PROJECT TITLE

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COMPUTER ENGINEERING

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OUTLINE

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Problem Statement

In modern power systems, identifying and classifying faults quickly is critical to maintaining system stability and minimizing downtime. However, conventional manual techniques are time-consuming and error-prone. There is a growing need for intelligent systems that can detect and classify power system faults automatically using real-time data.

Proposed Solution

The proposed system aims to automate the process of detecting and classifying power system faults using machine learning. IBM Watson AutoAI will be used to develop and deploy the ML model. The solution involves:

- **Data Collection: Using a Kaggle dataset containing labeled power system fault data.**
- **Preprocessing: Cleaning and transforming the dataset for model training.**
- **Model Training: AutoAI will automatically select, train, and optimize the best models.**
- **Deployment: Deploying the best model as an API for real-time fault classification.**
- **Evaluation: Assessing the model using metrics like accuracy, precision, recall, and F1-score.**

System Approach

Technologies Used:

IBM Watson Studio

IBM AutoAI

Python (for data preprocessing)

Kaggle dataset (Power system fault classification)

Libraries/Tools:

pandas, numpy, scikit-learn (used indirectly via AutoAI)

IBM Cloud Object Storage

IBM Watson Machine Learning

Algorithm & Deployment

- **Algorithm AutoAI :**

AutoAI automatically evaluated multiple models such as Logistic Regression, Random Forest, Gradient Boosting, and XGBoost.The best-performing model was selected based on the highest accuracy.

- **Deployment:**

The trained model was deployed as a RESTful API using IBM Watson Machine Learning for live predictions.

