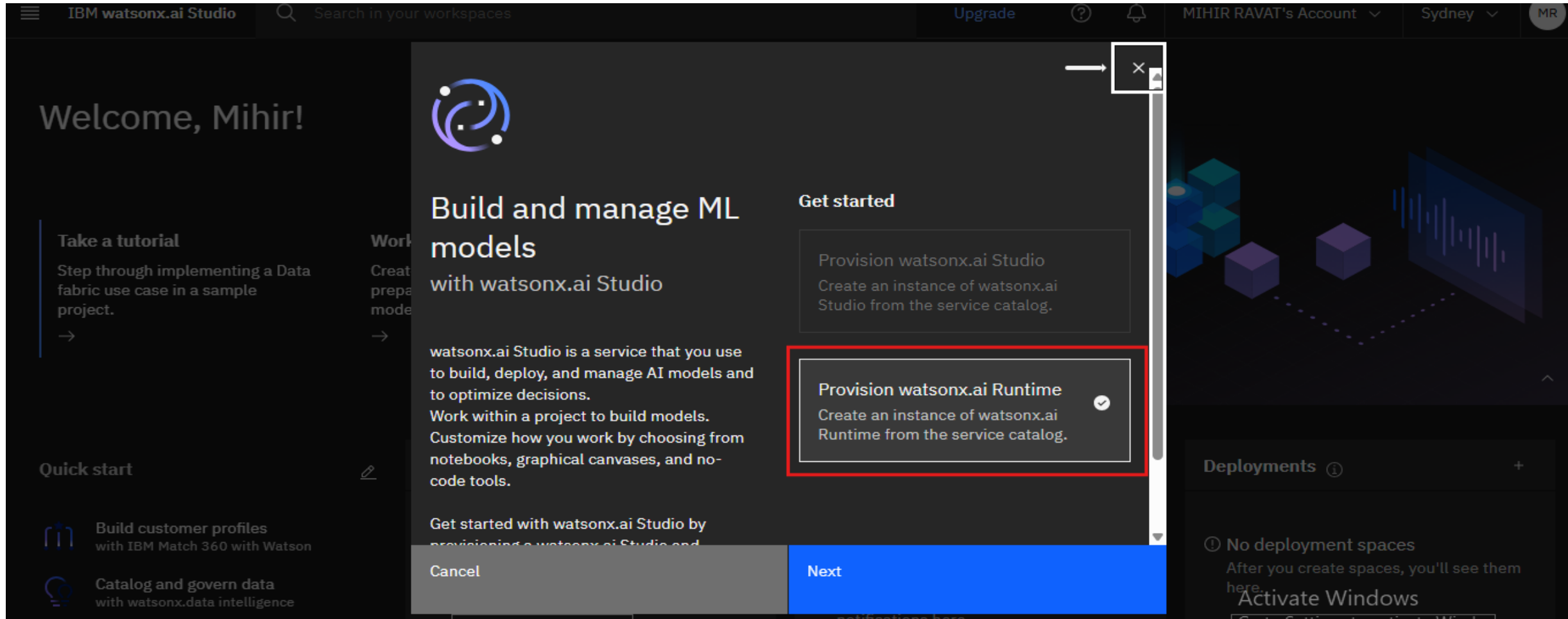
IBM Cloud Base cloud infrastructure

IBM watsonx.ai Studio is part of IBM Cloud Pak for Data and watsonx, and serves as the AI capability of the data fabric architecture.

Activate Windows  
Go to Settings to activate Windows

# RESULT

Step 6: Select Provision Watsonx.ai Runtime and click on Next.



# RESULT

Step 7: Click on create

**watsonx.ai Runtime**

Author: IBM • Date of last update: Jul 23, 2025 • [Docs](#) • [API Docs](#)

**Create** | About

Select a region

Select a region

Sydney

**Pricing plan**

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

Plan	Features	Pricing
Lite	<b>Service instance</b> Instance includes: <ul style="list-style-type: none"><li>• 20 capacity unit-hours (CUH) per month</li></ul>	Free

**Summary**

**watsonx.ai Runtime**

Region: Sydney  
Plan: Lite  
Service name: watsonx.ai Runtime-wm  
Resource group: Default

