CAPSTONE PROJECT

POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE LEARNING

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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

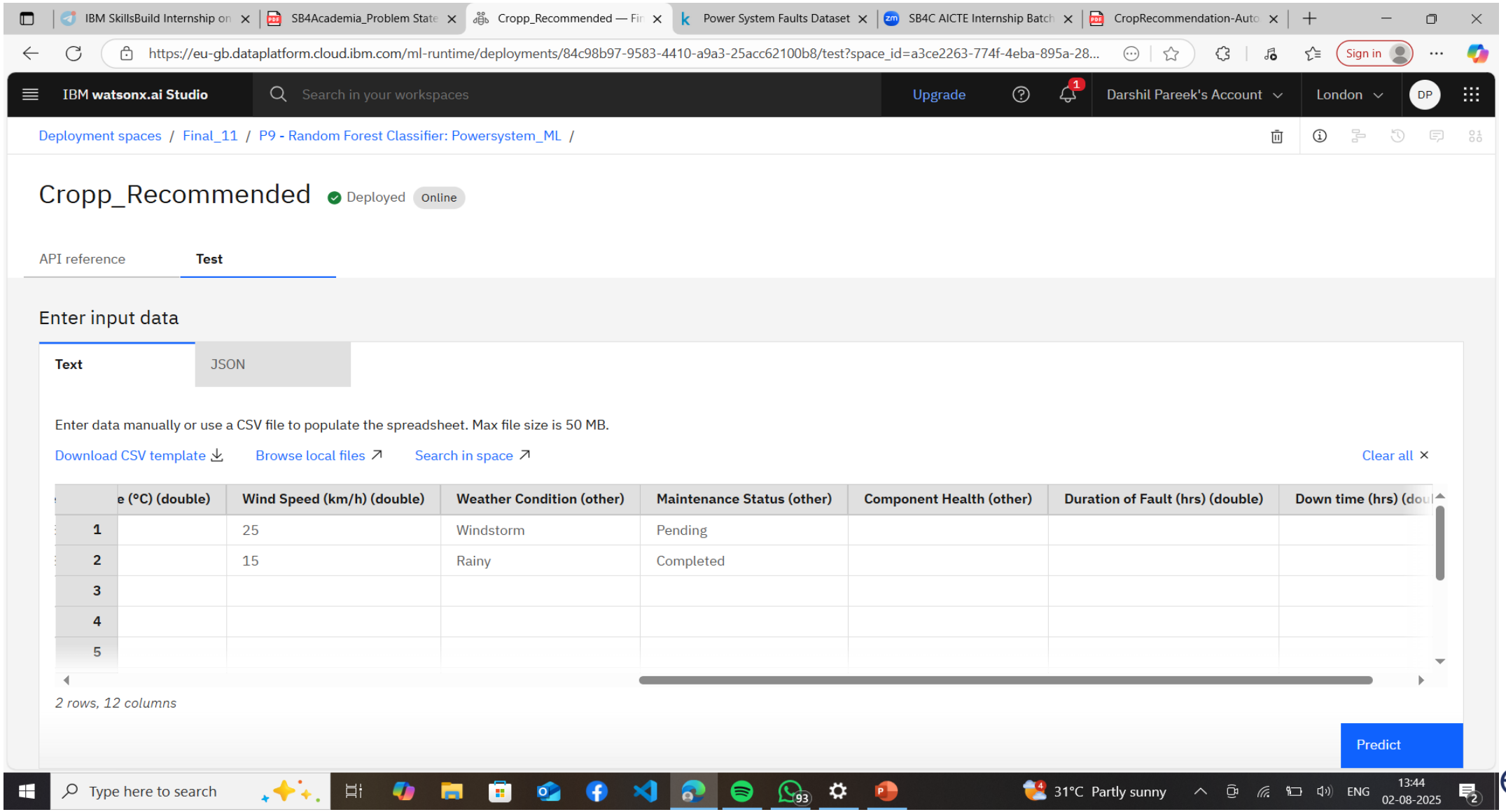
- **Training Process:**

