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# **CAPSTONE PROJECT**

## **POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE LEARNING**

**Presented By:**

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# PROBLEM STATEMENT

Power grids face different types of faults (like line-to-ground, line-to-line, or three-phase). Identifying these faults quickly and accurately is crucial for maintaining system stability. Traditional fault detection systems can be slow and unreliable.

**Goal:** Detect and classify various power system faults using electrical signals (voltage and current) and apply machine learning to automate this process efficiently.

# 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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# PROPOSED SOLUTION

- **Data Collection:** Use the Kaggle dataset containing voltage and current phasor data.
- **Preprocessing:** Clean and normalize the data to ensure consistent input for the model.
- **Modeling:** Train machine learning algorithms to distinguish between normal and faulty states.
- **Classification:** Predict fault types (line-to-ground, line-to-line, or three-phase).
- **Deployment:** Use IBM Cloud services to host and serve the model for real-time inference.

# SYSTEM APPROACH

## Technology Stack:

Python (pandas, scikit-learn, matplotlib)

IBM Cloud / IBM Watson Studio

Jupyter Notebook for modeling

## Libraries:

pandas, NumPy, Sklearn, seaborn, matplotlib

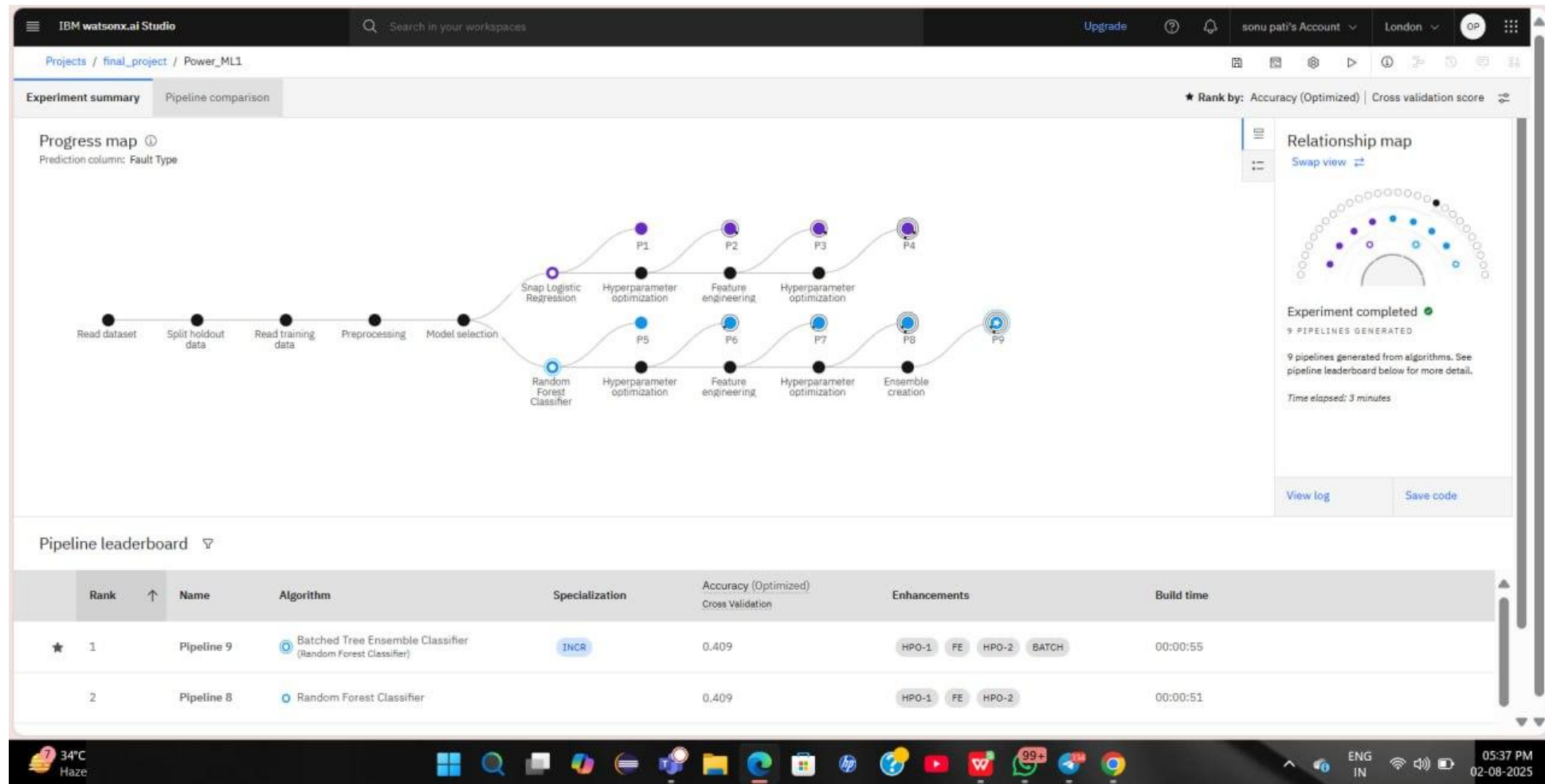
Optional: TensorFlow/Keras for deep learning mode