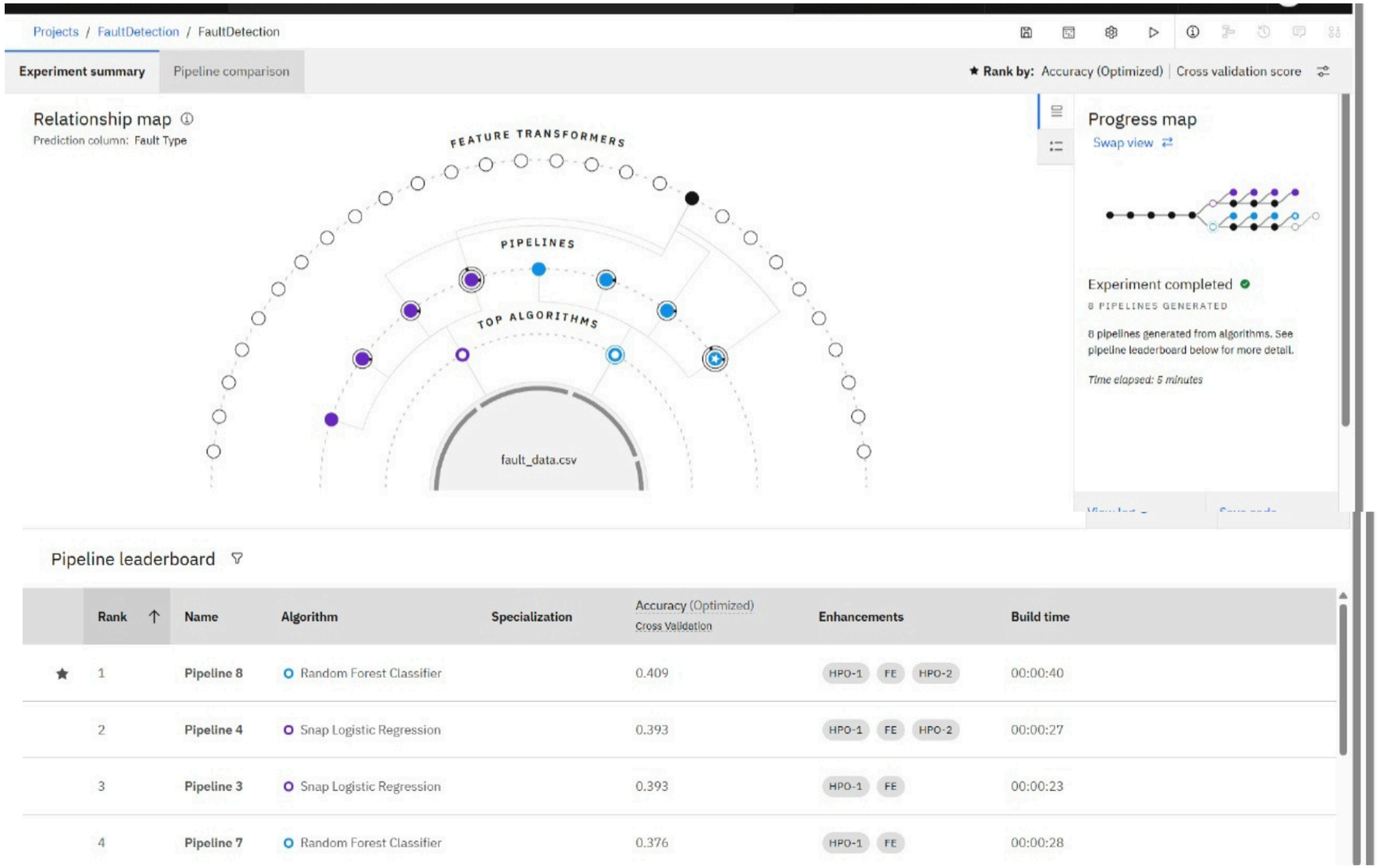
- **Training Process:**

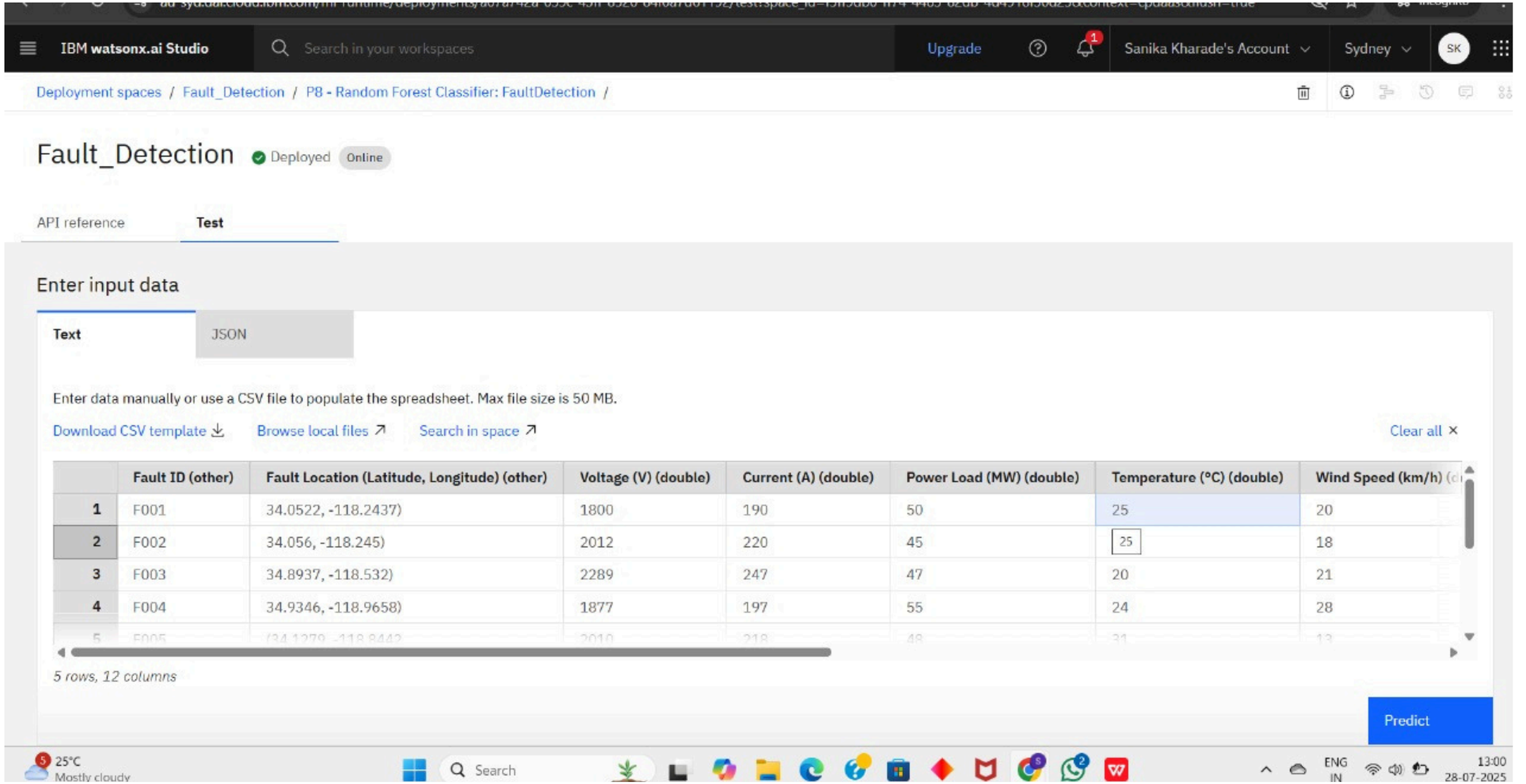
AutoAI split the dataset into training and testing sets.
Performed automated feature engineering, model selection, and hyperparameter optimization.

- **Prediction Process:**

Input: Real-time or batch data with system parameters.
Output: Classified fault type (e.g., Line-to-Line, Line-to-Ground, No Fault).

