
CAPSTONE PROJECT

INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECTS

Presented By:

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OUTLINE

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PROBLEM STATEMENT

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a government initiative to ensure rural connectivity through all-weather roads. However, with multiple sub-schemes (PMGSY-I, PMGSY-II, RCPLWEA, etc.), thousands of ongoing and completed road/bridge projects need to be efficiently categorized. Manual classification is labor-intensive, error-prone, and inefficient for large-scale implementation. There's a need for an automated system to classify projects based on their physical and financial features for better monitoring, transparency, and policy planning.

PROPOSED SOLUTION

The proposed system uses AI to automatically classify road/bridge projects into the correct PMGSY scheme based on structured attributes such as project cost, length, state, district, terrain type, and sanction year. The system is developed and deployed using **IBM Watsonx.ai Studio** and **Cloud Object Storage**. **AutoAI** was used for model training, tuning, and deployment with minimal manual coding. This ensures scalable, accurate, and fast categorization of infrastructure projects for government use.

■ Data Collection:

Dataset taken from

https://aikosh.indiaai.gov.in/web/datasets/details/pradhan_mantri_gram_sadak_yojana_pmgsy.html

SYSTEM APPROACH

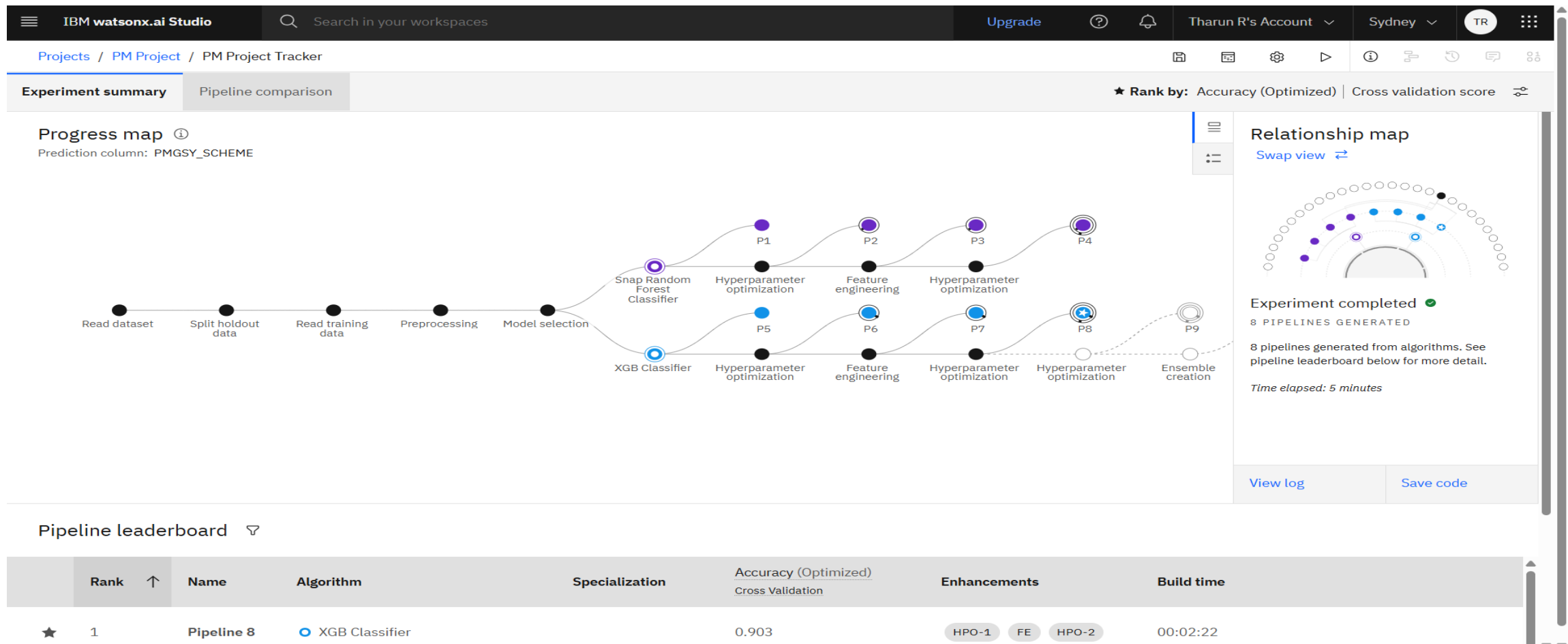
- **Platform:** IBM Watsonx.ai Studio
- **Storage:** IBM Cloud Object Storage (for training data)
- **Development Mode:** AutoAI (Build machine learning models automatically)
- **Model Deployment:** Model deployed as a RESTful endpoint using Watsonx
- **Languages:** Minimal Python (AutoAI handles most)
- **Evaluation:** Auto-generated metrics (Accuracy, Precision, F1-score)

