edunet foundation

Air Quality Prediction after 24 Hours

Learning Objectives

- Understand the importance of monitoring air pollution.
- Learn how to preprocess air quality datasets.
- Implement Machine Learning models for AQI prediction.
- Evaluate accuracy and visualize results.

Tools and Technology used

- IBM Cloud
- Watsonx.ai Studio
- IBM Cloud Object Storage
- IBM AutoAI
- IBM Machine Learning Model
- Jupyter Notebook

Methodology

- Data Collection (Air Quality dataset)
- Data Cleaning (handling missing values)
- Feature Engineering (lag variables, pollutant trends)
- Model Training (ML algorithms for prediction)
- Model Evaluation (MAE, RMSE, R^2)
- Visualization of predicted AQI vs actual AQI

Problem Statement:

- Air pollution has become a critical environmental issue, causing health hazards and climate effects. There is a need for a system to predict AQI in advance so that preventive actions can be taken.

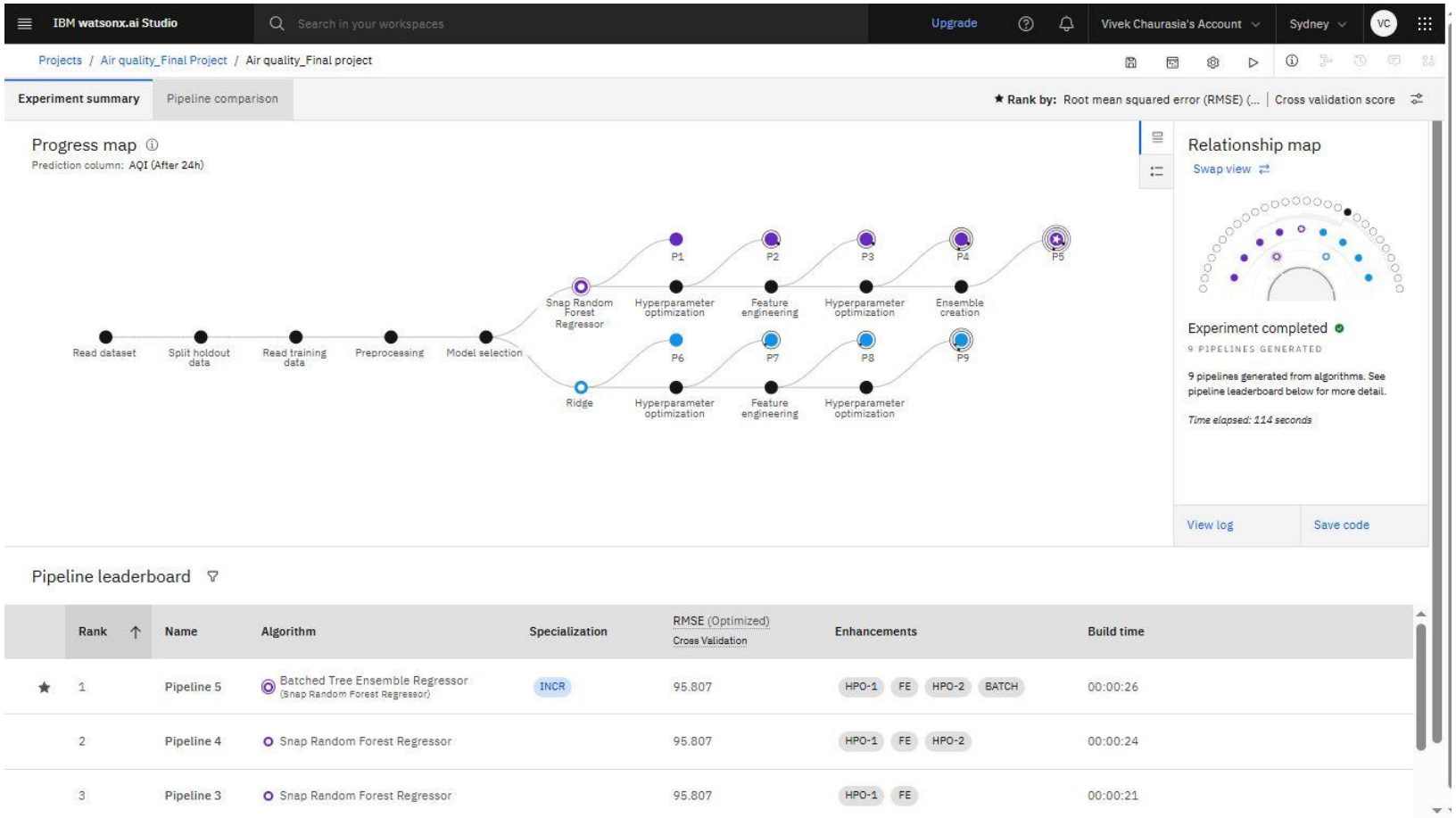
Solution:

We propose a Machine Learning based AQI prediction model that:

- Predicts AQI values 24 hours ahead.
- Helps government, organizations, and citizens plan precautionary measures.
- Provides a decision-support tool for air quality management.