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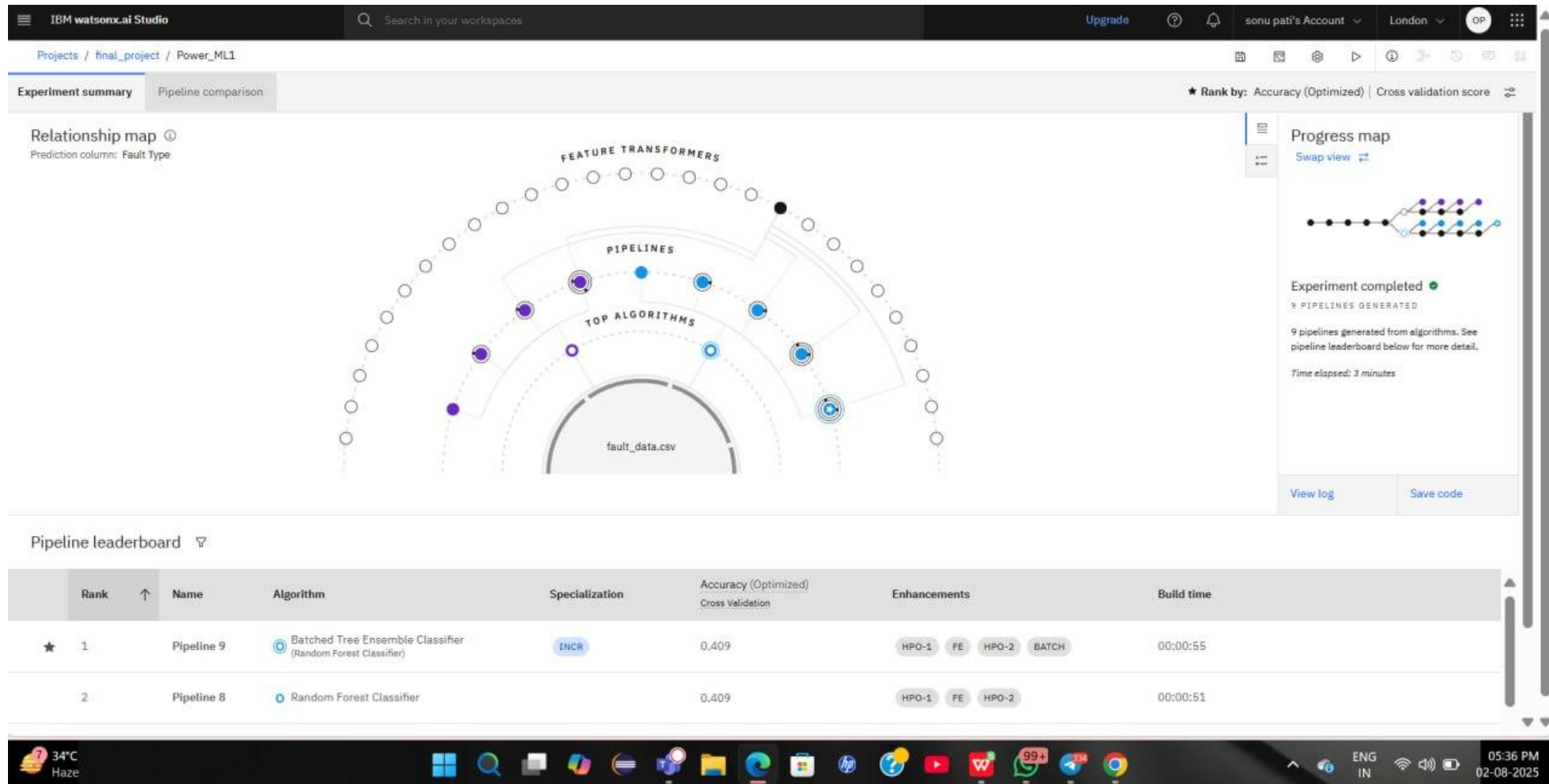
# ALGORITHM & DEPLOYMENT

