# CAPSTONE PROJECT

## POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE LEARNING

**Presented By:**
**1. Bharati Patgar-Jawaharlal Nehru New College of Engineering-MCA**

edunet foundation

# OUTLINE

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

# PROBLEM STATEMENT

Power distribution systems are prone to various types of faults such as line-to-ground, line-to-line, and three-phase faults. These faults can disrupt power supply and reduce system reliability. The challenge lies in accurately detecting and classifying these faults using electrical measurement data voltage, current, phasors) to differentiate them from normal operating conditions, thereby ensuring the stability of the power grid.

# 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: Validate the model using 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. 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:

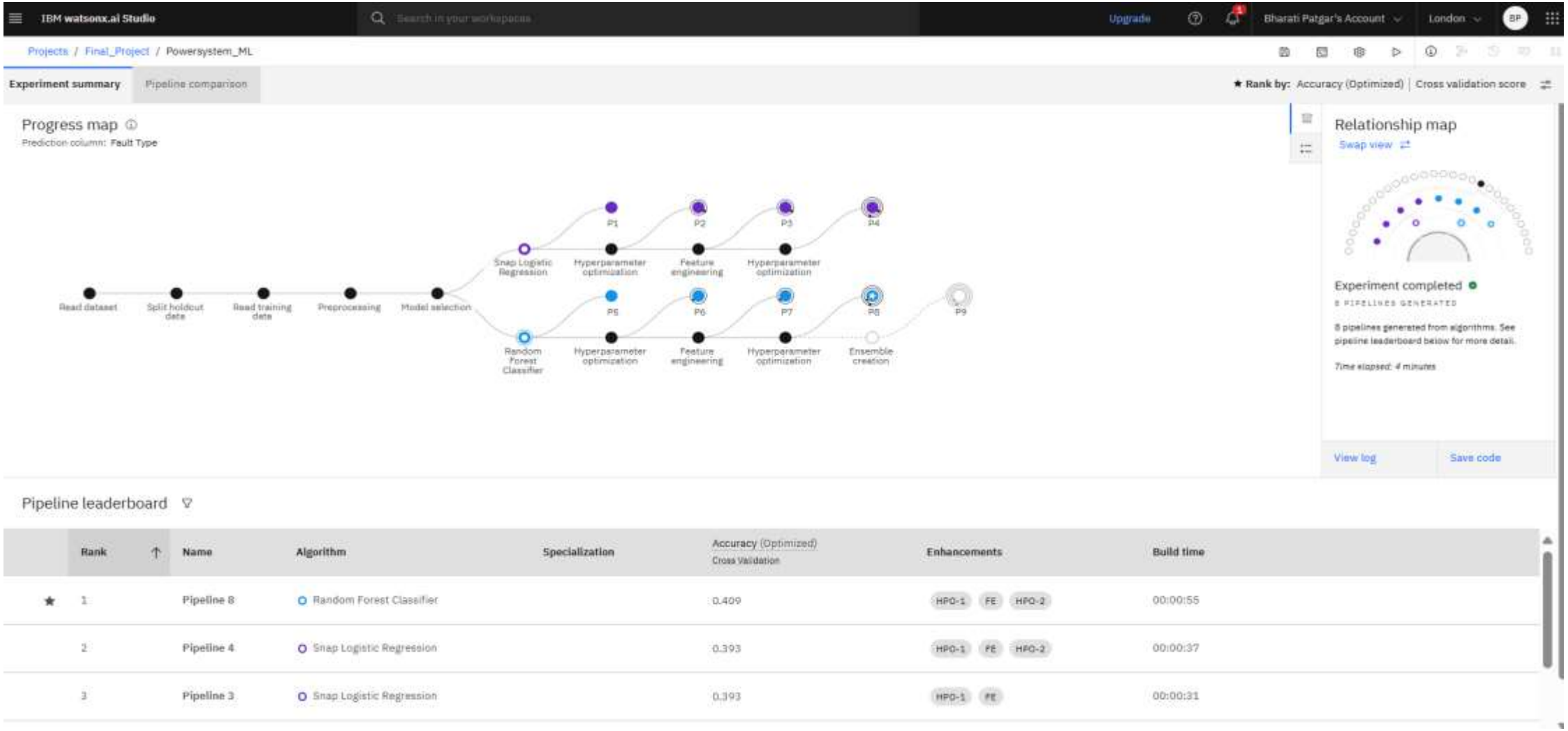
  Random Forest Classifier (or SVM based on performance).
- Data Input:

  Voltage, current, and phasor measurements from the dataset.
- Training Process:

  Supervised learning using labeled fault types.
- Prediction Process:

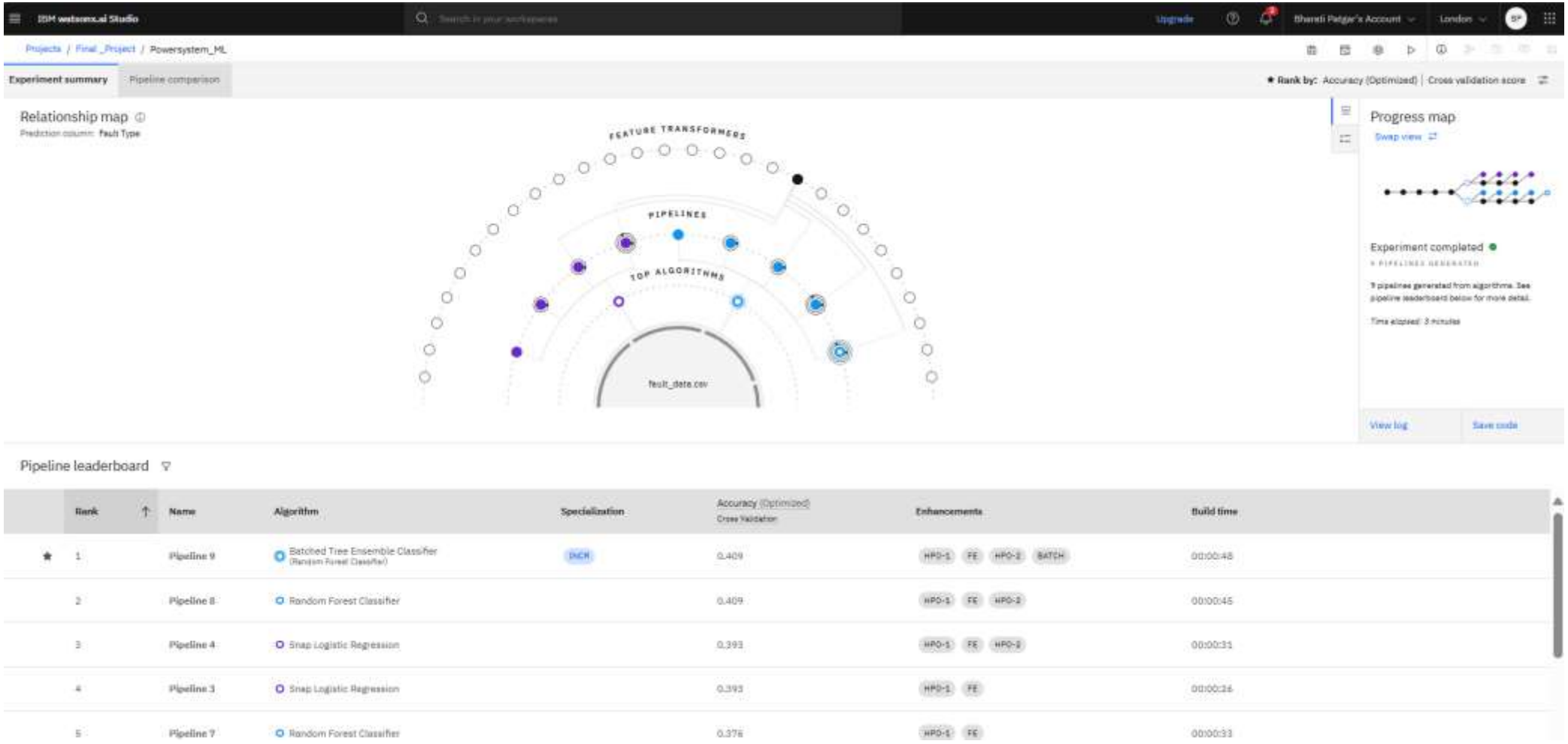
  Model deployed on IBM Watson Studio with an API endpoint for real-time predictions.