**Create**

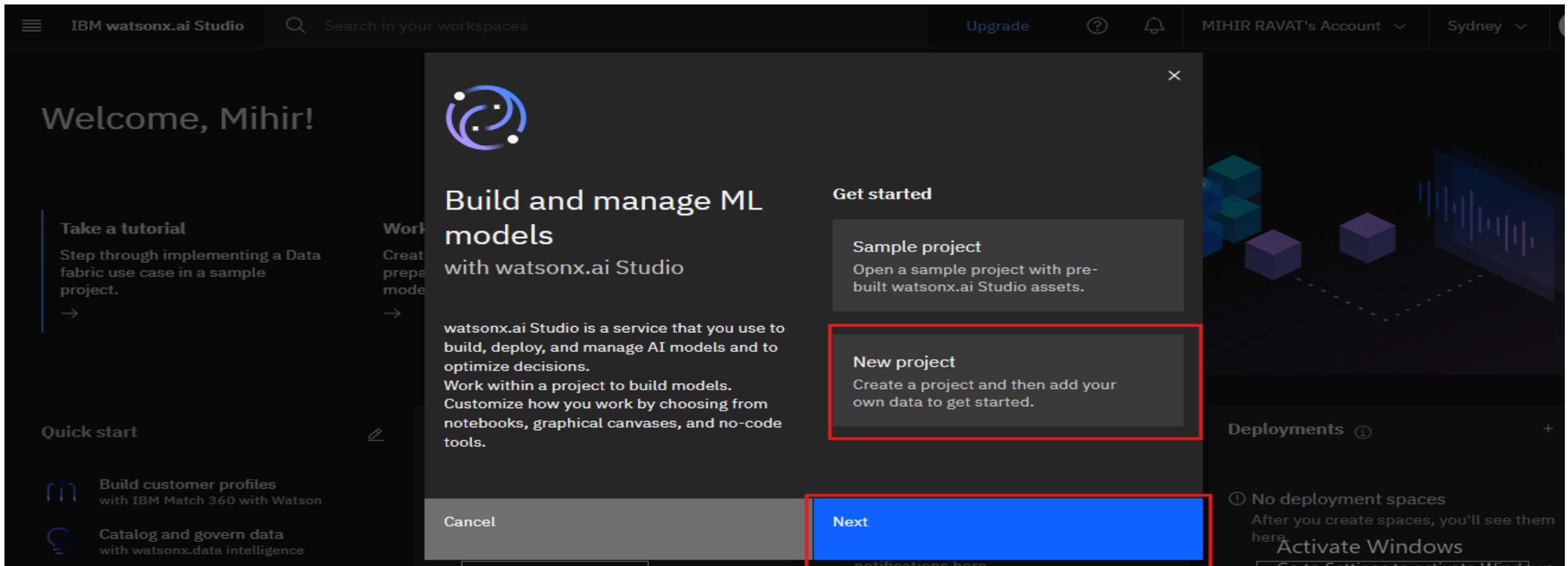
[View terms](#)

Cancel

Activate Windows  
Go to Settings to activate Windows


# RESULT


Step 8: Select New project and click on Next




# RESULT


Step 9: Enter project name and scroll a little.

 IBM watsonx.ai Studio

 Search in your workspaces


Upgrade





MIHIR RAVAT's Account ▾

Sydney ▾

MR 

+ New

 Local file

 Sample

Define details

Name

Project\_41

Description (optional)

What's the purpose of this project?

Tags (optional)

Add tags

Cancel

Create

Activate Windows  
Go to Settings to activate Windows.



# RESULT

Step10: Select storage service and **Click on Add** ,then select **Free plan** and **Click on continue**

The screenshot displays the IBM Watsonx.ai Studio interface for Cloud Object Storage. The main content area shows the 'Pricing plan' section with two tabs: 'Create' and 'About'. The 'Create' tab is active, showing a table of pricing plans. The 'Lite(deprecated)' plan is highlighted with a blue border, indicating it is the selected option. The summary sidebar on the right provides details about the selected plan, including the region, plan name, service name, and resource group. A red box highlights the 'Create' button in the sidebar, which is the next step in the process.

Author: IBM • Date of last update: Apr 15, 2025 • [Docs](#) • [API Docs](#)

**Create** About

### Pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

Plan	Features	Pricing
One-Rate	One-Rate Plan is a Pay-as-You-Go option with a single, flat monthly rate (\$/GB) that includes storage, API operations, retrieval, and outbound bandwidth—making it ideal for high-activity workloads with frequent access and data transfer, such as analytics, media, and web apps. The plan includes built-in allowances that scale with stored capacity and offers automatic volume discounts as usage grows	
Lite(deprecated)	Lite plan instance is free to use for Storage capacity up to 25 GB per month. Lite plan instance is used for trial, and can be easily upgraded to Standard plan for unlimited scalability and full functionality.  None  Lite plan services are deleted after 30 days of inactivity.	Free ✓

#### Summary

**Cloud Object Storage**  
Region: Global  
Plan: Lite(deprecated)  
Service name: Cloud Object Storage-wa  
Resource group: Default

**Create**

[View terms](#)

Activate Windows  
Go to Settings to activate Windows.

Cancel

# RESULT

Step 11: Click on refresh then click on **Create**

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

?

MIHIR RAVAT's Account

Sydney

MR

## Create a project

Start with a new, blank project or select from where to import an existing project.

+ New

Local file

Sample

Tags (optional)

Add tags

Add tags to make projects easier to find. To add tags, separate them with commas and press Enter.

Storage

Cloud Object Storage-wa

Project includes integration with [Cloud Object Storage](#) for storing project assets.

Advanced settings

Cancel

Create

# RESULT

Step 12: Click on the **Manage**, Under Manage tab click on **Services & integrations** and click on **Associate service**.

The screenshot displays the IBM watsonx.ai Studio interface. At the top, a dark navigation bar includes the 'IBM watsonx.ai Studio' logo, a search bar, an 'Upgrade' button, and user account information. Below this, a breadcrumb trail shows 'Projects / Project\_41'. A secondary navigation bar contains tabs for 'Overview', 'Assets', 'Jobs', and 'Manage', with 'Manage' highlighted by a red box. On the left, a sidebar lists project management options, with 'Services & integrations' highlighted by a red box. The main content area, titled 'Services & integrations', features two tabs: 'IBM services' (active) and 'Third-party integrations'. The 'IBM services' tab contains instructions on associating IBM Cloud services and a 'Find services' search bar. A blue button labeled 'Associate service' with a plus icon is highlighted by a red box in the bottom right corner of the main content area.