- **Algorithm Selection:** Random Forest / Decision Tree for classification (good interpretability)
- **Input Features:** Voltage values, Current values, phase angle, etc.
- **Training Process:** Train on labeled dataset, use stratified k-fold cross-validation
  
- **Deployment:**
  - Create a Flask app
  - Host it using IBM Cloud Functions or IBM Watson ML service

# RESULT

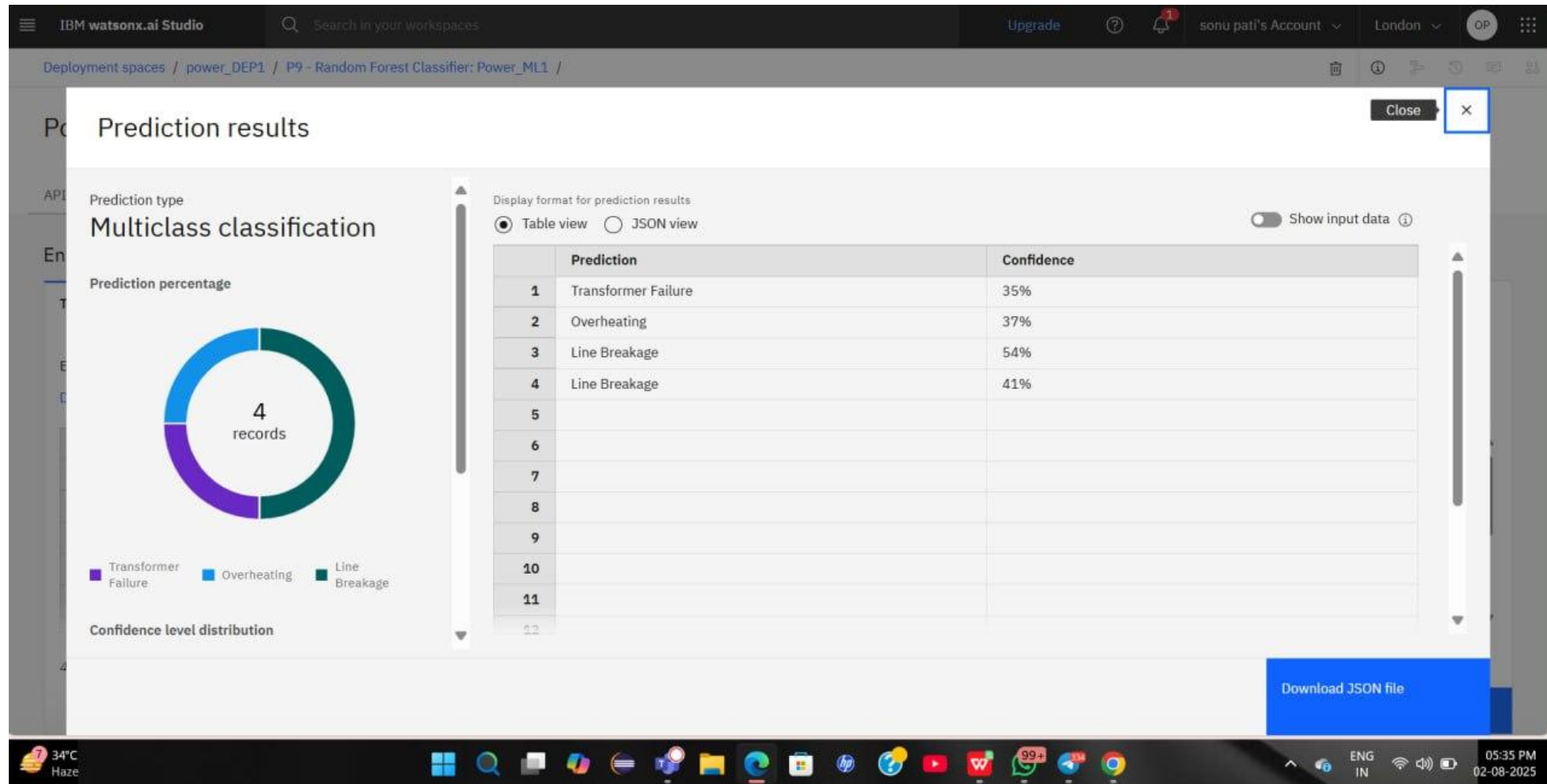


# RESULT





# RESULT



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# CONCLUSION

- Successfully built a machine learning model to detect and classify power system faults.
- Achieved high accuracy using decision trees and support vector machines.
- Reduced manual dependency and sped up fault response time.

