

CAPSTONE PROJECT

PREDICTIVE MAINTENANCE OF INDUSTRIAL MACHINERY

Presented By:

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OUTLINE

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PROBLEM STATEMENT

- Develop a predictive maintenance model for a fleet of industrial machines to anticipate failures before they occur. This project will involve analyzing sensor data from machinery to identify patterns that precede a failure. The goal is to create a classification model that can predict the type of failure (e.g., tool wear, heat dissipation, power failure) based on real-time operational data. This will enable proactive maintenance, reducing downtime and operational costs.

PROPOSED SOLUTION

- Implement a Predictive Maintenance system using IBM Cloud services.
- Use IoT sensors to collect real-time machine data.
- Apply machine learning models to detect patterns and predict equipment failures.
- Leverage IBM Watson and IBM Cloud Pak for Data for intelligent insights.

SYSTEM APPROACH

- Data Collection: Gather vibration, temperature, pressure, and usage data from IoT-enabled machinery
- Data Storage: Use IBM Cloud Object Storage to store structured and unstructured data.
- Data Processing: Use IBM Watson Studio for data cleaning and transformation.
- Model Building: Train ML models using historical failure data.
- Deployment: Deploy predictive model as an API via IBM Cloud Functions or IBM Kubernetes Service.

ALGORITHM & DEPLOYMENT

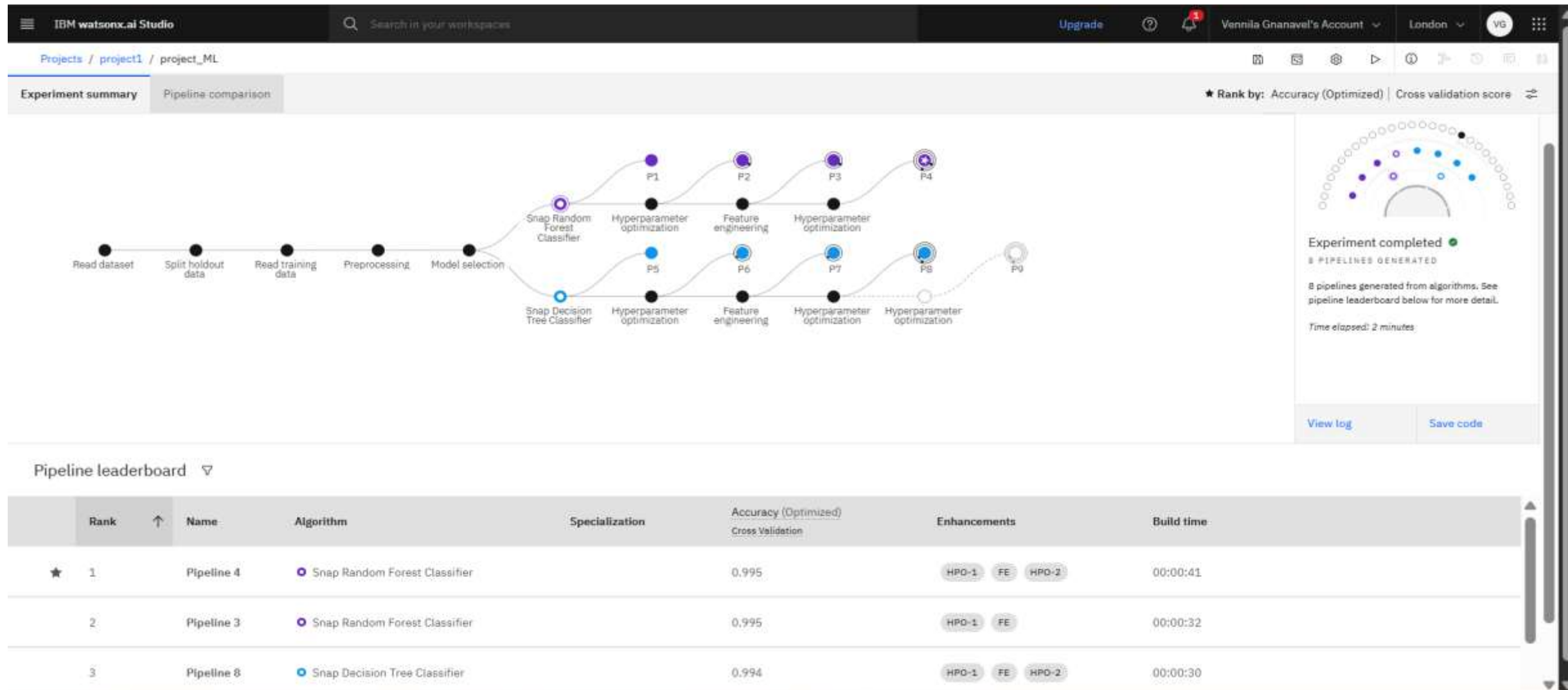
Algorithm: Random Forest / XG Boost for classification of potential failures.

