CAPSTONE PROJECT

POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE

Presented By:
KUCHIPUDI BHASKAR –KONERU LAKSHMAIA EDUCATION FOUNDATION -CSE

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 electrical distribution systems, detecting and classifying power faults quickly and accurately is crucial to maintaining grid reliability and minimizing damage.
- Various fault conditions such as line-to-ground (L-G), line-to-line (L-L), and three-phase faults can disrupt power flow, cause equipment failures, or lead to blackouts.
- There is a need to build a model that can automatically detect and classify faults based on electrical measurement data like voltage and current phasors.

PROPOSED SOLUTION

- The proposed system aims to detect and classify power system faults using machine learning by:
- Collecting and preprocessing voltage and current data during both normal and fault conditions.
- Applying classification algorithms to learn patterns associated with specific fault types.
- Using IBM AutoAI to automate the model training and deployment process.
- Enabling real-time or near-real-time fault detection to support fast grid response.

SYSTEM APPROACH

- Technology Used:
- Platform: IBM Cloud Lite (Watson Studio, AutoAI)
- Language/Tools: Python (Optional), IBM Watson Studio GUI
- Data Source: Kaggle Dataset – Power System Faults Dataset

- System Requirements:
- CSV file with voltage and current readings
- IBM Cloud Lite account
- Internet connection for cloud deployment

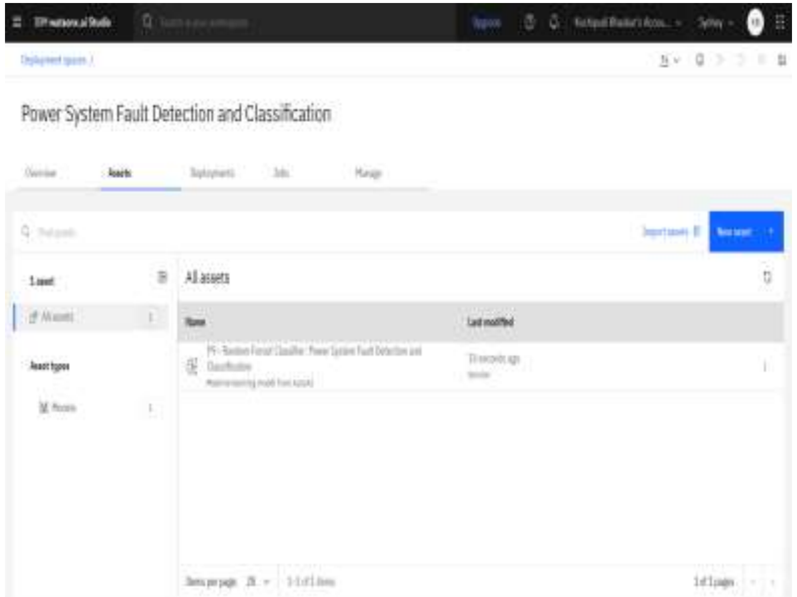
ALGORITHM & DEPLOYMENT

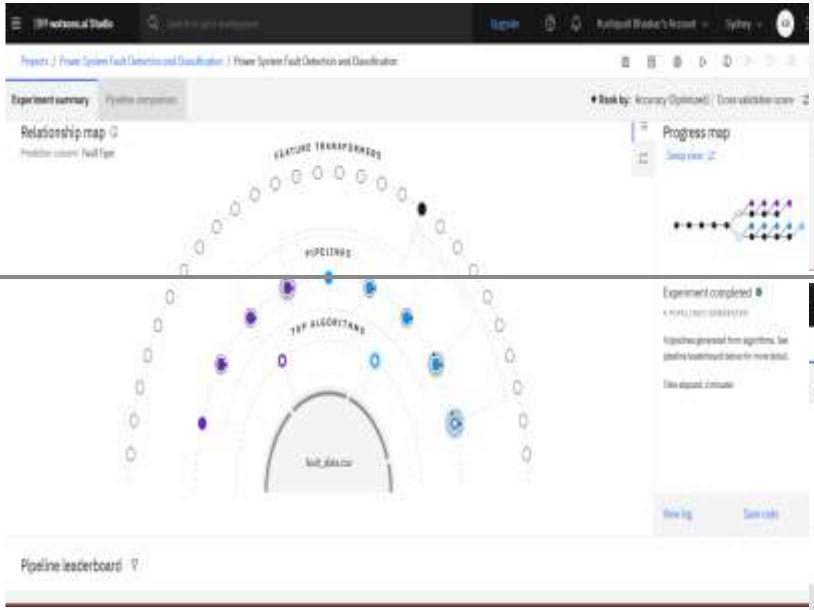
- Algorithm:
- AutoAI selects and compares algorithms like Decision Trees, Random Forest, SVM, Gradient Boosted Trees.
- Input Features: Voltage (V), Current (I), other phasor data.
- Target Output: Fault Type (e.g., Normal, L-G, L-L, 3-phase).