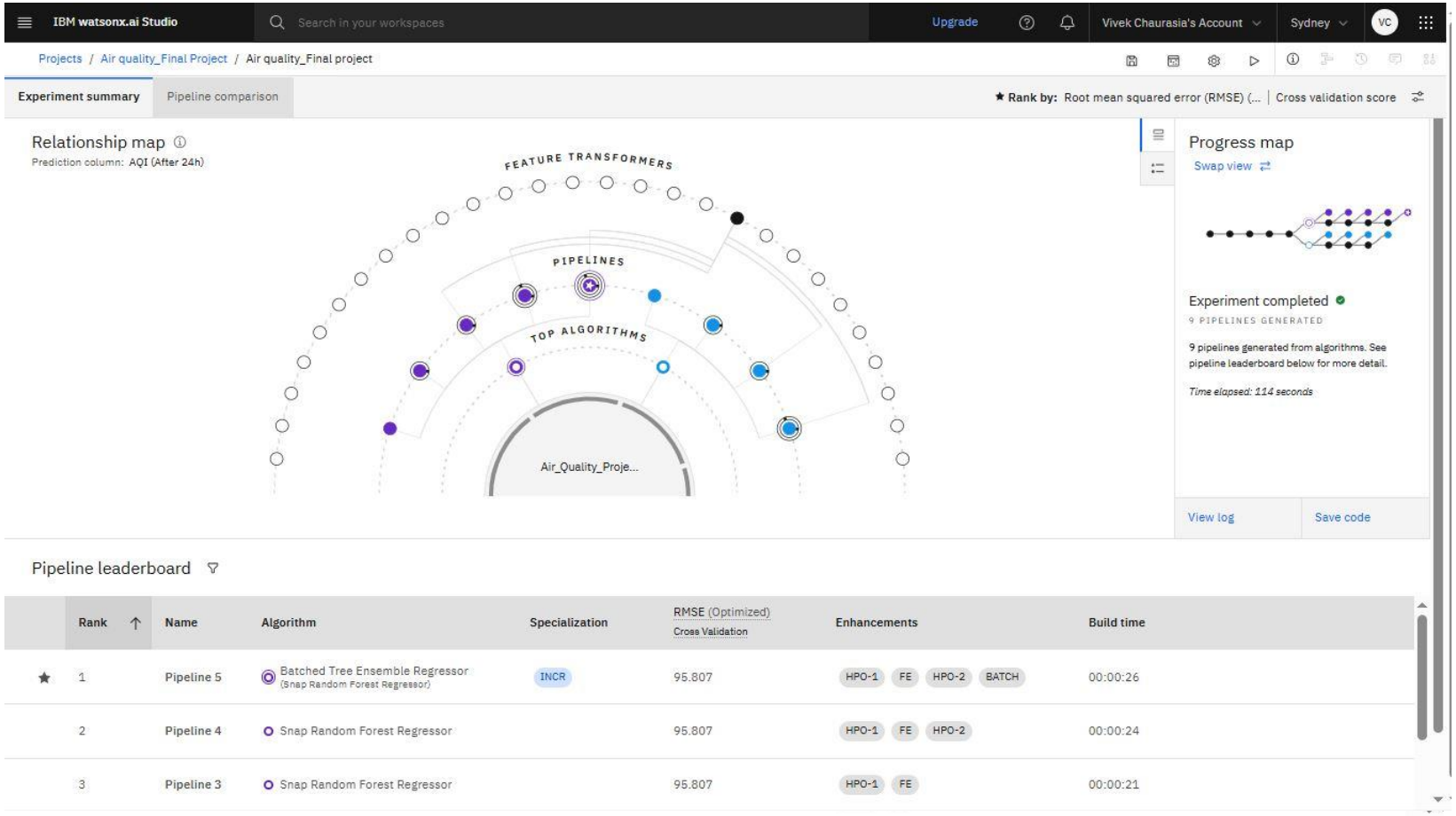
Screenshot of Output:

➢Result 1:



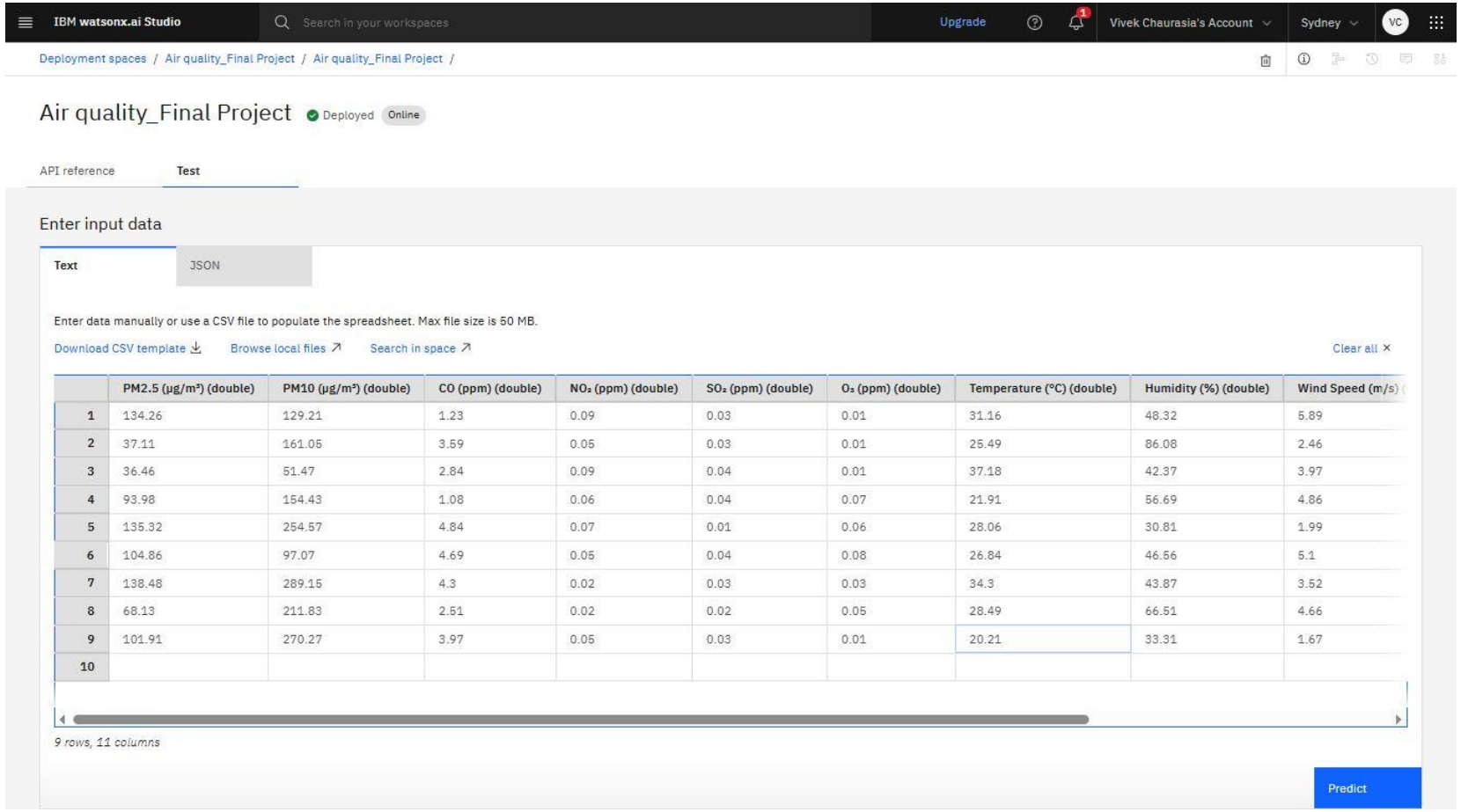
Screenshot of Output:

➢Result 2:



Screenshot of Output:

➢Result 3:



	PM2.5 (µg/m³) (double)	PM10 (µg/m³) (double)	CO (ppm) (double)	NO_2 (ppm) (double)	SO_2 (ppm) (double)	O_3 (ppm) (double)	Temperature (°C) (double)	Humidity (%) (double)	Wind Speed (m/s)
1	134.26	129.21	1.23	0.09	0.03	0.01	31.16	48.32	5.89
2	37.11	161.05	3.59	0.05	0.03	0.01	25.49	86.08	2.46
3	36.46	51.47	2.84	0.09	0.04	0.01	37.18	42.37	3.97
4	93.98	154.43	1.08	0.06	0.04	0.07	21.91	56.69	4.86
5	135.32	254.57	4.84	0.07	0.01	0.06	28.06	30.81	1.99
6	104.86	97.07	4.69	0.05	0.04	0.08	26.84	46.56	5.1
7	138.48	289.15	4.3	0.02	0.03	0.03	34.3	43.87	3.52
8	68.13	211.83	2.51	0.02	0.02	0.05	28.49	66.51	4.66
9	101.91	270.27	3.97	0.05	0.03	0.01	20.21	33.31	1.67
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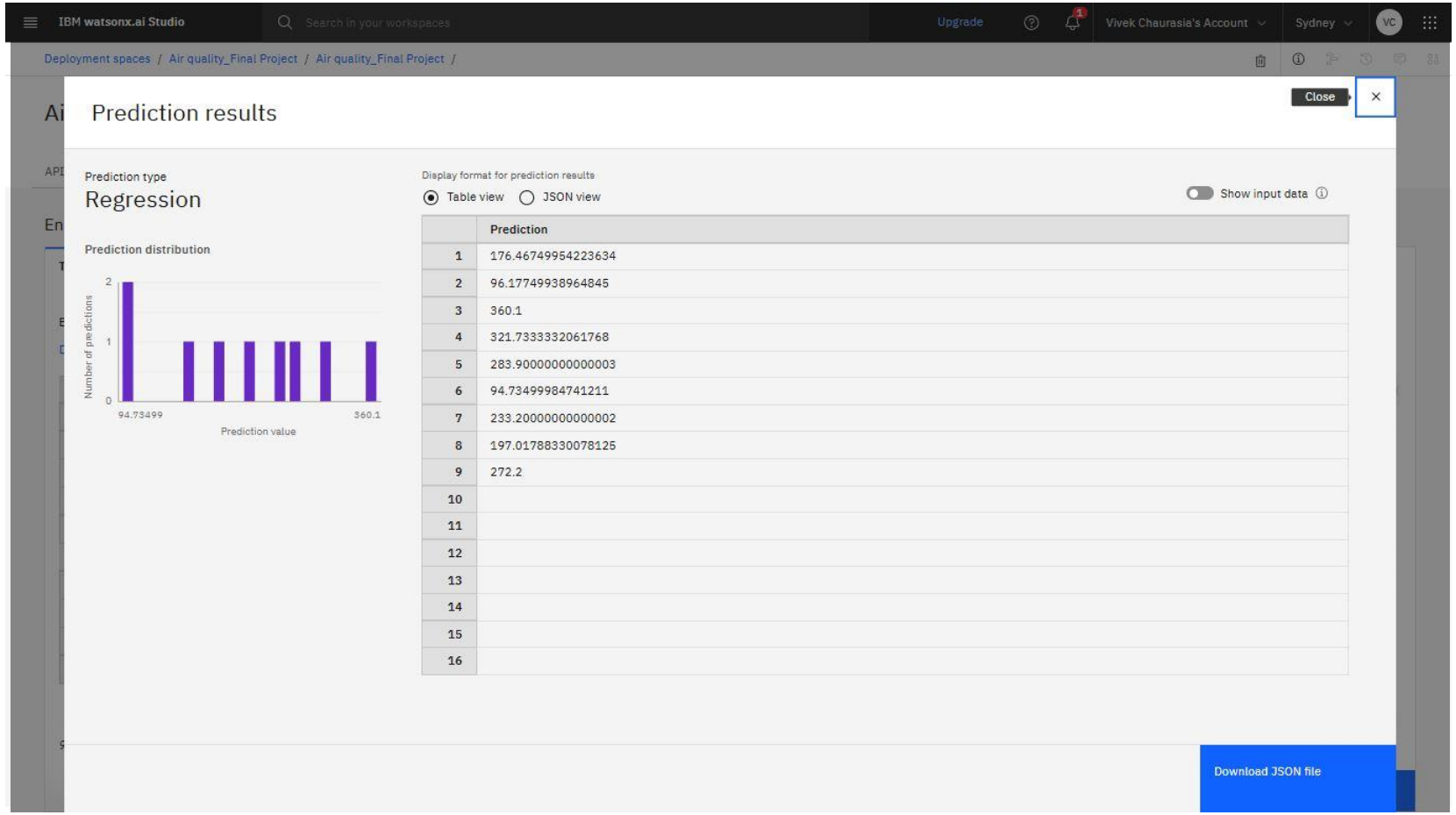
Screenshot of Output:

➢Result 4:



Conclusion:

- Successfully built a predictive model for AQI forecasting.
- Prediction helps in early warnings for pollution control.
- Can be extended with real-time data for better accuracy.
- Future scope: Integration with IoT sensors and Cloud platforms.