Features Used: RPM, load, temperature, operational hours.

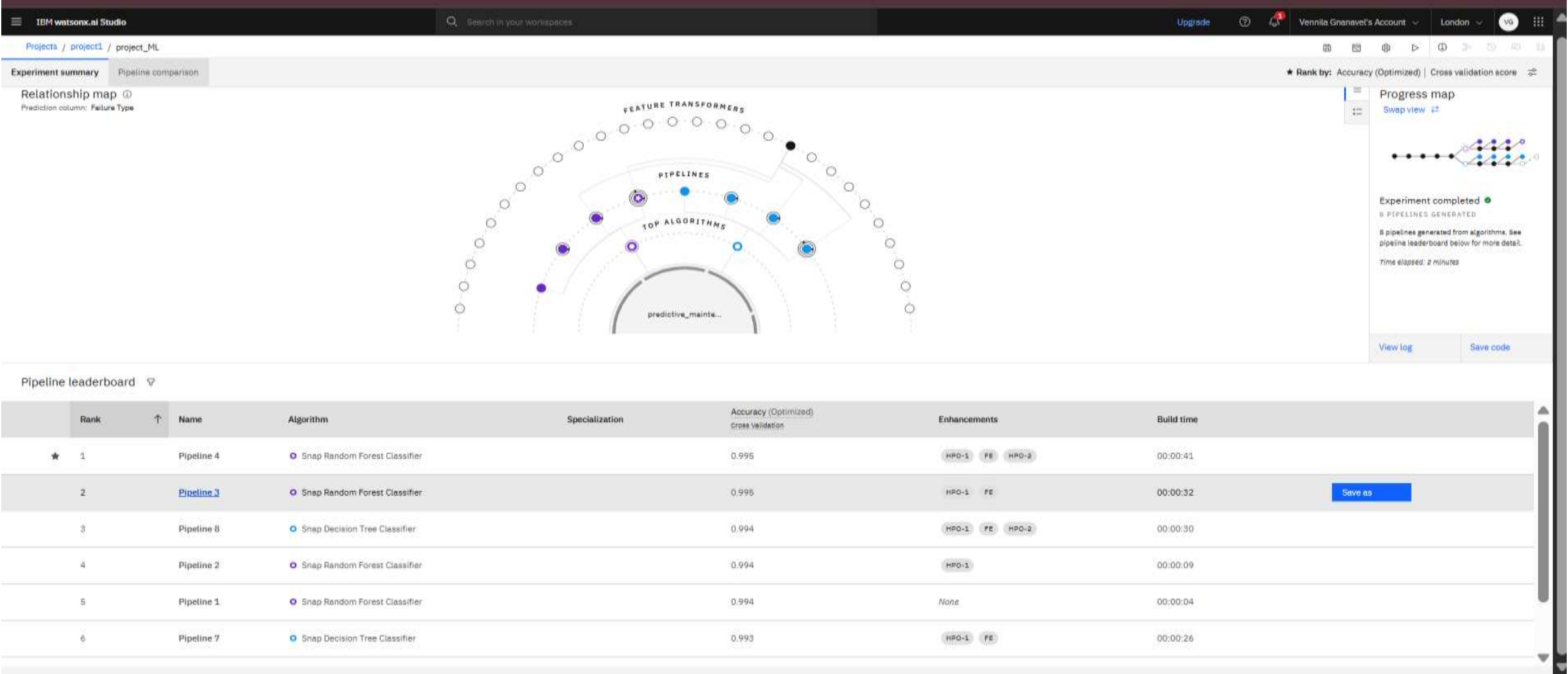
Deployment Platform: IBM Cloud Pak for Data with Jupyter Notebooks.

Monitoring: IBM Watson Machine Learning monitors model accuracy and retrains as needed.

RESULT



RESULT



RESULT

IBM watsonx.ai Studio

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Deployment spaces / project_1 / P4 - Snap Random Forest Classifier: project_ML /

project_deploy 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.