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41

Overview Assets Jobs **Manage**

Project

- General
- Access control
- Environments
- Resource usage
- Services & integrations**
- Tools
- Pipeline

### Services & integrations

**IBM services** Third-party integrations

Associate IBM Cloud services with this project to add tools, compute environments, or other capabilities. [Learn more.](#)

Find services

Associate service +

# RESULT

## Step 13: Click on the Watsonx.ai Runtime and Associate

### Associate service

Choose an existing or add a new service to associate with your project.

Resource Groups ▾ Locations ▾

Find services

New service +

	Name	Type	Plan	Location	Status	Group
<input checked="" type="checkbox"/>	watsonx.ai Runtime-wm ⓘ	watsonx.ai Runtime	Lite	Sydney	◆ Not associated	Default

Cancel

Associate

# RESULT

Step 14: Click on **Overview** and then Click on “**Build machine learning models automatically**”

The screenshot displays the IBM watsonx.ai Studio interface. At the top, a dark navigation bar includes the logo, a search bar, an 'Upgrade' button, and user account information. Below this, a breadcrumb trail shows 'Projects / Project\_41'. A secondary navigation bar contains tabs for 'Overview', 'Assets', 'Jobs', and 'Manage', with 'Overview' being the active tab. The main content area is titled 'Start working' and features four recommended actions: 'Add users as collaborators', 'Add data to work with', 'Work with data and models in Python or R notebooks', and 'Build machine learning models automatically'. The last option is highlighted with a red border. A 'View all' link is at the bottom left, and a 'Collapse' button is at the bottom right.

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41

Overview Assets Jobs Manage

Start working

Recommended

Add users as collaborators

Add data to work with

Work with data and models in Python or R notebooks

Build machine learning models automatically

View all

Collapse

# RESULT

## Step 15: Enter experiment name and click on **Create**

### Build machine learning models automatically

Define the details to create an AutoAI experiment asset and open it in the AutoAI tool.

+ New

Sample

Define details

Name

Power\_1

Description (optional)

What's the purpose of this AutoAI experiment?

Tags (optional)

Define configuration

watsonx.ai Runtime service instance

watsonx.ai Runtime-wm

Environment definition ⓘ

Large: 8 CPU and 32 GB RAM

This environment definition consumes 20 capacity units per hour for training. For details, see [watsonx.ai Runtime plans](#).

Cancel

Back

Create

# RESULT

Step 16: Add the downloaded data set (fault\_data.csv) with the help of Browse option

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney


MR

Projects / Project\_41 / Power\_1

Configure AutoAI experiment

Power\_1

Add data source



Drop data files here or browse for files to upload

Add files such as tabular data (CSV).