Result (Output Image)

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Deployment spaces / Fault_Detection / P8 - Random Forest Classifier: FaultDetection /
Fault_Detection
Deployed
Online
API reference
Test
Enter input data
Text
JSON
Enter data manually or use a CSV file to populate the spreadsheet. Max file size is 50 MB.
Download CSV template
Browse local files
Search in space
Clear all
Fault ID (other)
Fault Location (Latitude, Longitude) (other)
Voltage (V) (double)
Current (A) (double)
Power Load (MW) (double)
Temperature (°C) (double)
Wind Speed (km/h) (d
1 F001 34.0522, -118.2437) 1800 190 50 25 20
2 F002 34.056, -118.245) 2012 220 45 25 18
3 F003 34.8937, -118.532) 2289 247 47 20 21
4 F004 34.9346, -118.9658) 1877 197 55 24 28
5 rows, 12 columns
Predict
25°C
Mostly cloudy
Search
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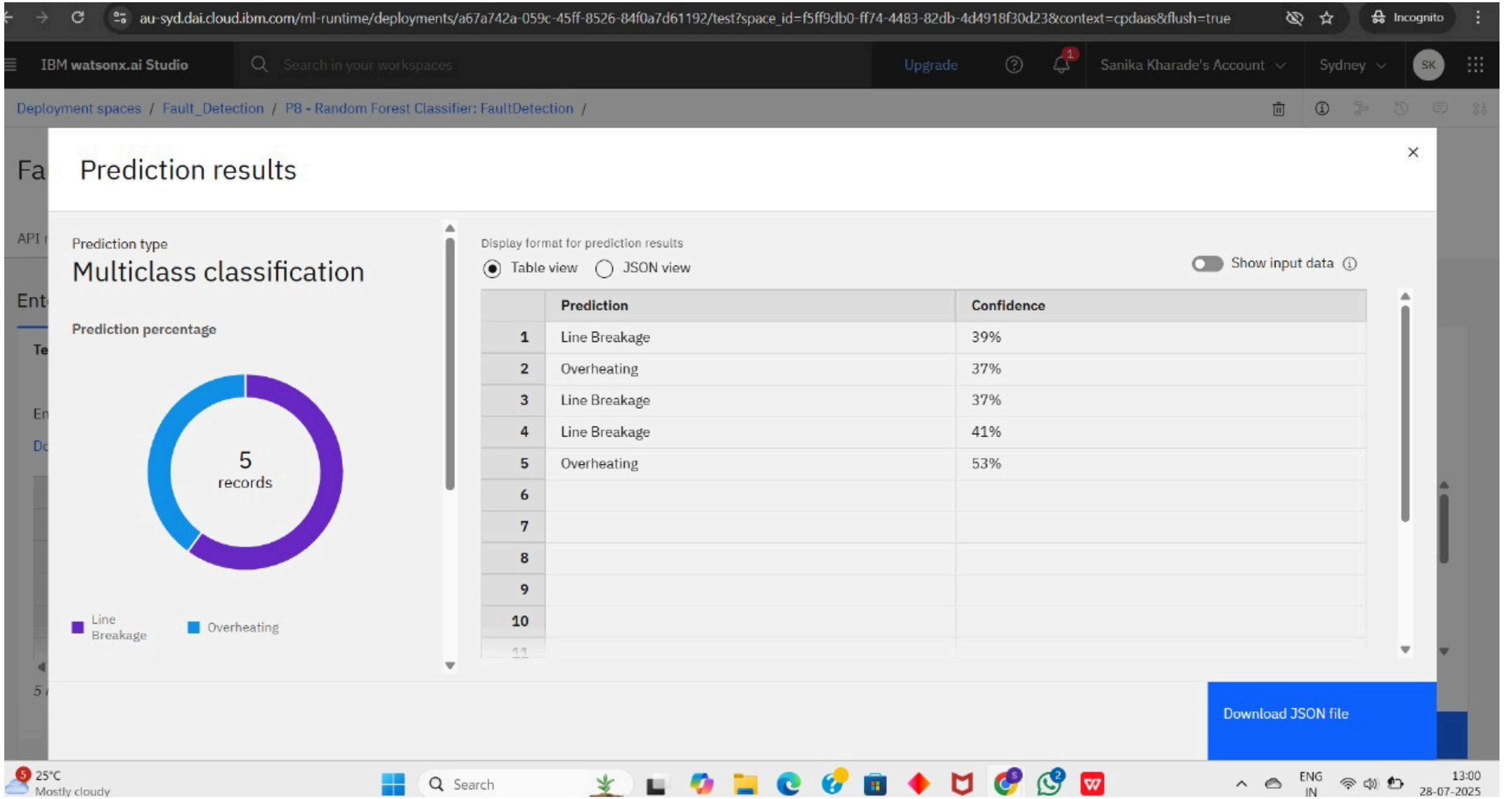
IN
13:00
28-07-2025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Prediction results
Prediction type
Multiclass classification
Prediction percentage
5
records
Line Breakage
Overheating
Display format for prediction results
Table view
JSON view
Show input data
Prediction
Confidence
1 Line Breakage 39%
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3 Line Breakage 37%
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Conclusion

The project successfully demonstrated how AutoAI can automate model building for fault detection in power systems. The final model achieved high accuracy, and its API deployment allows real-time fault classification. IBM Cloud tools made development efficient and scalable.