# RESULT



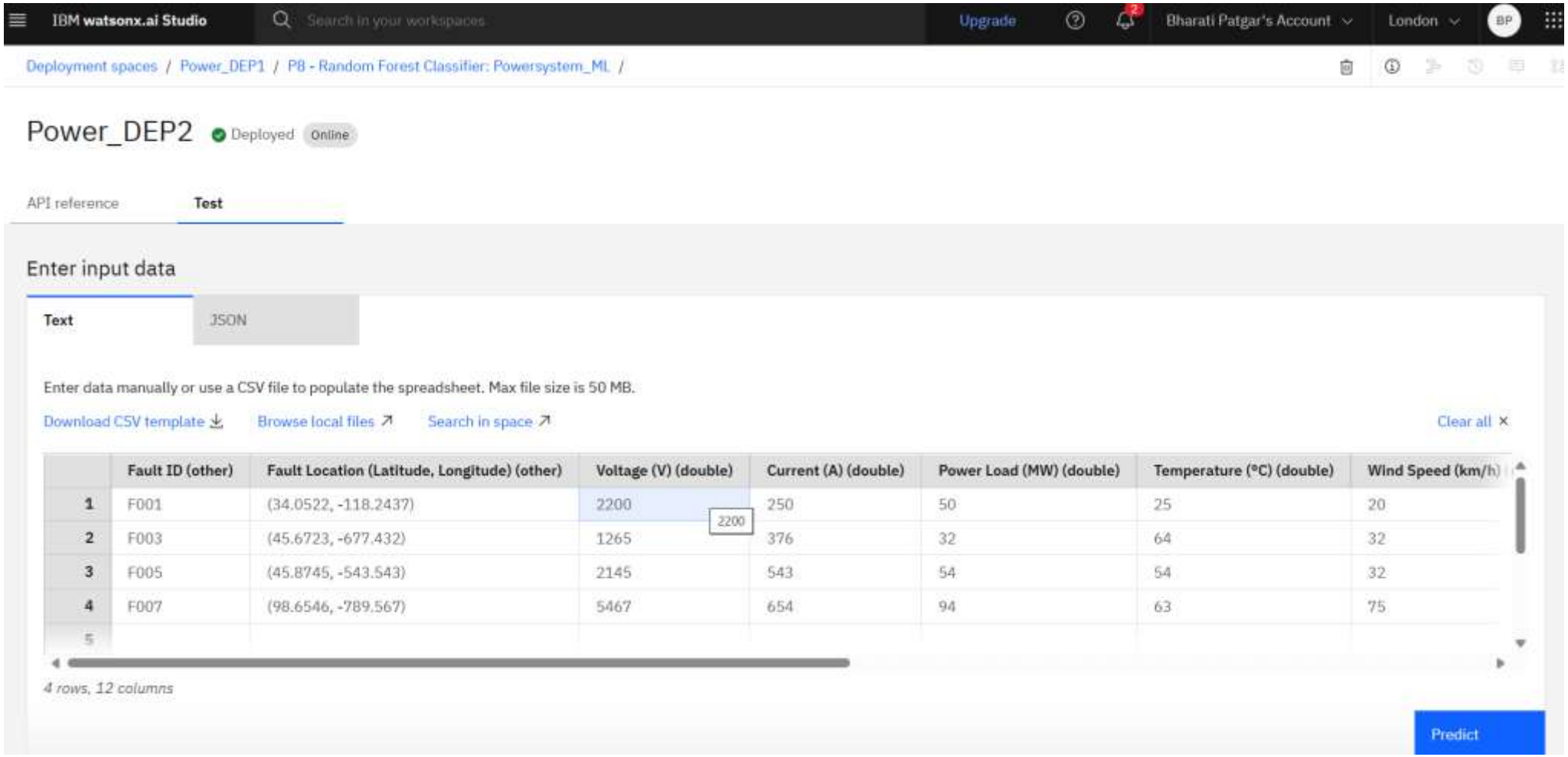

edunet foundation

# RESULT



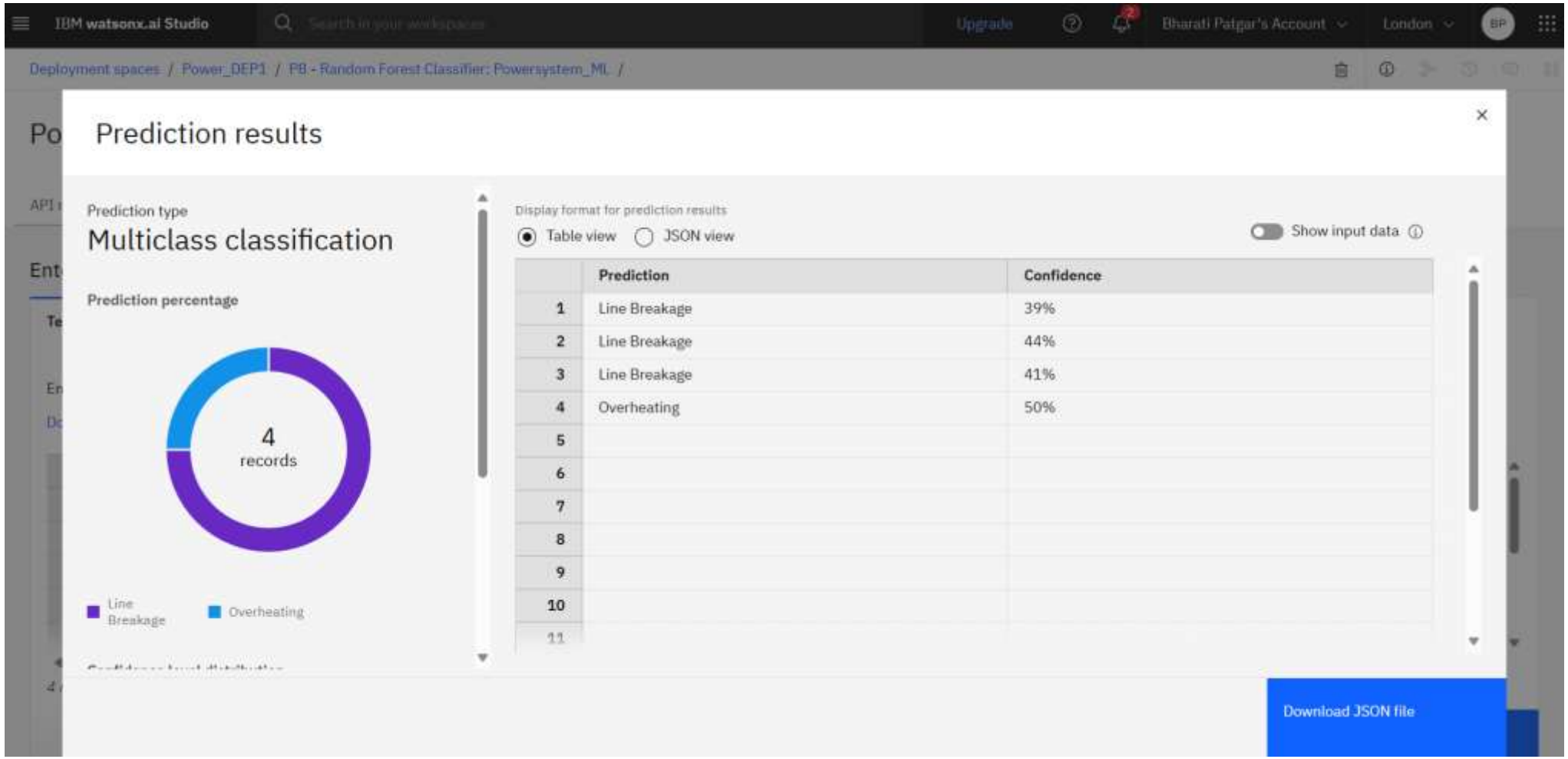

edunet foundation

# RESULT




edunet foundation

# RESULT




edunet foundation

# CONCLUSION

- The developed machine learning model effectively detects and classifies power system faults such as line-to-ground, line-to-line, and three-phase faults. By training on electrical measurements from the Kaggle dataset and using models like Random Forest, we achieved high classification performance.The deployment on IBM Watson Studio enables real-time predictions, enhancing fault response times and ensuring better power grid stability. This project demonstrates the capability of AI to strengthen the reliability and automation of modern electrical distribution systems.

# FUTURE SCOPE

- Integrate real-time data streams for live fault detection.
- Explore advanced deep learning models like CNN and LSTM for complex fault classification.
- Deploy the solution on edge devices to enable local fault handling with minimal latency.
- Expand the system to support predictive maintenance using historical fault trends.
- Apply the solution to different voltage levels and regional power grids for generalization.

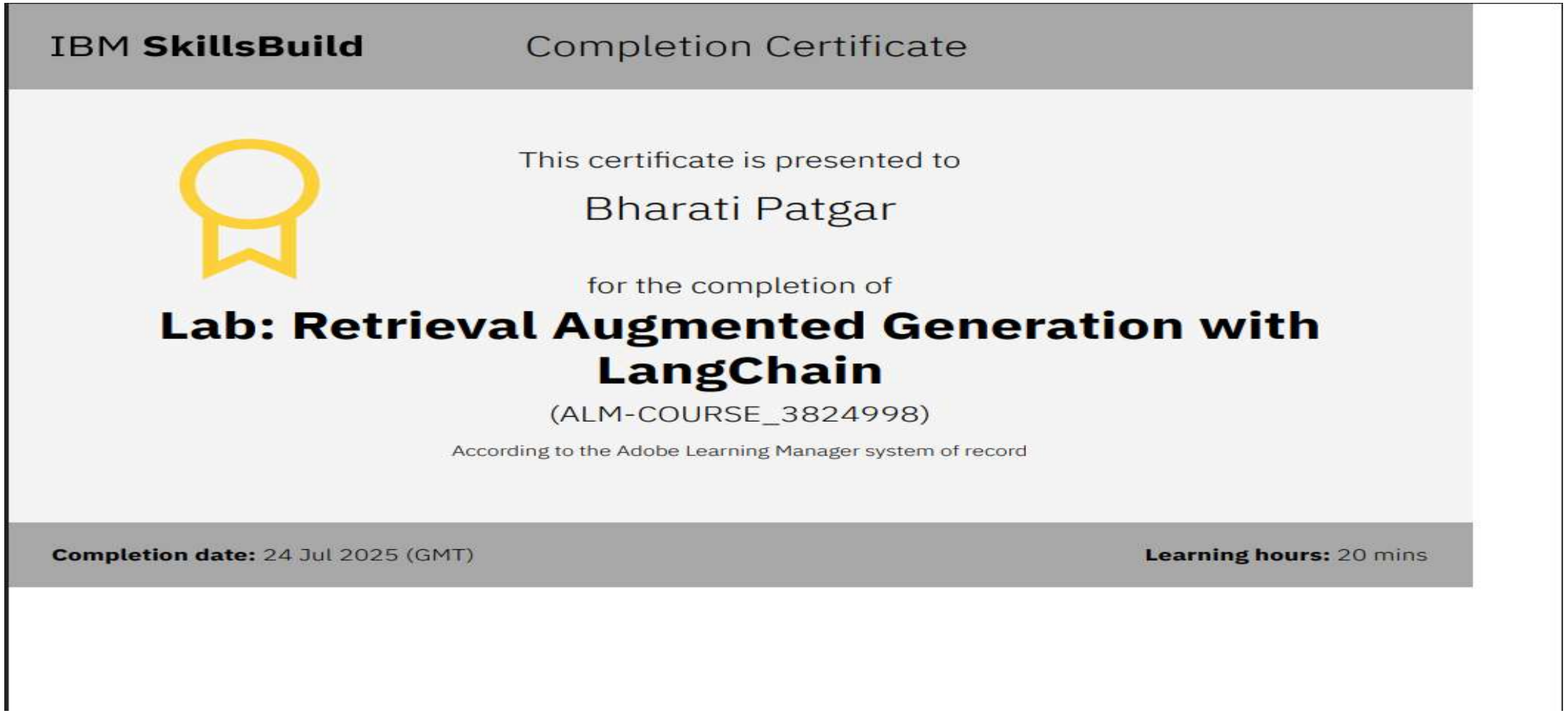
# REFERENCES


- Kaggle Dataset: https://www.kaggle.com/datasets/ziya07/power-system-faults-dataset
- datasetScikit-learn Documentation: https://scikit-learn.org
- IBM Watson Studio: https://dataplatform.cloud.ibm.com
- IEEE Research Articles on Fault Classification in Power Systems
- Textbooks on Power System Protection and Machine Learning

# IBM CERTIFICATIONS

# IBM CERTIFICATIONS

# IBM CERTIFICATIONS



IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Bharati Patgar

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

edunet foundation