ALGORITHM & DEPLOYMENT

- **AutoAI Pipeline:** Multiple classifiers (e.g., Logistic Regression, Random Forest, XGBoost) were tried automatically.
- **Input Features:** Project Cost, Length, Sanction Year, State, District, Bridge or Road, Terrain Type, etc.
- **Target Label:** PMGSY_SCHEME
- **Training:** AutoAI handled data splitting, feature engineering, hyperparameter tuning.
- **Deployment:** The best model pipeline was selected and deployed via Watsonx.ai to an endpoint for API-based inference.

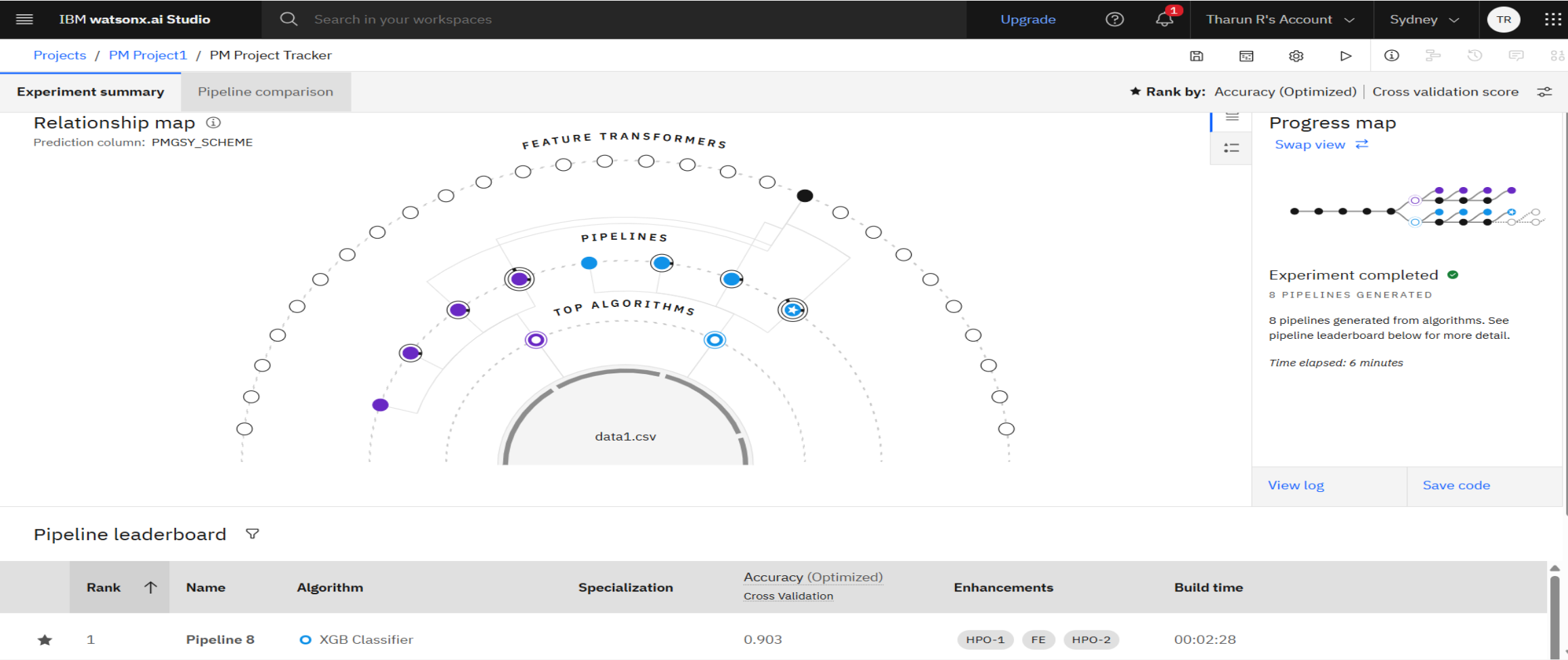
RESULT

■ Pipeline creation of the Project



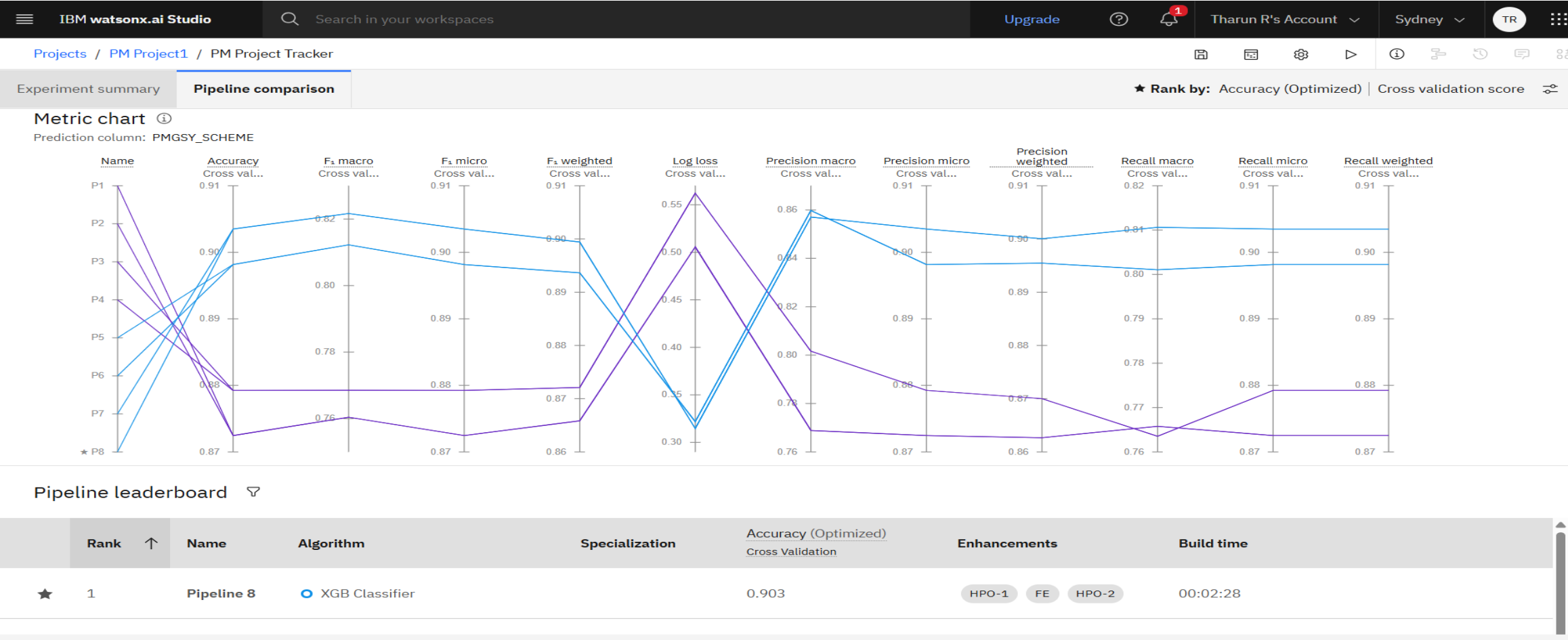
RESULT

■ Pipeline creation of the Project



RESULT






Pipeline comparison



RESULT

- Different Model's Accuracy

Pipeline leaderboard

	Rank 	Name	Algorithm	Specialization	Accuracy (Optimized) <u>Cross Validation</u>	Enhancements	Build time	
★	1	Pipeline 8	 XGB Classifier		0.903	HPO-1 FE HPO-2	00:02:22	
	2	Pipeline 7	 XGB Classifier		0.903	HPO-1 FE	00:01:11	Save as
	3	Pipeline 6	 XGB Classifier		0.898	HPO-1	00:00:23	
	4	Pipeline 5	 XGB Classifier		0.898	None	00:00:04	

RESULT

- Give input to the model

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

Tharun R's Account

Sydney

TR

Deployment spaces / PM Project Deployment1 / P8 - XGB Classifier: PM Project Tracker