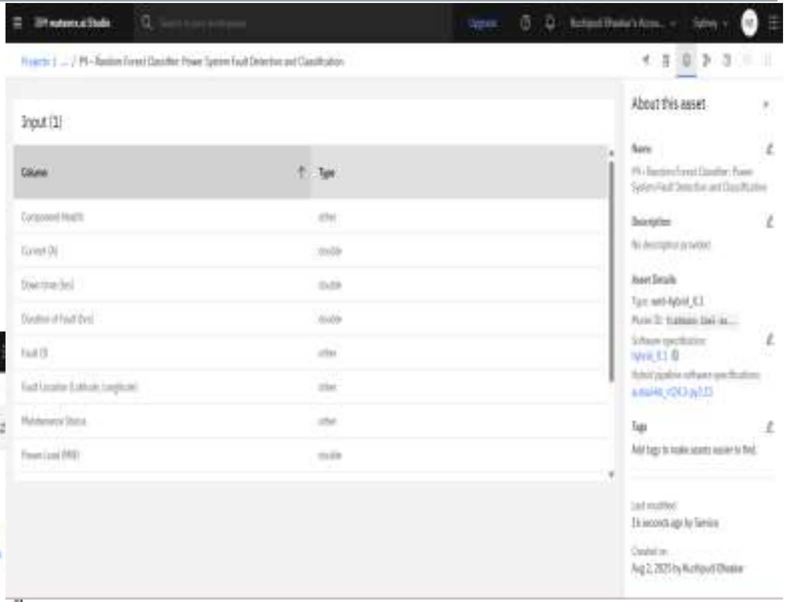
- Deployment:
- Best model is saved and deployed on IBM Watson Machine Learning.
- An API endpoint is generated for external use.

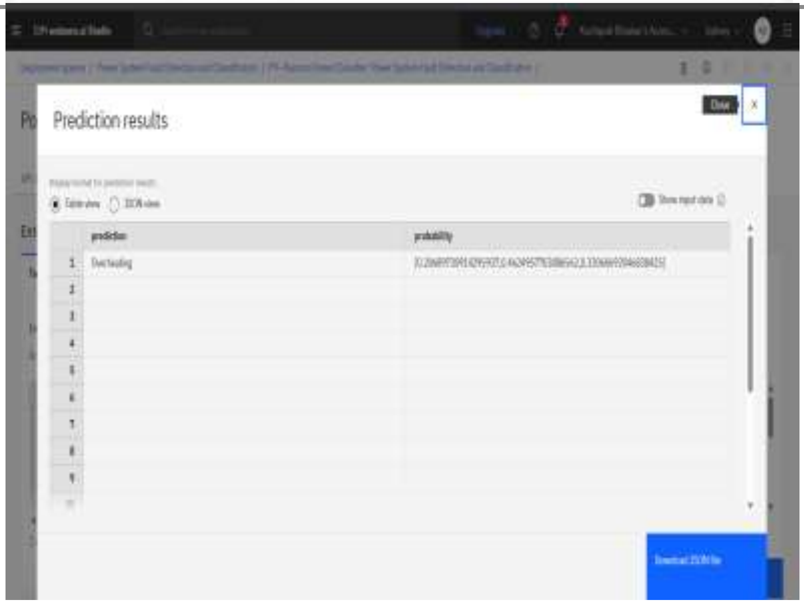
RESULT

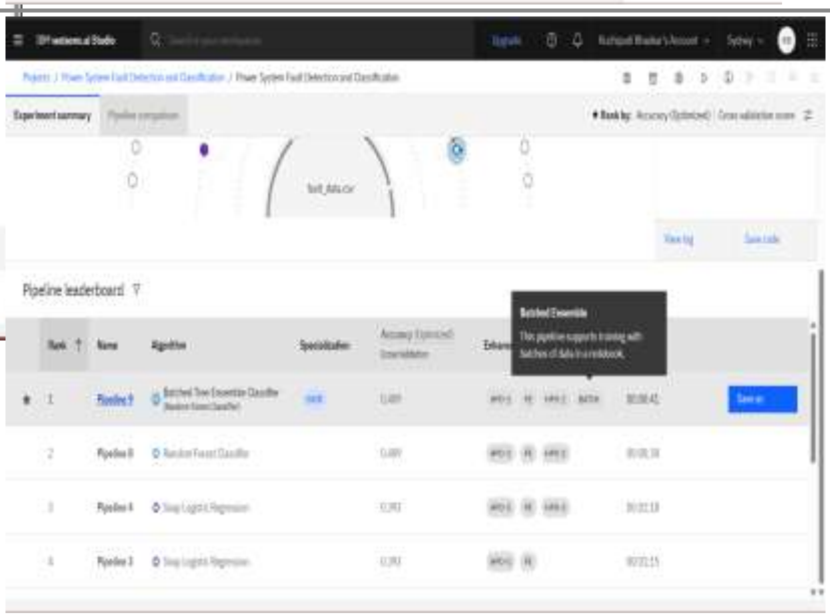
- Confusion matrix to show prediction vs. actual
- Example output:
- Input: V=220V, I=5.2A
- Output: Fault Type = Line-to-Ground
- (Include screenshots from AutoAI output, deployment, or predictions)











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CONCLUSION

- The ML model successfully classifies fault types with high accuracy.
- Helps in real-time grid monitoring and faster restoration.
- Reduces dependency on manual inspection and improves response time.

FUTURE SCOPE

- Use real-time streaming data for live fault detection
- Integrate with SCADA systems for automation
- Expand to fault location prediction
- Explore deep learning models for better accuracy

REFERENCES

- Kaggle Dataset: https://www.kaggle.com/datasets/ziya07/power-systemfaults-dataset
- IBM Cloud Docs: https://cloud.ibm.com/docs
- Research papers on fault classification in power systems

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IBM CERTIFICATIONS

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THANK YOU