CAPSTONE PROJECT

POWER SYSTEM FAULT DETECTION AND CLASSIFICATION

Presented By:

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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**

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ROBLEM STATEMENT

ign a machine learning model to detect and classify different types of faults in a
er distribution system. Using electrical measurement data (e.g., voltage and
ent phasors), the model should be able to distinguish between normal operatin
ditions and various fault conditions (such as line-to-ground, line-to-line, or three
se faults). The objective is to enable rapid and accurate fault identification,
ch is crucial for maintaining power grid stability and reliability. .

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ROPOSED SOLUTION

velop a machine learning model that classifies power system faults using the datasets provided. The model will process electrical measur ntify the type of fault rapidly and accurately ,this classification will help automate fault detection and assist in quicker recovery actions, e tem reliability.

ta Collection:

- Use the Kaggle datasets on Power system faults.
- Features include fault types (e.g., LG, LL, 3Φ), time-series electrical measurements, and system parameters relevant for classification.

ta Preprocessing:

- Clean and normalize the data.
- The system generated multiple pipelines with different preprocessing techniques and algorithms, ensuring optimal feature treatment.

ployment:

- The best-performing model was deployed as an API service using IBM Watson, enabling real-time fault type prediction.
- Users can now send new input data (voltage, current values, etc.) to the API and receive predicted fault types instantly.

luation:

- The model was validated using the test set and evaluated on accuracy, precision, recall, and F1-score to assess classification performanc

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YSTEM APPROACH

"System Approach" section outlines the overall strategy and methodology for developing and lementing the power system fault detection and classification. Here's a suggested structure fo section:

ystem requirements:

IBM CLOUD (mandatory)

IBM Watson studio for model development and deployment

IBM cloud object storage for datasets handling .

LGORITHM & DEPLOYMENT

orithm Selection:

Random forest Classifier or SVM based on Performance..

ta Input:

Voltage , Current and Phasor measurements from the datasets..

ining Process:

Supervised learning using labeled fault types..

diction Process:

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

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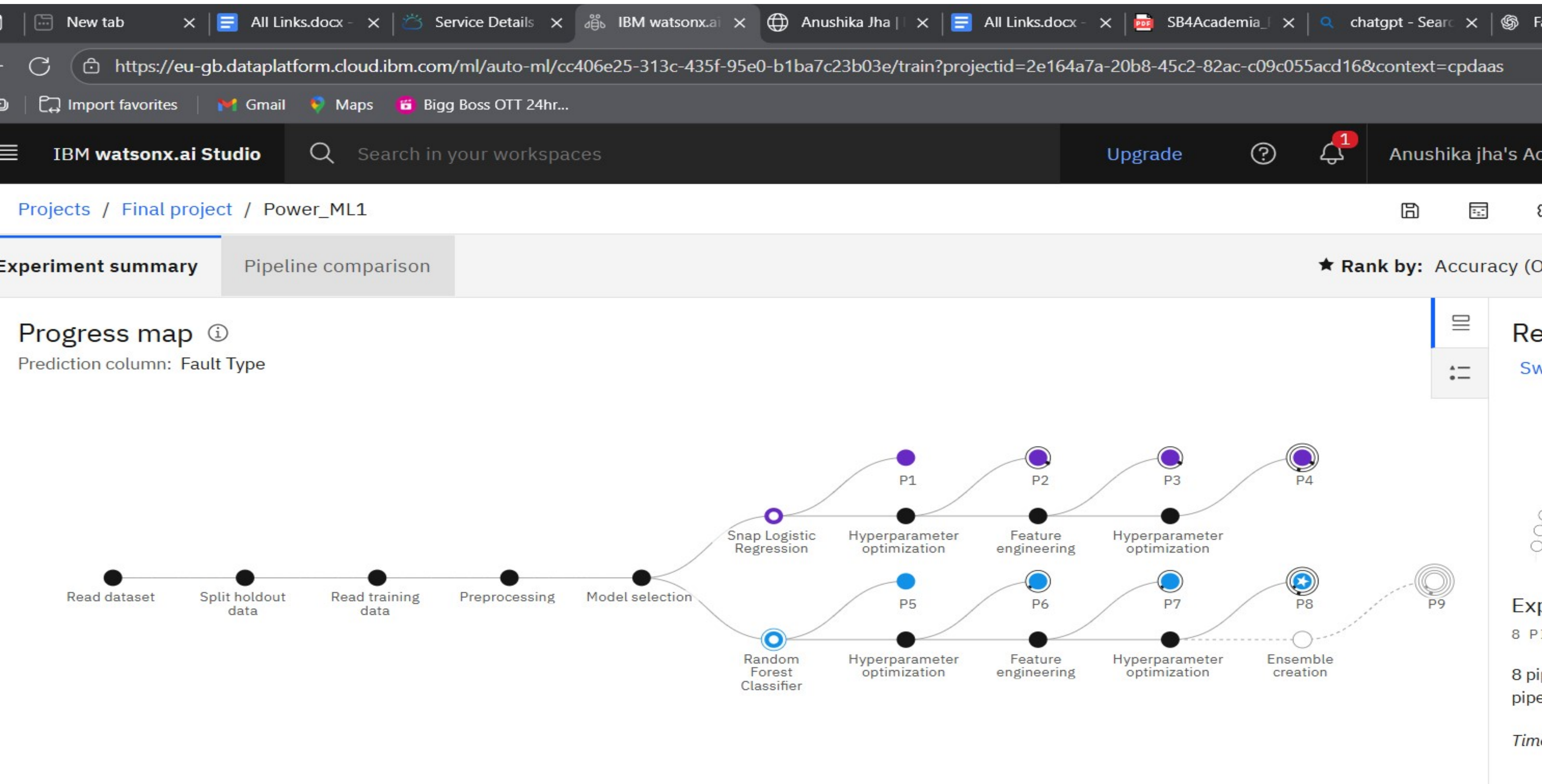
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Preprocessing
Model selection
Snap Logistic Regression
Random Forest Classifier
P1
P2
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P9
Hyperparameter optimization
Feature engineering
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Feature engineering
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Ensemble creation

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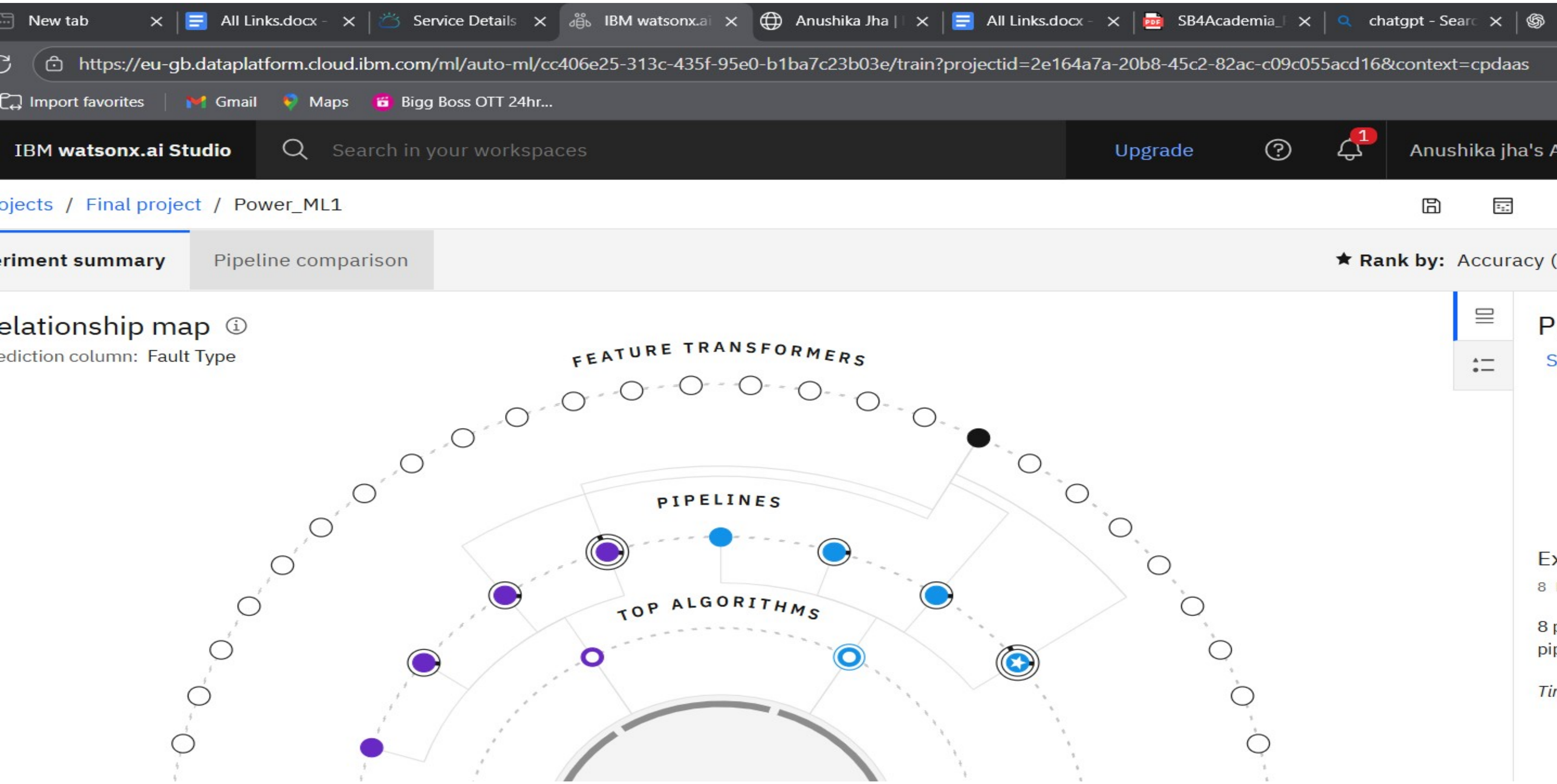