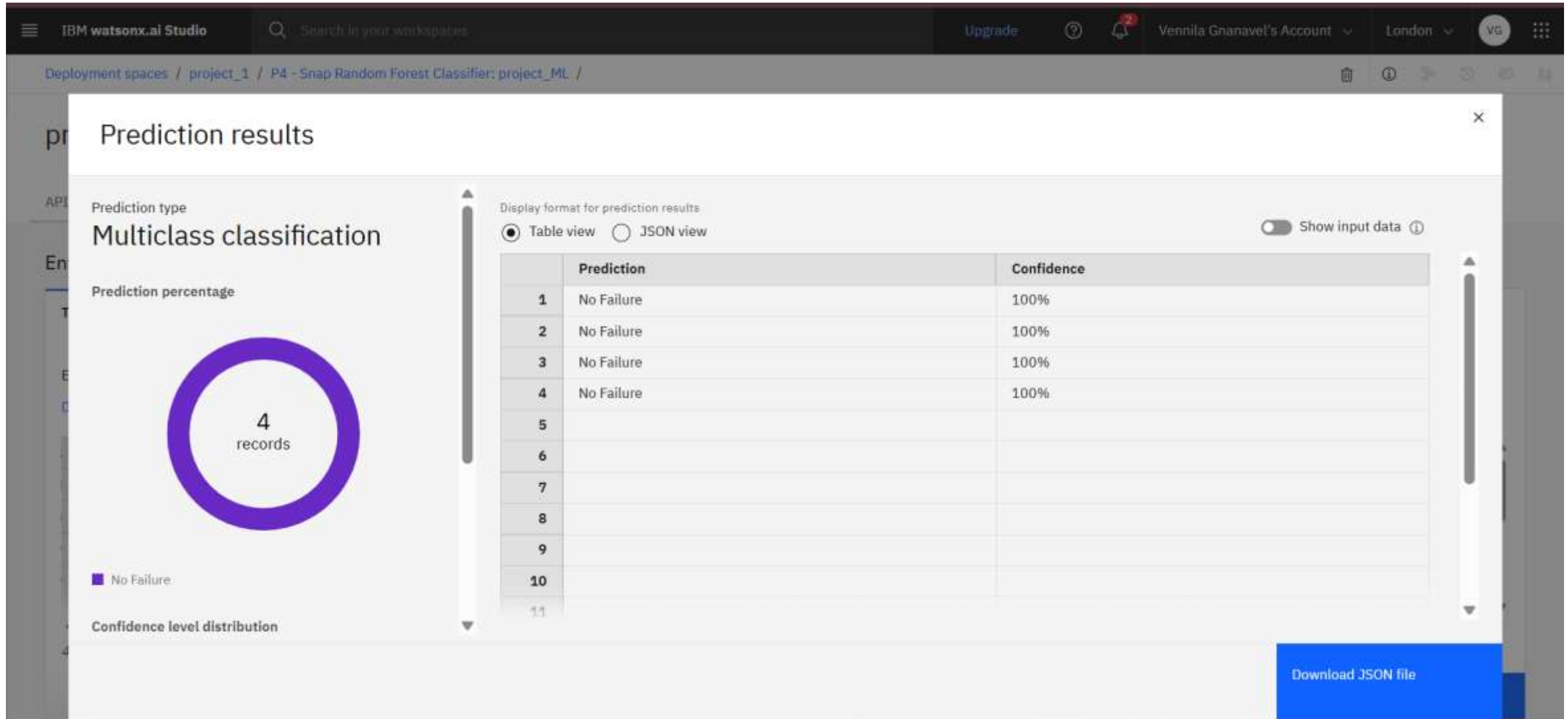
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	ier)	Type (other)	Air temperature [K] (double)	Process temperature [K] (double)	Rotational speed (rpm) (double)	Torque [Nm] (double)	Tool wear [min] (double)	Target (double)
1		M	298.1	308.6	1551	42.8	0	0
2		L	298.2	308.7	1408	46.3	3	0
3		L	298.8	308.6	1872	22.5	82	0
4		H	298.8	309.2	1372	53.4	25	0

4 rows, 9 columns

Predict

RESULT



CONCLUSION

- Predictive Maintenance on IBM Cloud offers a scalable, intelligent solution for industrial efficiency.
- Helps industries transition from reactive to proactive maintenance strategies.
- Enhances equipment lifespan, safety, and operational productivity.

FUTURE SCOPE

- Integrate edge computing for faster local predictions.
- Apply deep learning models (LSTM) for time-series forecasting.
- Expand to a broader range of industrial sectors (energy, transport).
- Use blockchain with IBM Hyperledger for secure maintenance logs.

REFERENCES

- BM Cloud Documentation: <https://cloud.ibm.com/docs>
- IBM Watson Studio: <https://www.ibm.com/cloud/watson-studio>
- IBM Cloud Pak for Data: <https://www.ibm.com/products/cloud-pak-for-data>
- Research Papers on Predictive Maintenance using ML
- Industrial Machinery Maintenance Standards (ISO 13374)

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Completion Certificate



This certificate is presented to

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Completion date: 25 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU