CAPSTONE PROJECT

PROJECT TITLE

Presented By:
Pavithra M
Meenakshi Sundararajan Engineering College
Computer science

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

In modern power distribution systems, it is crucial to quickly detect and classify faults such as **line-to-ground**, **line-to-line**, and **three-phase faults** using real-time electrical measurements like voltage and current phasors. Traditional methods are time-consuming and manual. A machine learning approach can offer **rapid and automated fault identification**, improving **grid stability and reliability**.

PROPOSED SOLUTION

The proposed solution leverages **machine learning algorithms** to detect and classify power system faults using features extracted from voltage and current measurements. The steps include:

- Data preprocessing and labeling (using Kaggle dataset).
- Training models (e.g., Random Forest, SVM, or LSTM) to classify faults.
- Using IBM Cloud Lite services for training, model deployment, and dashboard visualization.
- Providing real-time inference capabilities for live electrical fault detection.

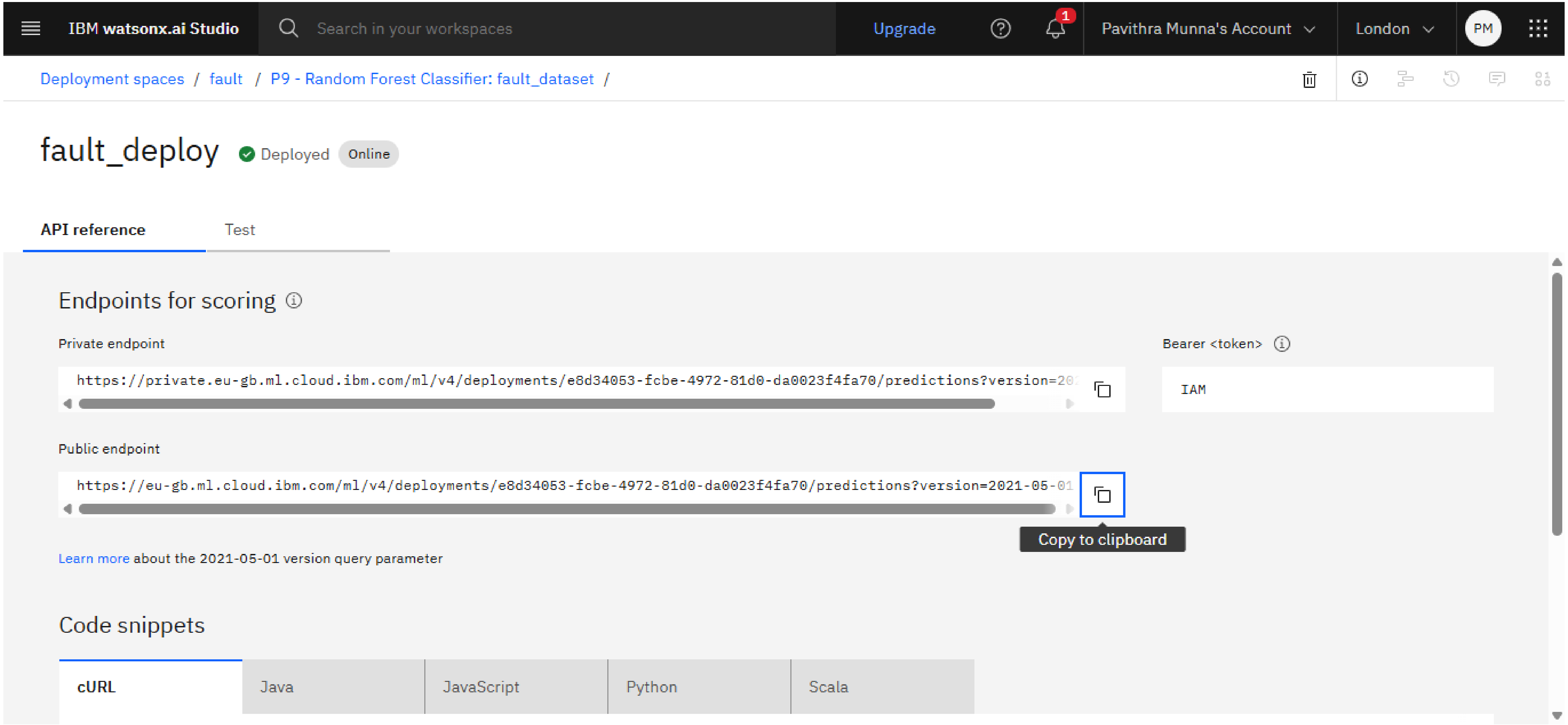
SYSTEM APPROACH

- **Dataset:** Kaggle – Power System Faults Dataset
- **Preprocessing:** Normalization, feature extraction (voltage, current magnitudes, angles).
- **Tools & Technologies:**
  - Python (Pandas, NumPy, scikit-learn, TensorFlow)
  - IBM Watson Studio (model training)
  - IBM Cloud Lite (deployment using Cloud Functions / App)
  - IBM Cloud Object Storage (dataset)
- **Model Training:** Supervised learning classification
- **Deployment:** IBM Cloud Functions or IBM Watson Machine Learning for API hosting