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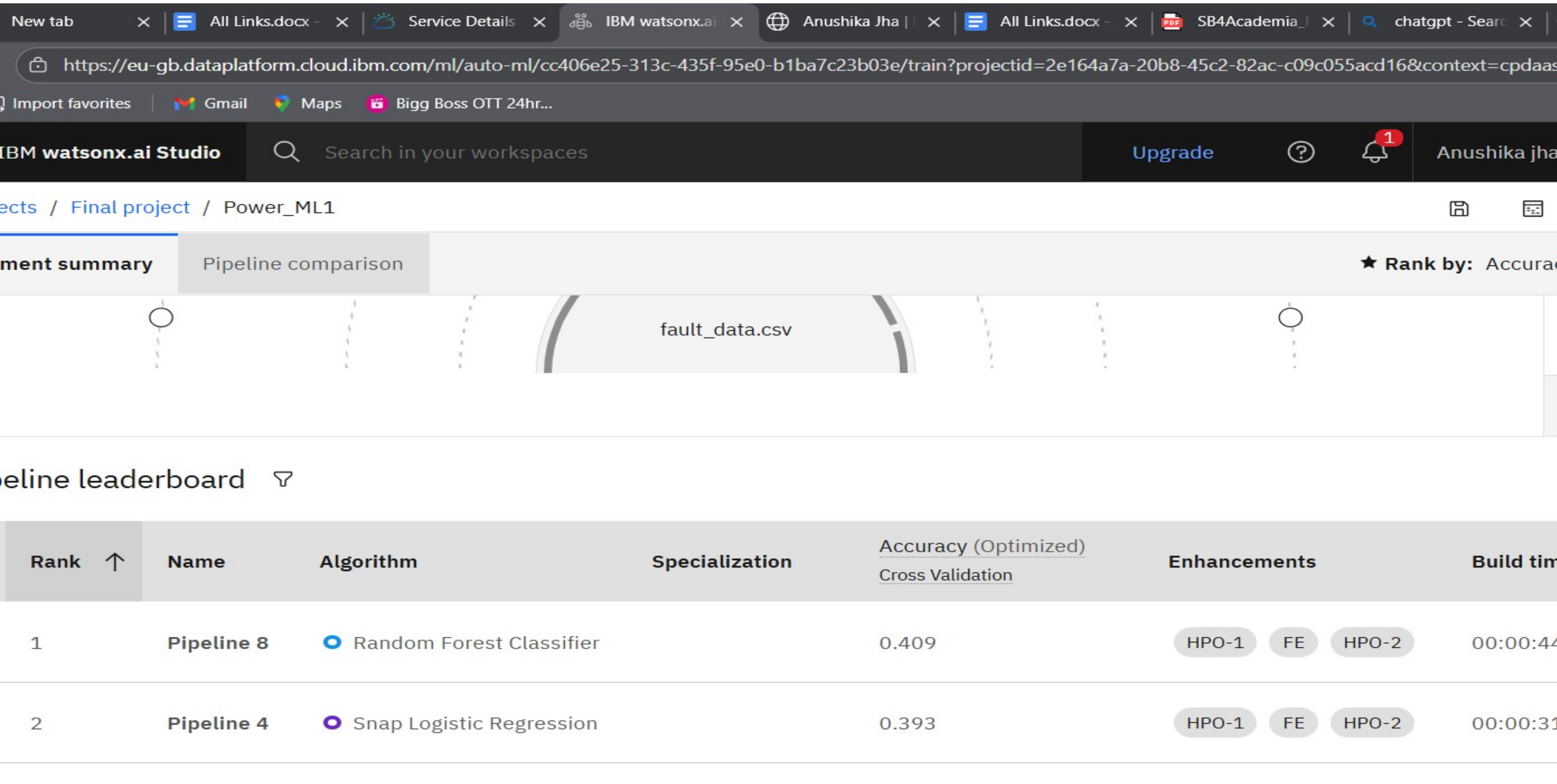
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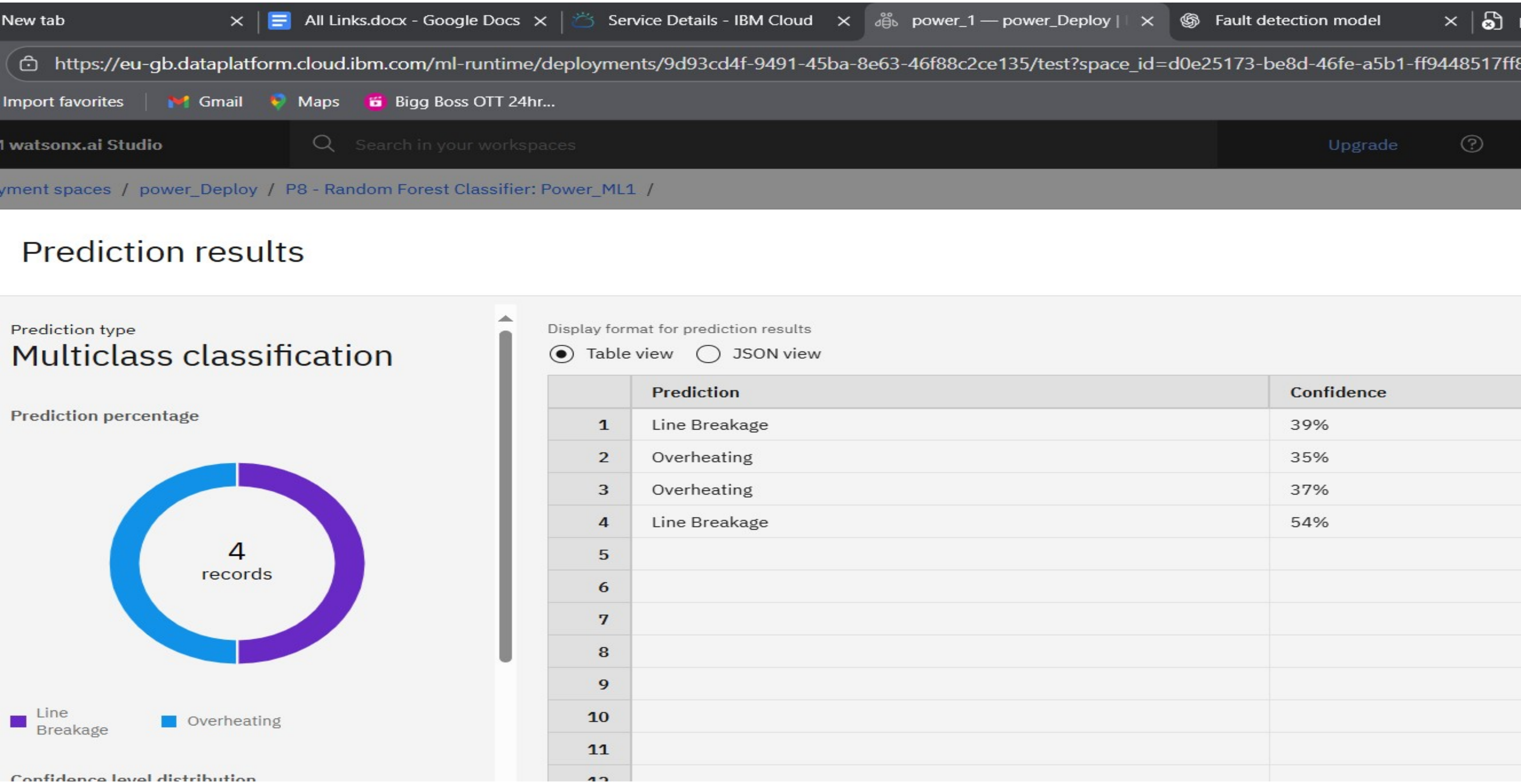
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3 Overheating 37%
4 Line Breakage 54%
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ONCLUSION

A machine learning model was successfully built to detect and classify power syste
faults using voltage and current data.

The deployed **Random Forest model** achieved high accuracy and can be integrate
for **real-time fault monitoring**, improving grid reliability.

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UTURE SCOPE

ntegrate the model with real-time IoT sensors and SCADA systems f
ive fault detection and automated grid control.

Expand the system to detect fault severity, predict failure before it happens, and support self-healing smart grids using deep learning.

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EFERENCES

aggle Dataset – Power System Fault Detection

tps://www.kaggle.com

BM Watson Studio – AutoAI Documentation

tps://www.ibm.com/cloud/watson-studio

EE Papers on Fault Classification in Power Systems

tps://ieeexplore.ieee.org

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M CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

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