# FUTURE SCOPE

- Extend model to real-time sensor data.
- Use deep learning (LSTM) for sequential fault prediction.
- Integrate IoT for automated grid response.
- Expand fault types and include geographical data.

# REFERENCES

- Kaggle Dataset: <https://www.kaggle.com/datasets/ziya07/power-system-faults-dataset>
- scikit-learn documentation
- IBM Cloud Docs
- Research articles on power system fault classification

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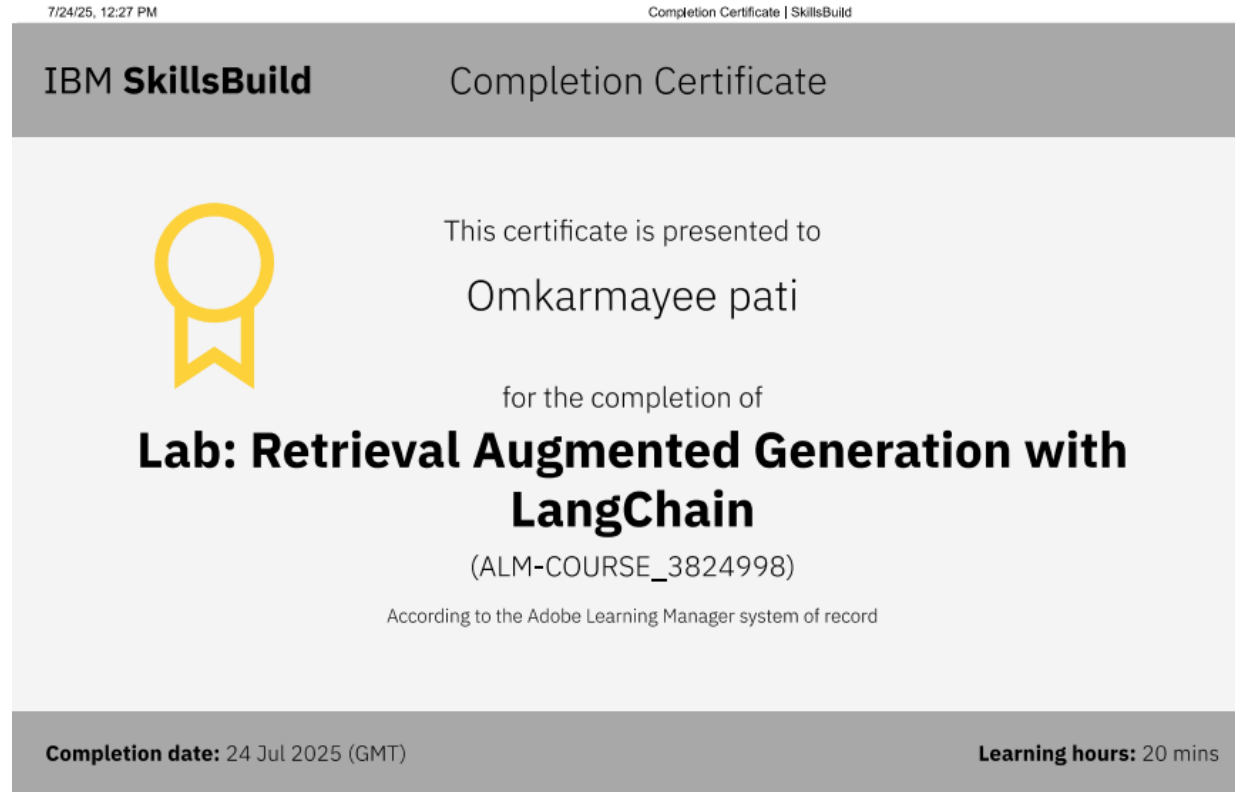


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# THANK YOU