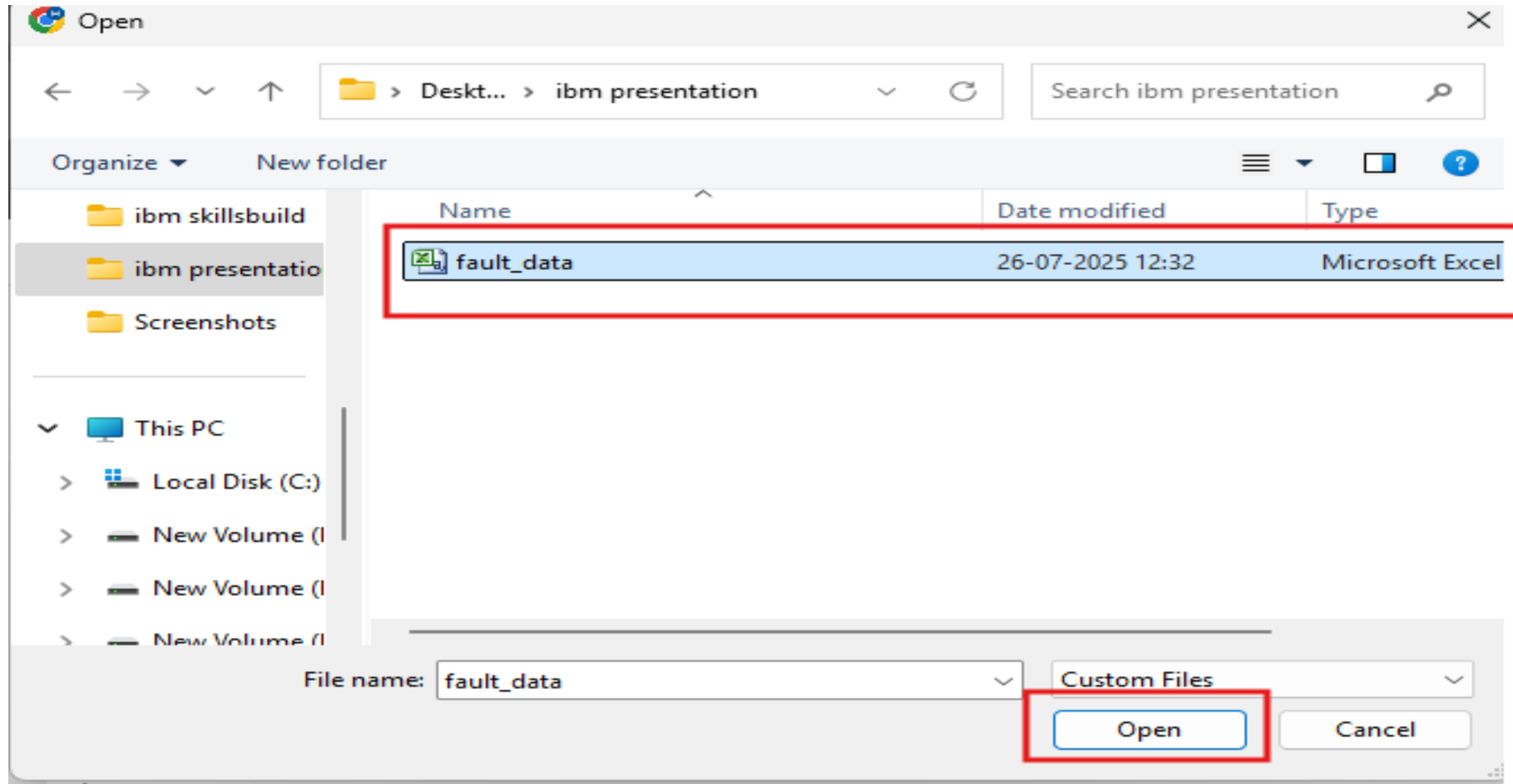
Browse

Select from project

Activate Windows

# RESULT

Step 17: Select the data set and click on Open





# RESULT

Step 18: Data set is loaded. In create a time series analysis? Choose **No** option, Choose prediction column.(Fault\_Type) and click on run experiment

The screenshot displays the IBM watsonx.ai Studio interface. The top navigation bar includes the logo, a search bar, and user account information. The main area is titled 'Configure AutoAI experiment' and shows the project 'Power\_1'. On the left, a file named 'fault\_data.csv' is listed with a size of 47.62 KB and 13 columns. The central panel, titled 'What do you want to predict?', shows the 'Prediction column' set to 'Fault Type'. Below this, the 'Prediction type' is 'Multiclass Classification', and it is 'Optimized for' 'Accuracy & run time'. At the bottom, the 'Run experiment' button is highlighted with a red box. The interface also shows 'CUH remaining: 20 CUH' and a watermark for 'edunet foundation'.

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41 / Power\_1

Configure AutoAI experiment

Power\_1

Autosaved: 11:38:57 AM

Browse

Select from project

fault\_data.csv

Size: 47.62 KB | Columns: 13

What do you want to predict?

Prediction column

Fault Type

Prediction column: Fault Type

CUH remaining: 20 CUH

PREDICTION TYPE

Multiclass Classification

OPTIMIZED FOR

Accuracy & run time

Experiment settings

Run experiment

Activate Windows

Go to Settings to activate Windows

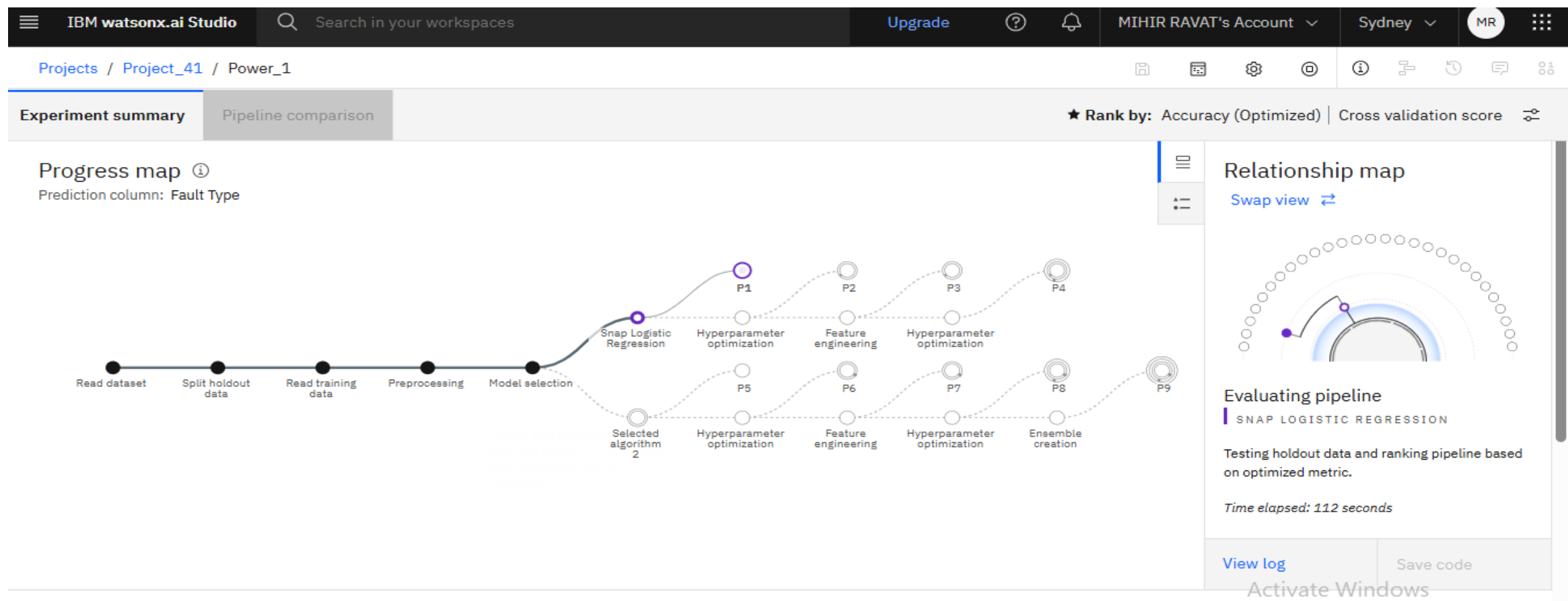
# RESULT

Step 19: Auto AI experiment is running. Now click on swap view

The screenshot displays the IBM Watsonx.ai Studio interface. The top navigation bar includes the IBM Watsonx.ai Studio logo, a search bar, an 'Upgrade' button, and user account information (MIHIR RAVAT's Account, Sydney, MR). The breadcrumb trail shows 'Projects / Project\_41 / Power\_1'. The main content area is divided into two tabs: 'Experiment summary' (active) and 'Pipeline comparison'. The 'Experiment summary' tab shows a 'Relationship map' with the prediction column set to 'Fault Type'. A scatter plot labeled 'fault\_data.csv' is visible. On the right side, a 'Progress map' panel is open, showing a 'Swap view' button (highlighted with a red box) and a 'Running' status for 'FAULT\_DATA.CSV'. The progress map indicates the experiment is 'Starting the AutoAI experiment' and has 'Time elapsed: 48 seconds'. At the bottom right, there are buttons for 'View log' and 'Save code', and a message to 'Activate Windows' with a link to 'Go to Settings to activate Windows.'

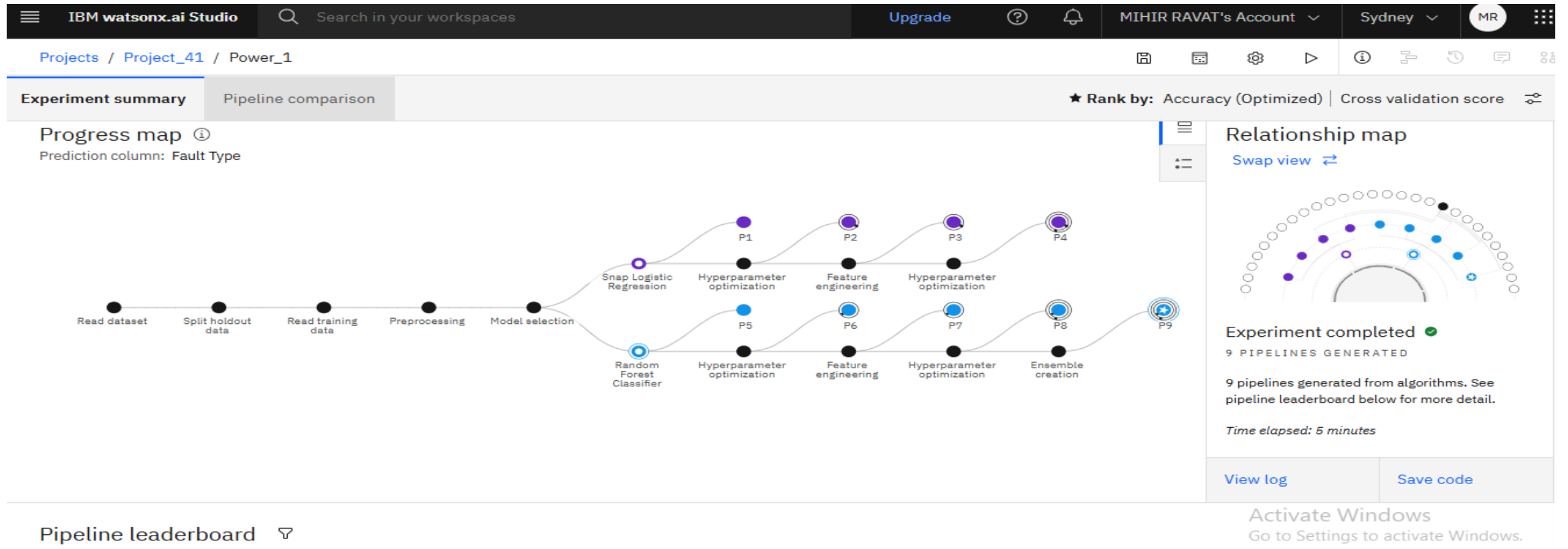
# RESULT

Pipelines are building



# RESULT

The experiment is completed



# RESULT

This is the pipeline leader board. In this Pipeline9 is the top performer along with the algorithm name i.e. Batched Tree Ensemble Classifier(Random Forest Classifier).

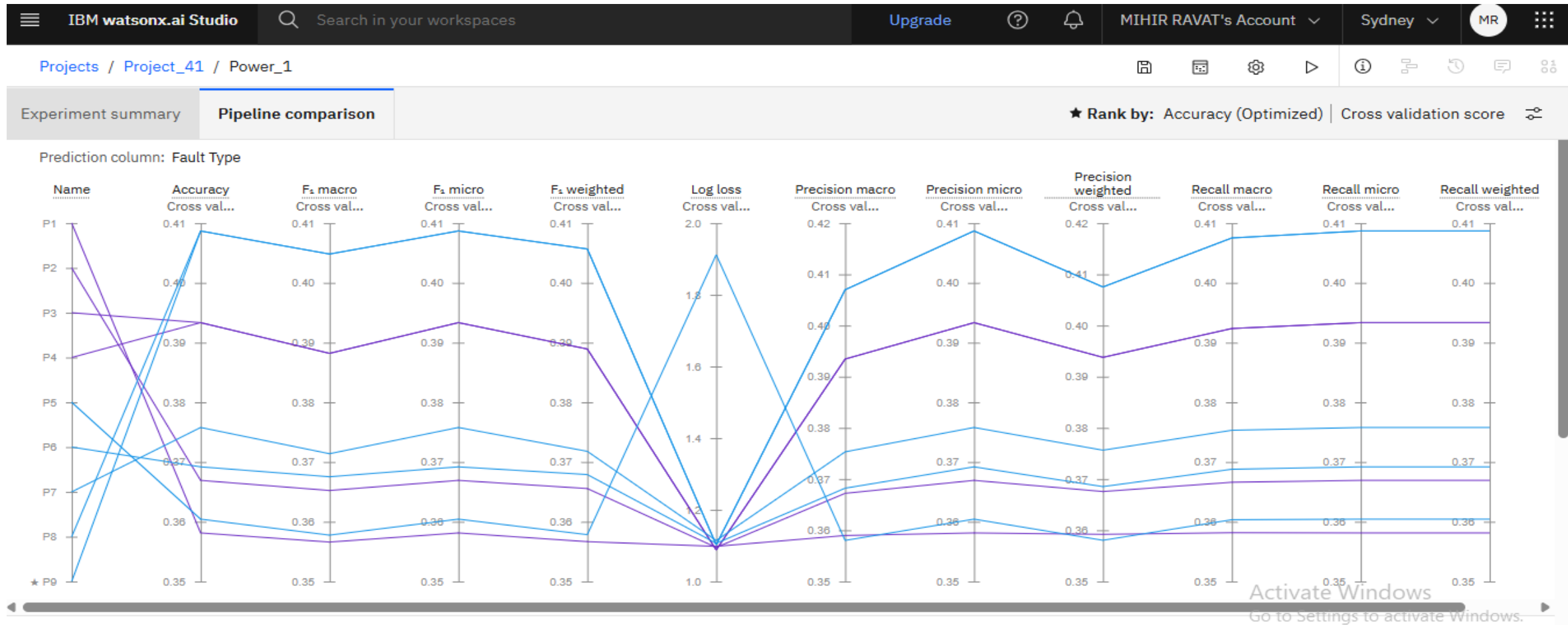
## Pipeline leaderboard

	Rank ↑	Name	Algorithm	Specialization ↑↓	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 9	Batched Tree Ensemble Classifier (Random Forest Classifier)	INCR	0.409	HPO-1 FE HPO-2 BATCH	00:01:33
	2	Pipeline 8	Random Forest Classifier		0.409	HPO-1 FE HPO-2	00:01:30
	3	Pipeline 4	Snap Logistic Regression		0.393	HPO-1 FE HPO-2	00:00:24
	4	Pipeline 3	Snap Logistic Regression		0.393	HPO-1 FE	00:00:19

Activate Windows  
Go to Settings to activate Windows.

# RESULT

This is pipeline comparison matrix chart, it shows the performance of all pipelines along with the parameter i.e Accuracy, Log-loss, etc



# RESULT

Step 20: Select the best pipeline i.e Pipeline9 and click on **save as**

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41 / Power\_1

Experiment summary

Pipeline comparison

★ Rank by: Accuracy (Optimized) | Cross validation score

Time elapsed: 5 minutes

[View log](#)

[Save code](#)

Pipeline leaderboard

# RESULT

## Step 21: Choose Model asset and click on Create

Save as

### Select asset type

**Model**

Create a watsonx.ai Runtime model asset that you can test with new data, deploy to generate predictions, and trace lineage activity.

**Notebook**

Create a notebook if you want to view the code that created this model pipeline or interact with with the model programmatically.

### Define details

**Name**

P9 - Random Forest Classifier: Power\_1

**Description (optional)**

Model description

**Tags**

Add tags to make assets easier to find.

Cancel

Create



# RESULT

The mode saved successfully and click on view in project

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41 / Power\_1

Experiment summary

Pipeline comparison

★ Rank by: A

✓ Saved Model successfully.  
P9 - Random Forest Classifier:  
Power\_1 was successfully saved to  
Project\_41.

[View in project](#)

Pipeline leaderboard

	Rank ↑	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 9	Batched Tree Ensemble Classifier (Random Forest Classifier)	INCR	0.409	HPO-1 FE HPO-2 BATCH	00:01:33
	2	Pipeline 8	Random Forest Classifier		0.409	HPO-1 FE HPO-2	00:01:30
	3	Pipeline 4	Snap Logistic Regression		0.393	HPO-1 FE HPO-2	00:00:24
	4	Pipeline 3	Snap Logistic Regression		0.393	HPO-1 FE	00:00:19

Activate Windows  
Go to Settings to activate Windows.

[https://au-syd.dai.cloud.ibm.com/ml-runtime/models/7c6d25ac-e7c7-4951-a5ed-03b1371258e2?project\\_id=c0cdd85f-e983-4344-81af-5dfcb3daf6fb&context=cpdaas](https://au-syd.dai.cloud.ibm.com/ml-runtime/models/7c6d25ac-e7c7-4951-a5ed-03b1371258e2?project_id=c0cdd85f-e983-4344-81af-5dfcb3daf6fb&context=cpdaas)

# RESULT

Step 22: Click on **promote to space** on arrow

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Projects / Project\_41 / P9 - Random Forest Classifier: Power\_1

Promote to space

Input (1)

Column	Type
Component Health	other
Current (A)	double
Down time (hrs)	double
Duration of Fault (hrs)	double
Fault ID	other
Fault Location (Latitude, Longitude)	other
Maintenance Status	other
Power Load (MW)	double

# RESULT

## Step 23: Click on Create a new deployment space

### Promote to space

Promote the asset to a deployment space to deploy the asset or to support a deployment.

Target deployment space

Select or create a space

Create a new deployment space

☐ Go to the model in the space after promoting it

Description (Optional)

Description of assets

#### Selected assets (1)

Name	Format	Version	Status
P9 - Random Forest Classifier: Pow...	Model	C... ▾	Queued

Promoting an asset promotes dependent assets as well. For example, promoting a model also promotes the associated software specification and package extensions. You will see all promoted assets in the target space.