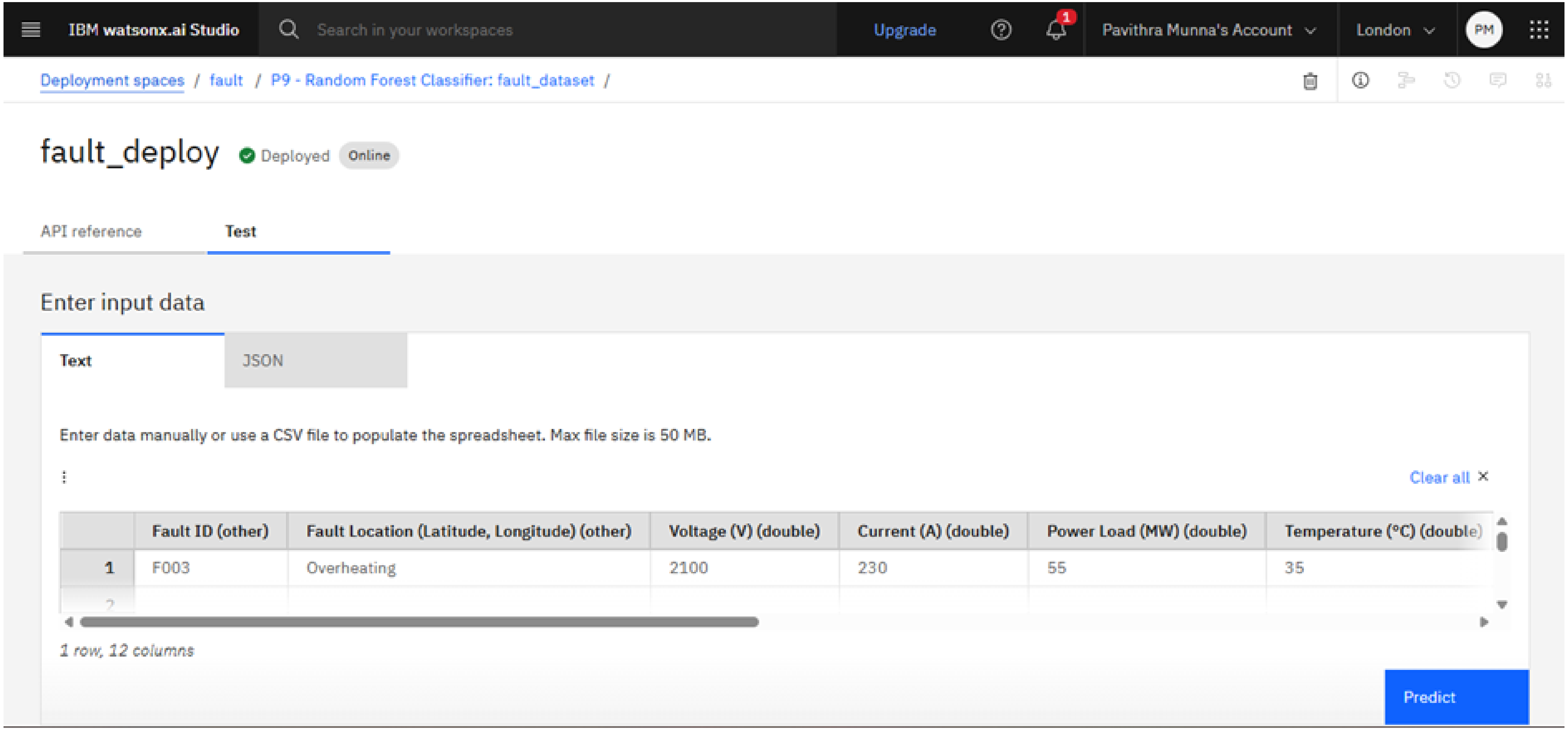
ALGORITHM & DEPLOYMENT

- **Algorithm**: Random Forest Classifier (for robust multi-class classification)
- **Input Features**: Voltage magnitude, phase angle, current magnitude, current angle
- **Target Output**: Fault type (No Fault, LG, LL, LLG, LLL, etc.)
- **Training**:
- Dataset split into train/test sets
- Cross-validation for model tuning
- **Deployment**:
- Trained model exported using joblib or pickle
- Deployed using IBM Cloud Functions API
- Real-time fault classification based on live sensor inputs (mock/test)