  Supervised learning using labeled fault types

- **Prediction Process:**

  Model deployed on IBM Watson Studio with API endpoint for real-time predict

RESULT



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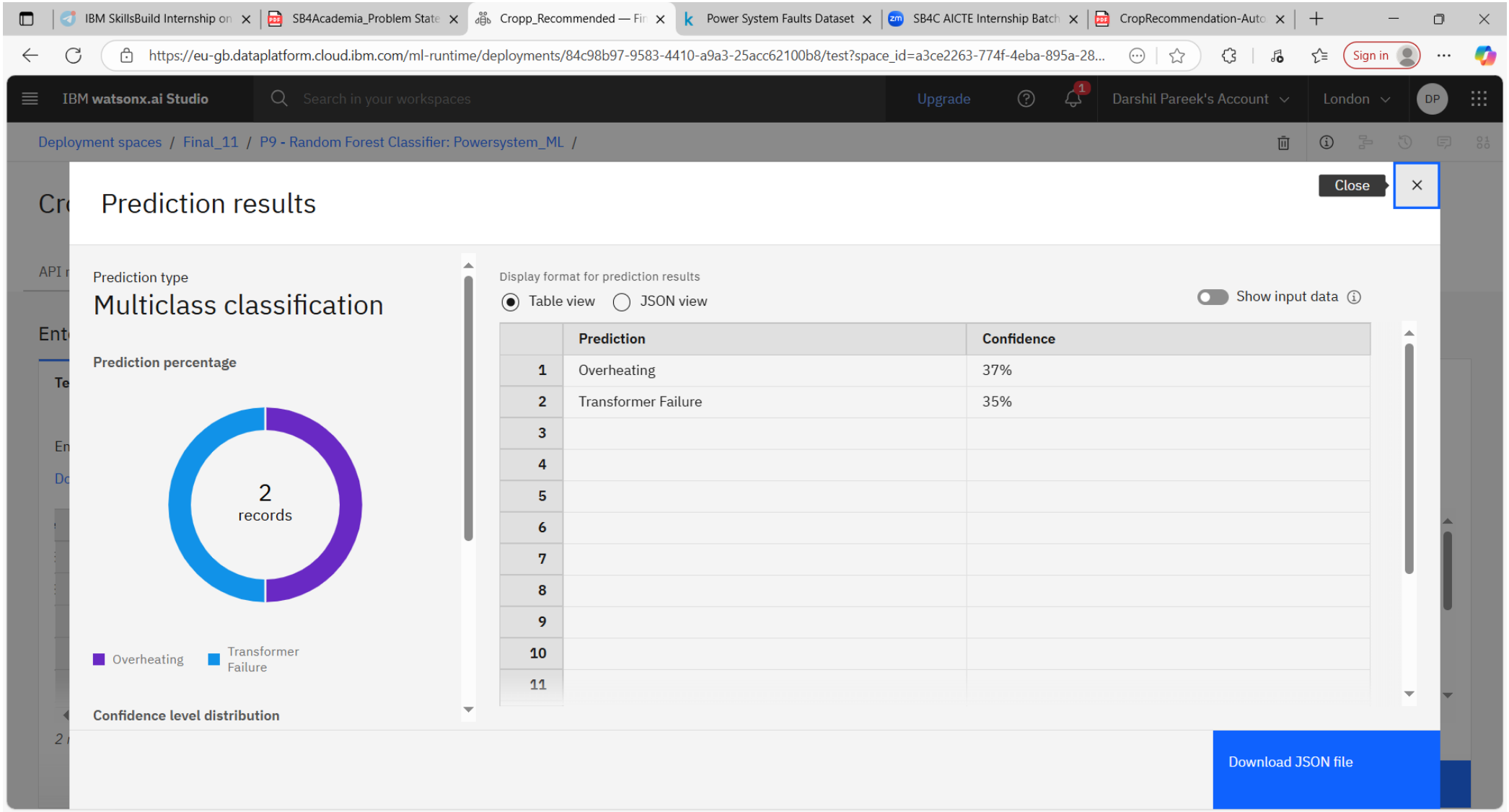
RESULT