Cancel

Activate Windows  
Promote  
Go to Settings to activate Windows

# RESULT

Step 24: Give the deployment space name and select **watsonx.ai Runtime service**, click on **Create**

Define details

Name

Deployment\_1

Description (Optional) 0/100

watsonx.ai Runtime (optional)

watsonx.ai Runtime-wm

Create a deployment space

Use a space to collect assets in one place to create, run, and manage deployments

+ New

Local file

Tags (optional)

Find or create tags

Add tags to make assets easier to find

Storage

Cloud Object Storage-wa

Space will include integration with [Cloud Object Storage](#) for storing space assets.

watsonx.ai Runtime (optional)

watsonx.ai Runtime-wm

Advanced Settings

Cancel

Create

# RESULT

## Step 25: Click on Promote

### Promote to space

Promote the asset to a deployment space to deploy the asset or to support a deployment.

Target deployment space

Deployment\_1

Why don't I see all of my spaces? ⓘ

☐ Go to the model in the space after promoting it

Description (Optional)

Description of assets

Find or create tags



Promoting a version of an asset to a space creates a new asset in the space, with a new asset ID.

Selected assets (1)

Name	Format	Version	Status
<a href="#">P9 - Random Forest Classifier: Pow...</a>	Model	Current	Queued

Promoting an asset promotes dependent assets as well. For example, promoting a model also promotes the associated software specification and package extensions. You will see all promoted assets in the target space.

Cancel

Promote

# RESULT

Step 26: It's Promoted and now click on **deployment space**

The screenshot displays the IBM watsonx.ai Studio interface. The top navigation bar includes the logo, a search bar, and user account information. The main content area shows a 'Promote to space' dialog box with a success message and a table of selected assets. A green notification pop-up in the top right corner confirms the successful promotion and provides instructions to go to the deployment space.

**Promote to space**  
Promote the asset to a deployment space to deploy the asset or to support a deployment.

✓ Promotion completed.

**Selected assets (1)**

Name	Format	Version	Status
P9 - Random Forest Classifier: Power_1	Model	Current	Promoted ✓

Promoting an asset promotes dependent assets as well. For example, promoting a model also promotes the associated software specification and package extensions. You will see all promoted assets in the target space.

**Success**  
Successfully promoted P9 - Random Forest Classifier: Power\_1 to the deployment space. Go to the **deployment space** to prepare the assets for deployment.  
Timestamp 12:16:18 PM

# RESULT

Step 27: Click on the Asset name

IBM watsonx.ai Studio

Search in your workspaces

Upgrade ?

MIHIR RAVAT's Account

Sydney

MR

Deployment spaces /

## Deployment\_1

Overview **Assets** Deployments Jobs Manage

Find assets

Import assets


New asset +

1 asset

All assets 1

Asset types

Models 1

Name	Last modified
 <a href="#">P9 - Random Forest Classifier: Power_1</a> Machine learning model from AutoAI	20 seconds ago Service

# RESULT

## Step 28: Click on new deployment

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR


Deployment spaces / Deployment\_1 / P9 - Random Forest Classifier: Power\_1

Deployments

Model details

Search

New deployment

Name	Type	Status	Tags	Last modified
<div><div></div><div><div>This asset doesn't have any deployments yet</div><div>Use the New Deployment button to create a deployment for this asset.</div></div></div>				

About this asset

Name

P9 - Random Forest Classifier: Power\_1

Description

No description provided.

Asset Details

Type: wml-hybrid\_0.1

Model ID: a3644ca9-b040-43...

Software specification: hybrid\_0.1

Hybrid pipeline software specifications: autoai-kb\_rt24.1-py3.11

Tags

Add tags to make assets easier to find.

Source asset details

Last modified

3 minutes ago by Service





# RESULT

Step 29: Select the **deployment type** and **deployment name** and click on **Create**

Create a deployment

Define details

Associated asset

P9 - Random Forest Classifier: Power\_1

Deployment type

Online

Run the model on data in real-time, as data is received by a web service.

Batch

Run the model against data as a batch process.

Name

Deployment\_2

Serving name

Deployment serving name

Enter a short name to be used as the serving name for the deployment. The name must be unique to be valid.

Cancel

Create

# RESULT

The model is deployed

IBM watsonx.ai Studio

Search in your workspaces

Upgrade ?

MIHIR RAVAT's Account




Deployment spaces / Deployment\_1 / P9 - Random Forest Classifier: Power\_1

Deployments

Model details

Search

New deployment

Name	Type	Status	Tags	Last modified	
 Deployment_2	Online	 Deployed		20 seconds ago MIHIR RAVAT (You)	

About this

Name

P9 - Random F

Description

No description

Asset Details

Tuner: watsonx.ai

# RESULT

Step 30: Now click on Test to predict with new values. Enter the data required from the fault\_data.csv and then click on predict

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

MIHIR RAVAT's Account

Sydney

MR

Deployment spaces / Deployment\_1 / P9 - Random Forest Classifier: Power\_1

Deployment\_2 ✓ Deployed Online

API reference 

Test

Enter input data

Text

JSON

Enter data manually or use a CSV file to populate the spreadsheet. Max file size is 50 MB.