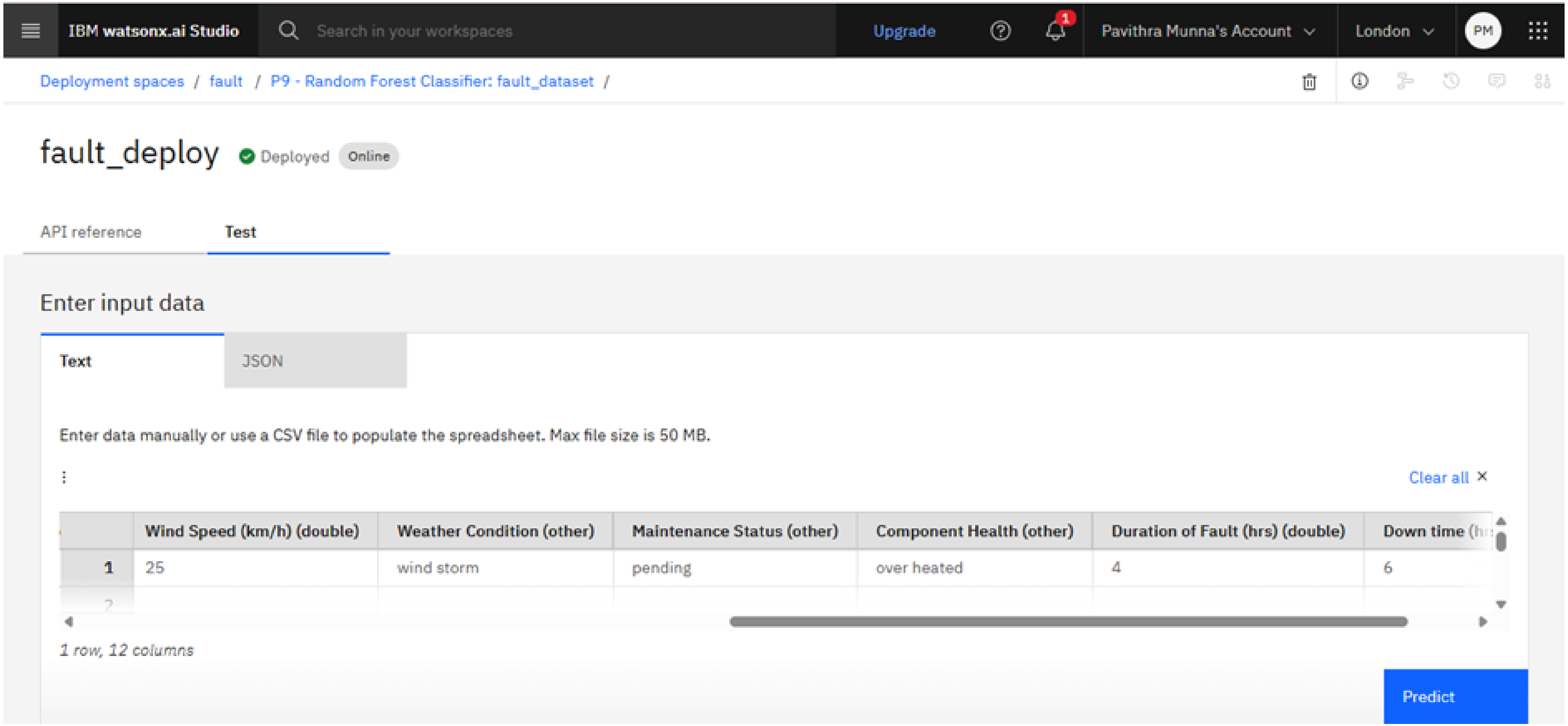
RESULT

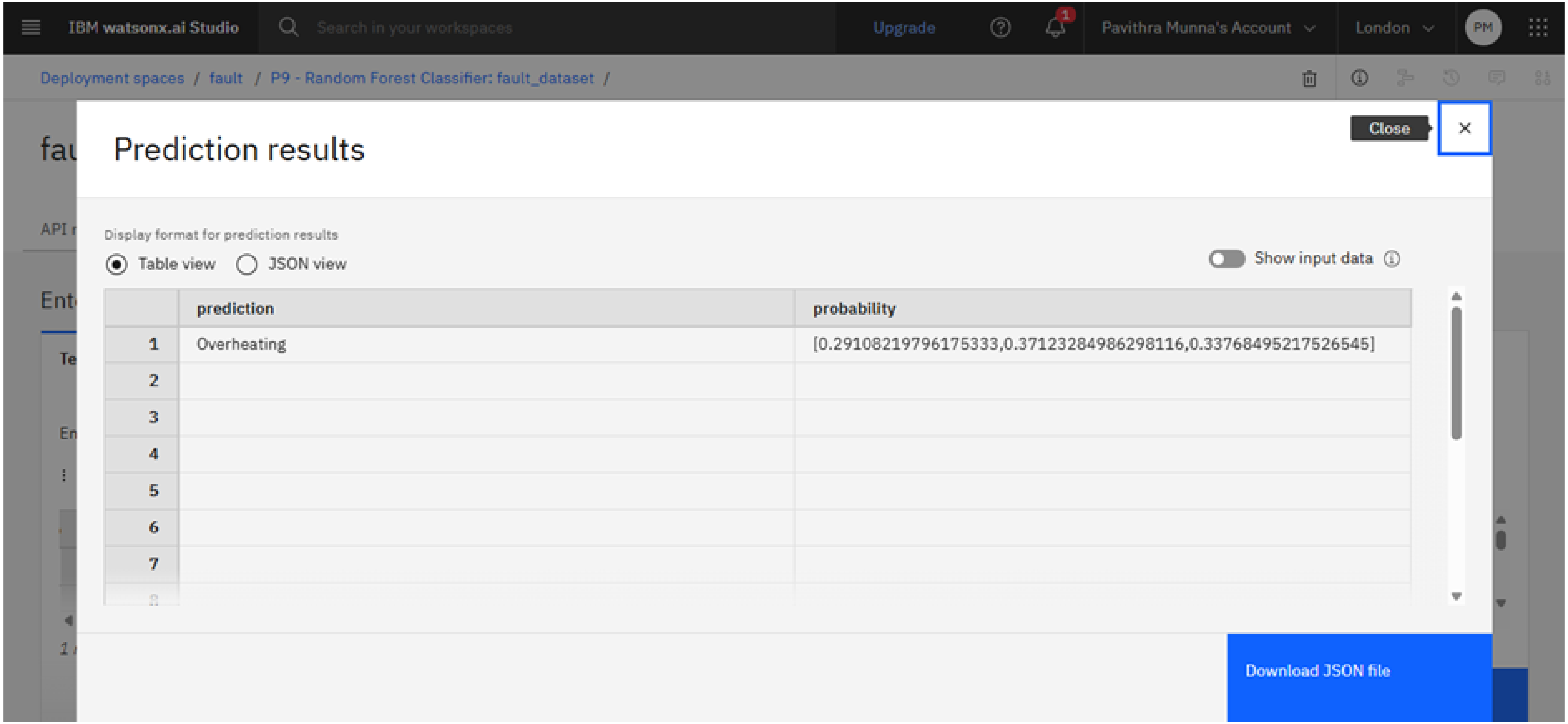


IBM watsonx.ai Studio
Search in your workspaces
Upgrade
Pavithra Munna's Account
London
PM
Deployment spaces / fault / P9 - Random Forest Classifier: fault_dataset /
fault_deploy
Deployed
Online
API reference
Test
Endpoints for scoring
Private endpoint
https://private.eu-gb.ml.cloud.ibm.com/ml/v4/deployments/e8d34053-fcbe-4972-81d0-da0023f4fa70/predictions?version=20
Bearer <token>
IAM
Public endpoint
https://eu-gb.ml.cloud.ibm.com/ml/v4/deployments/e8d34053-fcbe-4972-81d0-da0023f4fa70/predictions?version=2021-05-01
Copy to clipboard
Learn more about the 2021-05-01 version query parameter
Code snippets
cURL
Java
JavaScript
Python
Scala



edunet foundation


IBM watsonx.ai Studio
Search in your workspaces
Upgrade
Pavithra Munna's Account
London
PM
Deployment spaces / fault / P9 - Random Forest Classifier: fault_dataset /
fault_deploy
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.
Clear all
Wind Speed (km/h) (double)
Weather Condition (other)
