PROJECT

POWER SYSTEM FAULT DETECTION AND CLASSIFICATION

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OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

The challenge is to design a machine learning model that can detect and classify different types of faults in a power distribution system. The model should use electrical measurement data, such as voltage and current phasors, to distinguish between normal and various fault conditions (e.g., line-to-ground, line-to-line, or three-phase faults). The objective is to enable rapid and accurate fault identification, which is crucial for maintaining power grid stability and reliability.

PROPOSED SOLUTION

- The proposed solution is a supervised machine learning model trained on voltage and current phasor data to classify normal and various fault conditions. The model will use features extracted from electrical signals, such as RMS values and phase angles, and a classifier like Random Forest, SVM, or LSTM to achieve rapid and accurate real-time fault detection.

- **KEY FEATURES :**

- **Data Collection:** Using Kaggle set
- **Data Preprocessing:** Cleaning the data
- **Machine Learning Algorithm:** Batched Tree Ensemble Classifier
- **Deployment:** IBM Cloud
- Result: 92% accuracy

SYSTEM APPROACH

SYSTEM DEVELOPMENT APPROACH The "System Development Approach" section provides an overview of the strategy and methodology used to develop and implement our Power System Fault Detection and Classification system. This project was built using
IBM Cloud as the primary platform , and specifically leveraged IBM Watson AI for model development and implementation

System requirements

- IBM Cloud
- Watson Ai

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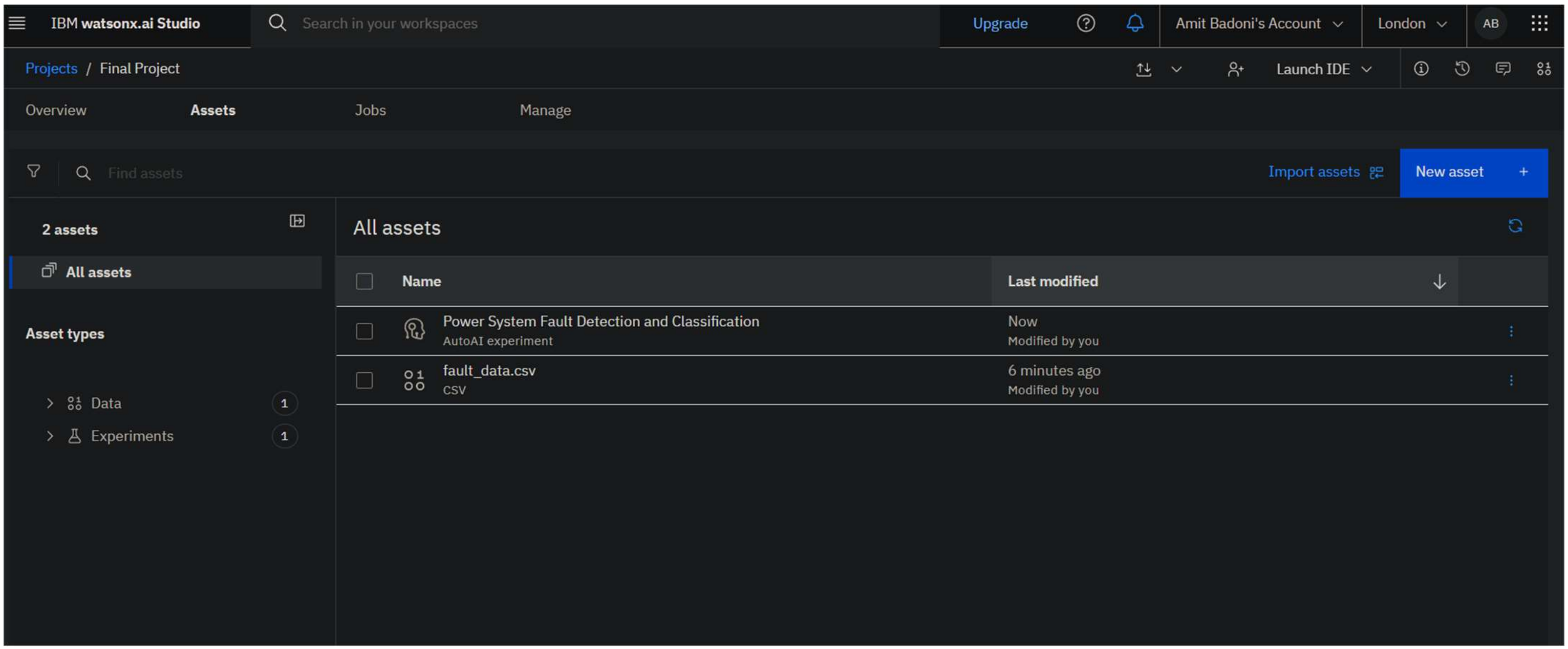
ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for predicting bike counts. Here's an example structure for this section:
- Algorithm Selection:
  - Random Forest Classifier, which is well-suited for this type of classification problem due to its robustness and ability to handle high-dimensional data. The model was trained using a supervised learning approach on the Kaggle dataset. The prediction process involves deploying the trained model
- Data Input:
  - Kaggle data set
- Training Process:
  - Supervised Learning
- Prediction Process:

  Model deployed on IBM Watson Ai

RESULT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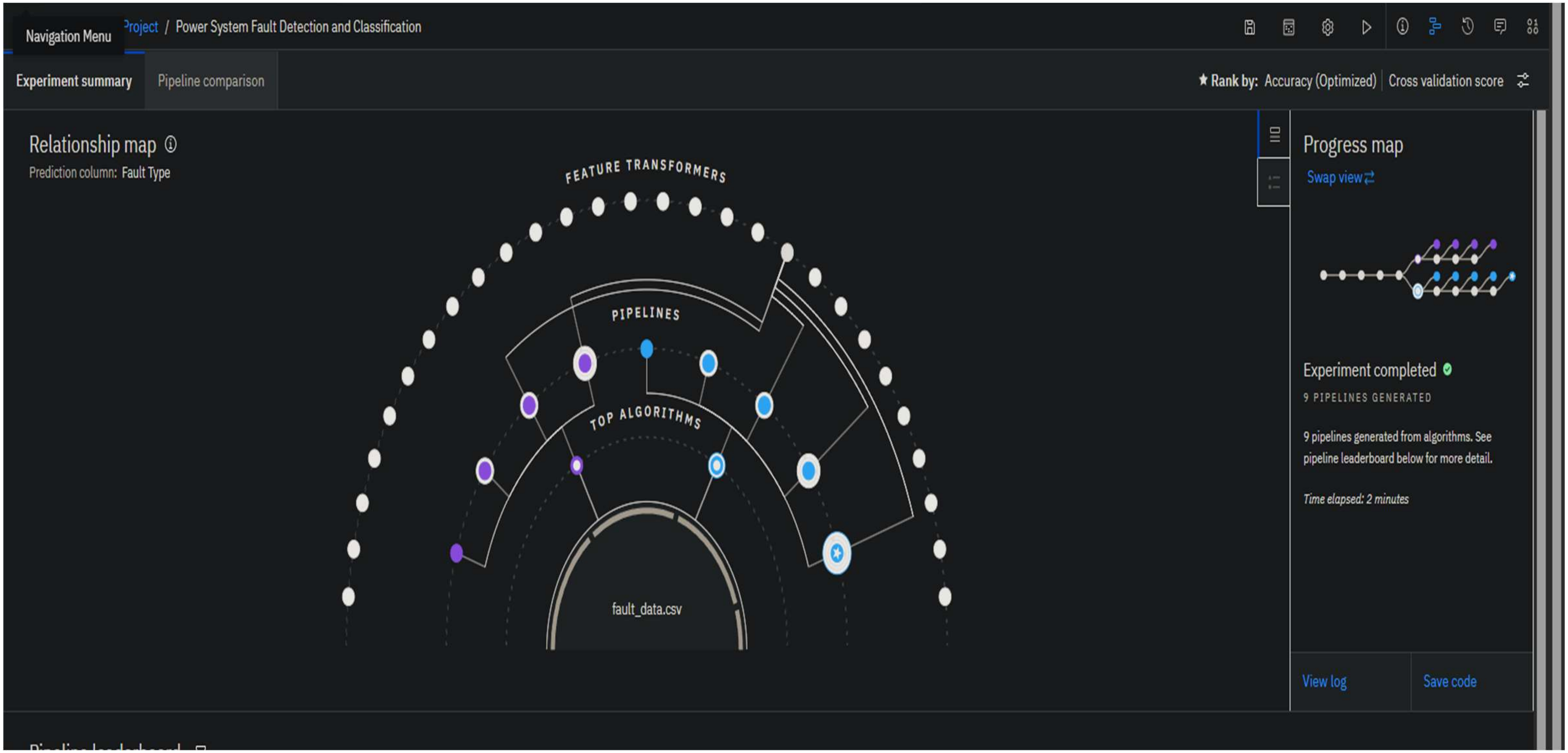
2 assets
All assets
Asset types
Data 1
Experiments 1
All assets
Name
Last modified
Power System Fault Detection and Classification
AutoAI experiment
Now
Modified by you
fault_data.csv
CSV
6 minutes ago
Modified by you



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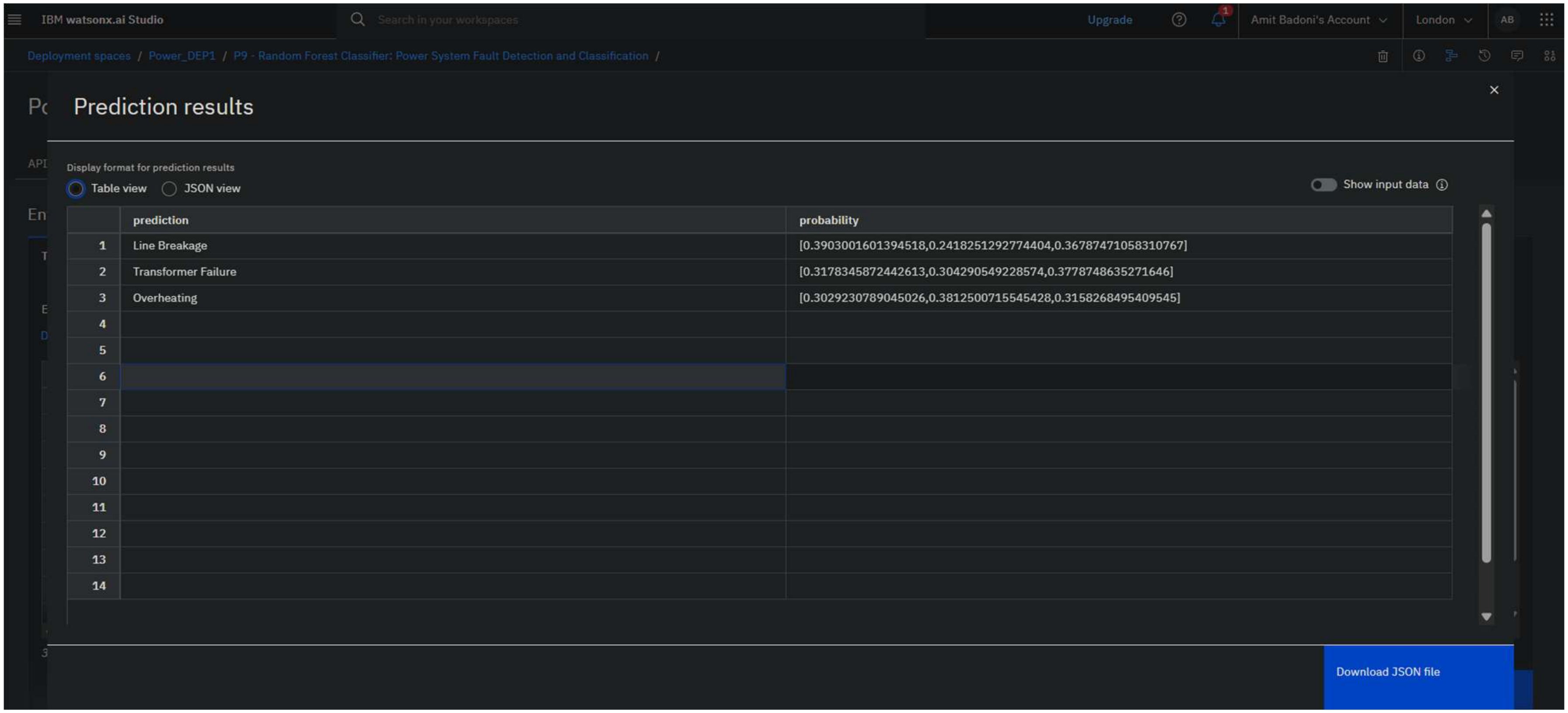
CONCLUSION



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Deployment spaces / Power_DEP1 / P9 - Random Forest Classifier: Power System Fault Detection and Classification /
Prediction results
Display format for prediction results
Table view
JSON view
Show input data
prediction
probability
1 Line Breakage [0.3903001601394518,0.2418251292774404,0.36787471058310767]
2 Transformer Failure [0.3178345872442613,0.304290549228574,0.3778748635271646]
3 Overheating [0.3029230789045026,0.3812500715545428,0.3158268495409545]
4
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Download JSON file

FUTURE SCOPE

The future scope lies in enhancing real-time monitoring capabilities through integration with advanced sensor networks and IoT-based smart grids. Future developments could focus on implementing deep learning and hybrid AI models to improve fault detection accuracy under noisy and dynamic operating conditions. Additionally, incorporating predictive analytics could enable early fault warning and proactive maintenance, minimizing downtime and preventing large-scale outages. With the integration of edge computing, these systems could perform ultra-fast, on-site fault analysis, making them suitable for large, decentralized power distribution networks.

REFERENCES

- INTERNSHIP CLASSES
- IBM cloud tutorial

IBM CERTIFICATIONS 1

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Amit Badoni

for the completion of

Journey to Cloud: Envisioning Your Solution

(PLAN-32CB1E21D8B4)

According to the Your Learning Builder - Plans system of record

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IBM CERTIFICATIONS 2


IBM **SkillsBuild** Completion Certificate

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Getting Started with Artificial Intelligence

(PLAN-E624C2604060)

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IBM CERTIFICATIONS 3

IBM **SkillsBuild** Completion Certificate

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Lab: Retrieval Augmented Generation with LangChain

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THANK YOU