[Download CSV template](#) [Browse local files](#) [Search in space](#) [Clear all](#)

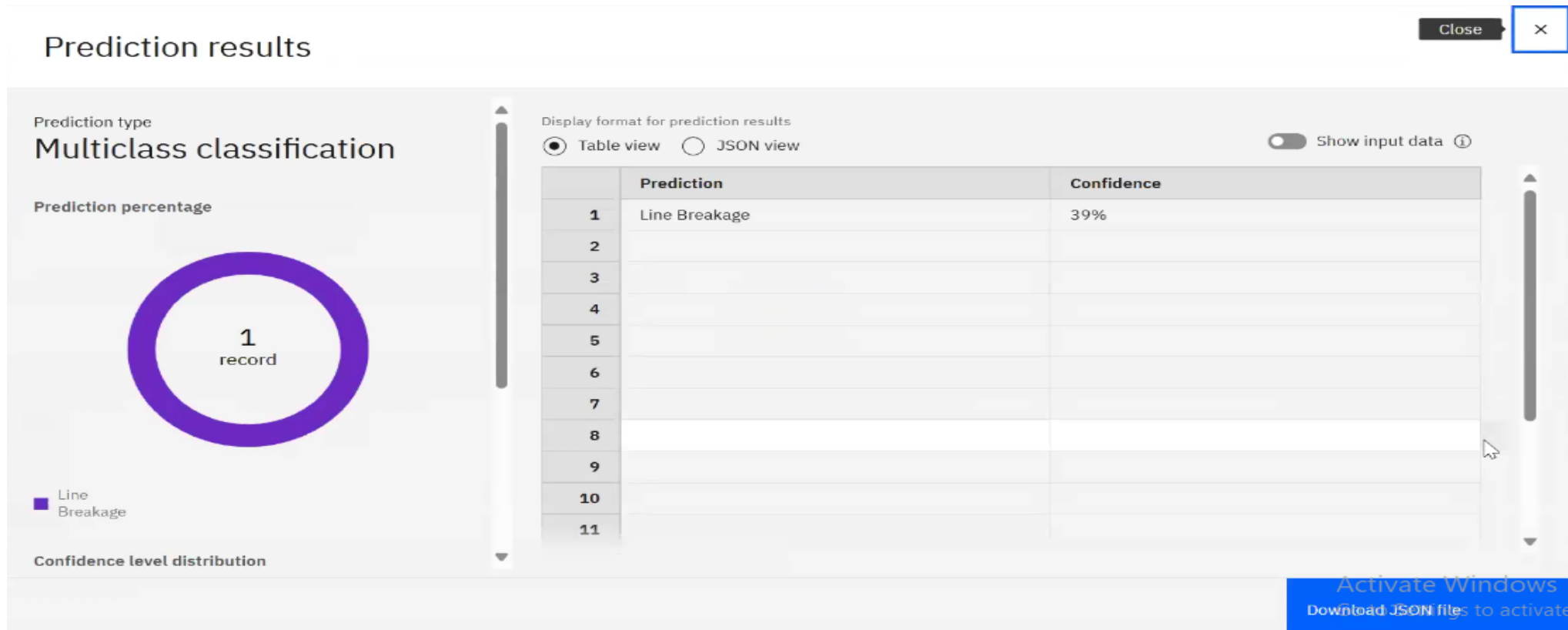
	Fault ID (other)	Fault Location (Latitude, Longitude) (other)	Voltage (V) (double)	Current (A) (double)	Power Load (MW) (double)	Temperature (°C) (double)	Wind Speed (km/h) (double)	Weather Co
1	Start typing or drag and drop a CSV file...							
2								
3								
4								
5								
6								

0 rows, 12 columns

Predict

# RESULT

The result is being displayed .It shows that the prediction type is **Multiclass classification**,in the table views it shows the confidence for the data entered,here the prediction is **Line Breakage** with a **confidence** of **39%**



# CONCLUSION

- The implementation of a machine learning model for power system fault detection and classification demonstrates the potential of data-driven approaches in improving grid reliability and operational efficiency. By analyzing voltage, current, and phasor measurement data, the model effectively distinguishes between normal and faulty conditions, including line-to-ground, line-to-line, and three-phase faults. Deploying the model on platforms like IBM Watson Studio further enables real-time fault diagnosis and faster system recovery. This work highlights the value of integrating AI with smart grid technologies to enable proactive and intelligent grid management.

# FUTURE SCOPE

- **Model Enhancement:** Explore deep learning techniques (e.g., LSTM or CNN) for improved accuracy in complex fault scenarios.
- **Real-Time Data Integration:** Integrate streaming data from smart sensors or PMUs (Phasor Measurement Units) for live fault monitoring.
- **Scalability:** Extend the system to cover larger grid segments and more diverse fault types.
- **Edge Deployment:** Investigate deployment on edge devices for faster, localized fault detection in remote substations.
- **Cybersecurity Considerations:** Explore secure AI models to prevent tampering and ensure trustworthy grid operation.

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# REFERENCES

- IBM Cloud Documentation – <https://cloud.ibm.com/docs>
- Kaggle Dataset: Power System Fault Classification  
<https://www.kaggle.com/datasets/ziya07/power-system-faults-dataset>

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Issued on: Jul 16, 2025  
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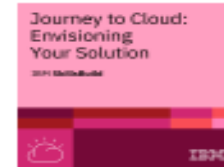
Verify: <https://www.credly.com/badges/96aecc9d-22d7-4c4a-8921-c2ba6b2fb63f>





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IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Mihir Ravat

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 24 Jul 2025 (GMT)

**Learning hours:** 20 mins



**THANK YOU**