Maintenance Status (other)
Component Health (other)
Duration of Fault (hrs) (double)
Down time
1
25
wind storm
pending
over heated
4
6
1 row, 12 columns
Predict



IBM watsonx.ai Studio
Search in your workspaces
Upgrade
Pavithra Munna's Account
London
PM
Deployment spaces / fault / P9 - Random Forest Classifier: fault_dataset /
Close
Prediction results
Display format for prediction results
Table view
JSON view
Show input data
prediction
probability
1
Overheating
[0.29108219796175333,0.37123284986298116,0.33768495217526545]
2
3
4
5
6
7
Download JSON file

CONCLUSION

- This project successfully demonstrates the ability of ML models to classify power system faults with high accuracy using voltage and current features. The deployment on IBM Cloud shows how scalable and real-time fault detection can be achieved, paving the way for smarter grids.

FUTURE SCOPE

- Integrate real-time IoT sensors for live data feeding
- Use deep learning (LSTM, CNN) for better temporal pattern recognition
- Expand to fault localization and severity estimation
- Integrate with SCADA systems in power grid

REFERENCES

- Kaggle Dataset: https://www.kaggle.com/datasets/ziya07/power-systemfaults-datase
- IBM Cloud Docs
- scikit-learn documentation
- Research papers on Power Fault Detection using ML
- Project git hub Repository Link-
  https://github.com/pavithra1639/MACHINE-LEARNING-PROJECT-IN-
  IBM-CLOUD-WITH-FAULT-DETECTION-DATASET

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Getting Started with Artificial Intelligence

Pavithra M

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence

Issued on: Jul 16, 2025
Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/2aaa893c-4ec7-471b-98d4-fab904852c22

IBM

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Pavithra M

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution

Issued on: Jul 18, 2025
Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/7babf801-ef6c-468c-8203-f94d09903b6e

edunet foundation

IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Pavithra M

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