PM Scheme1 Deployed Online

API referenceTest

Enter input data

TextJSON

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

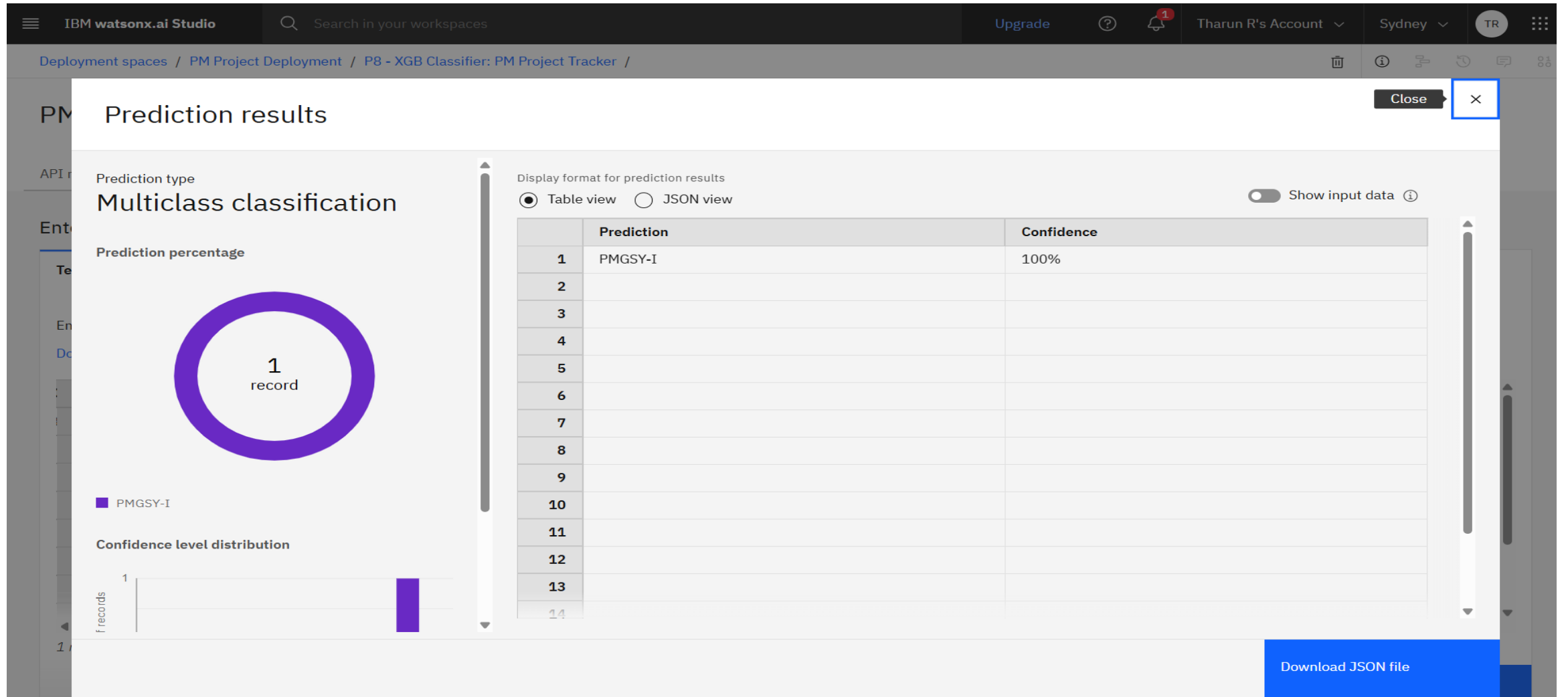
	DISTRICT_NAME (other)	NO_OF_ROAD_WORK_SANCTIONED (double)	NO_OF_BRIDGES_SANCTIONED (double)	NO_OF_ROAD_WORKS_COMPLETED (double)	NO_OF_BRIDGES_COMPLETED (double)
1	Kamrup Rural	766	133	766	133
2					
3					
4					
5					
6					
7					

1 row, 13 columns

Predict

RESULT

Model Prediction Result



RESULT

Model's Deployment Space

IBM watsonx.ai Studio

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1

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Deployments

Model details

Search

New deployment

Name	Type	Status	Tags	Last modified	
 PM Scheme	Online	 Deployed		15 minutes ago Tharun Ravi (You)	

Items per page: 20 1-1 of 1 items 1 of 1 pages

About this asset

Name

P8 - XGB Classifier: PM Project Tracker

Description

No description provided.

Asset Details

Type: wml-hybrid_0.1

Model ID: 8b1f7bf9-ebe3-44...

Software specification: hybrid_0.1

Hybrid pipeline software specifications: autoai-kb_rt24.1-py3.11

Tags

Add tags to make assets easier to find.

Source asset details

Last modified
16 minutes ago by Service

Created on
Jul 28, 2025 by Tharun Ravi

CONCLUSION

- This project successfully demonstrates how AI can simplify and accelerate the classification of rural infrastructure projects under the PMGSY scheme. By leveraging IBM Cloud tools, especially Watsonx.ai and Object Storage, a robust and deployable classification model was built with minimal code. This automated system helps decision-makers monitor progress and allocate funds more transparently and effectively.

FUTURE SCOPE

- Incorporate satellite imagery or geospatial features for even more robust classification.
- Integrate this model with existing PMGSY dashboards or GIS platforms.
- Expand classification to include project risk assessment, delay prediction, or quality monitoring using multimodal data.

REFERENCES

- https://aikosh.indiaai.gov.in/web/datasets/details/pradhan_mantri_gram_sadak_yojna_pmgsy.html
- IBM Watsonx.ai Documentation.
- IBM Cloud Object Storage Documentation.
- Research Papers on Infrastructure ML Models.

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THANK YOU