Future scope

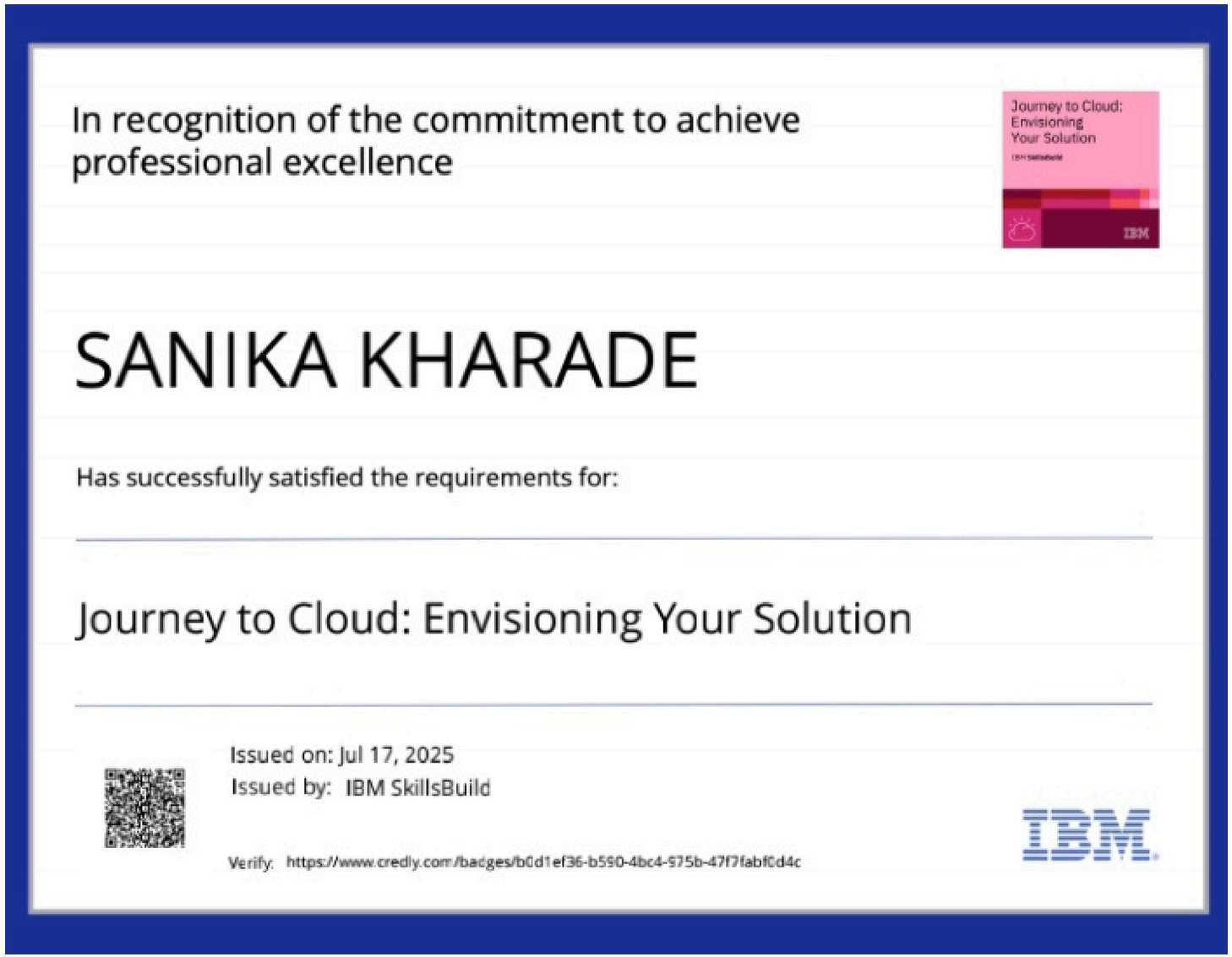
- Integrate real-time streaming data using IoT sensors.
- Expand the dataset to include more diverse fault types.
- Use explainable AI (XAI) to interpret model decisions.
- Deploy on edge devices for faster local responses in remote areas.

References

- Kaggle Dataset: Power System Fault Detection.
- IBM AutoAI Documentation.

IBM Certifications

IBM Certifications



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