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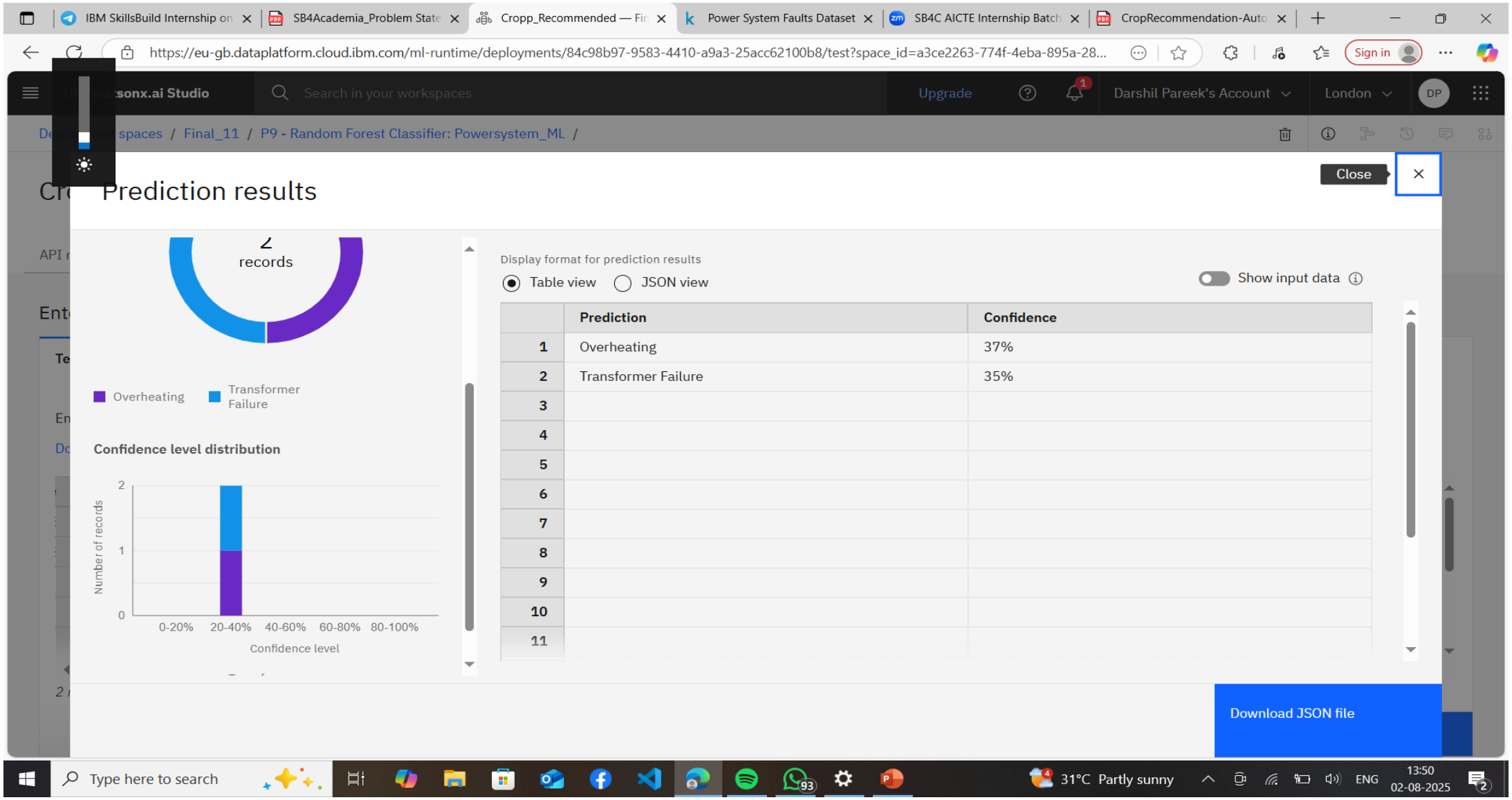
RESULT



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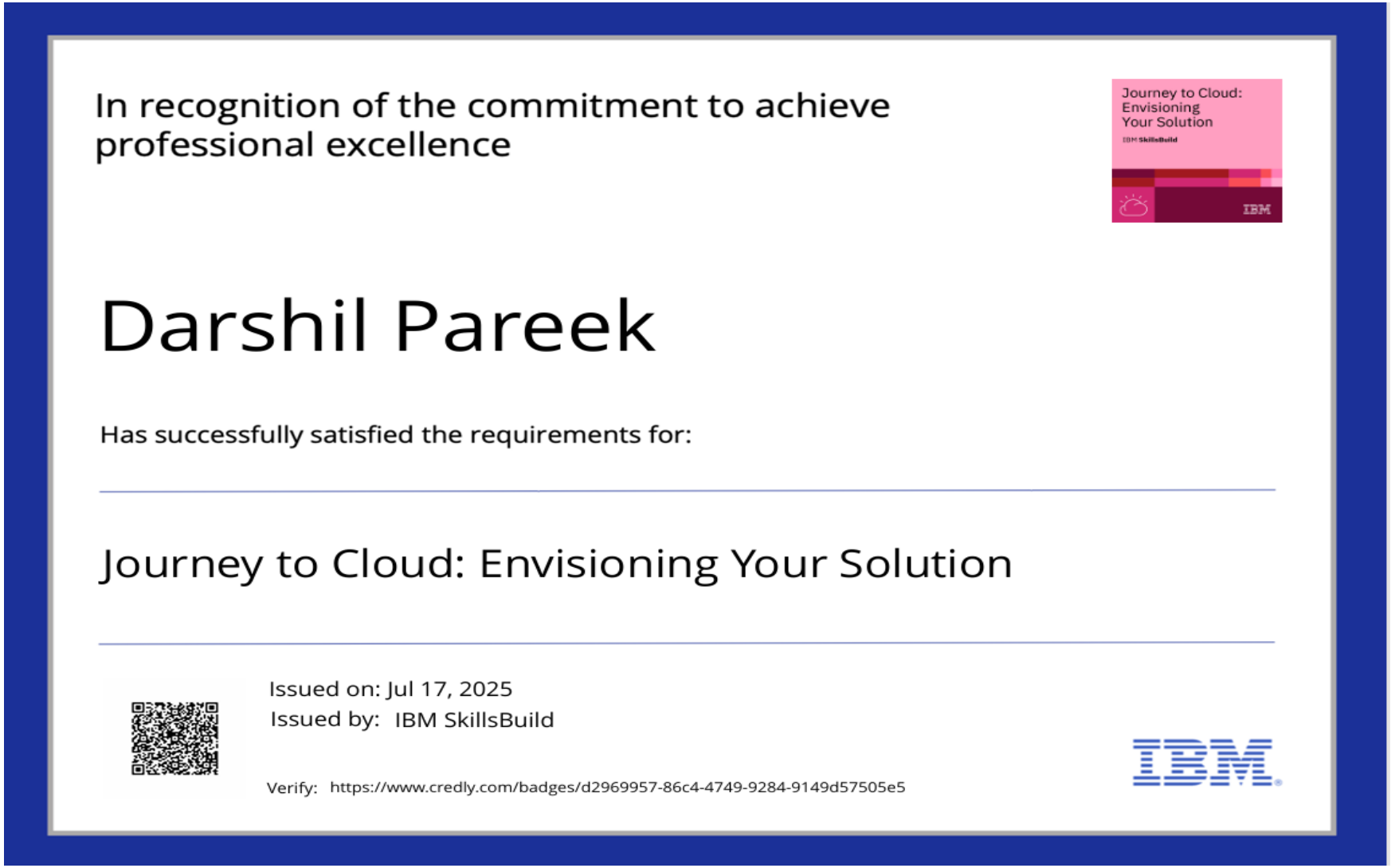
REFERENCES

- Power system fault detection and classification are critical tasks to ensure reliable and stable operation of electrical grids. Traditional methods based on thresholding or impedance analysis often fall short under complex fault scenarios. With the advancement of artificial intelligence, machine learning (ML) techniques like support vector machines (SVM), decision trees, random forests, and deep learning models such as CNNs and LSTMs have shown promising results in identifying and classifying various types of faults, including line-to-ground, line-to-line, and high-impedance faults.

IBM CERTIFICATIONS



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