CAPSTONE PROJECT

INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECTS

Presented By:
Tharun R – VIT, Vellore – Department of Computer Science and Engineering

edunet foundation

OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result
- Conclusion
- Future Scope
- References

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_yojna_pmgsy.html

SYSTEM APPROACH

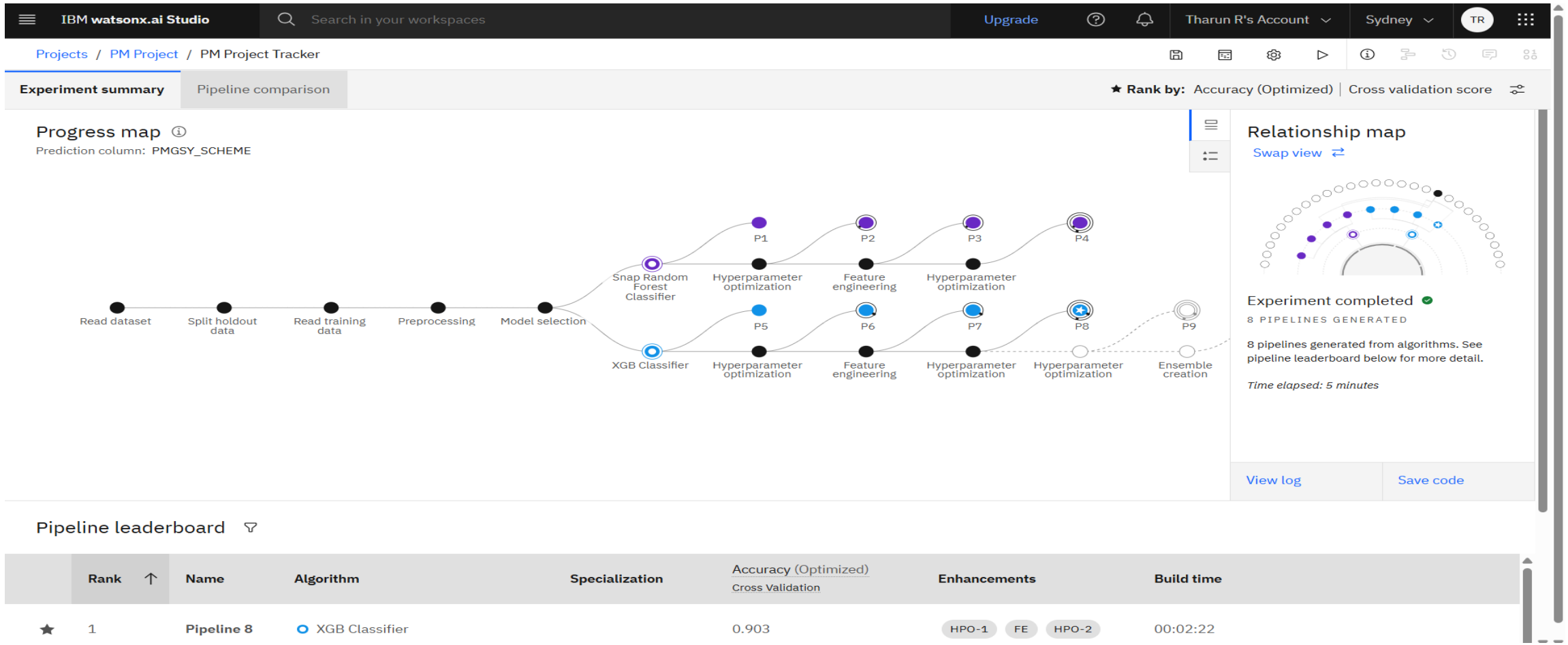
- **Platform:** IBM Watsonx.ai Studio
- **Storage:** IBM Cloud Object Storage (for training data)
- **Development Mode:** AutoAI (Build machine learning models automatically)
- **Model Deployment:** Model deployed as a RESTful endpoint using Watsonx
- **Languages:** Minimal Python (AutoAI handles most)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

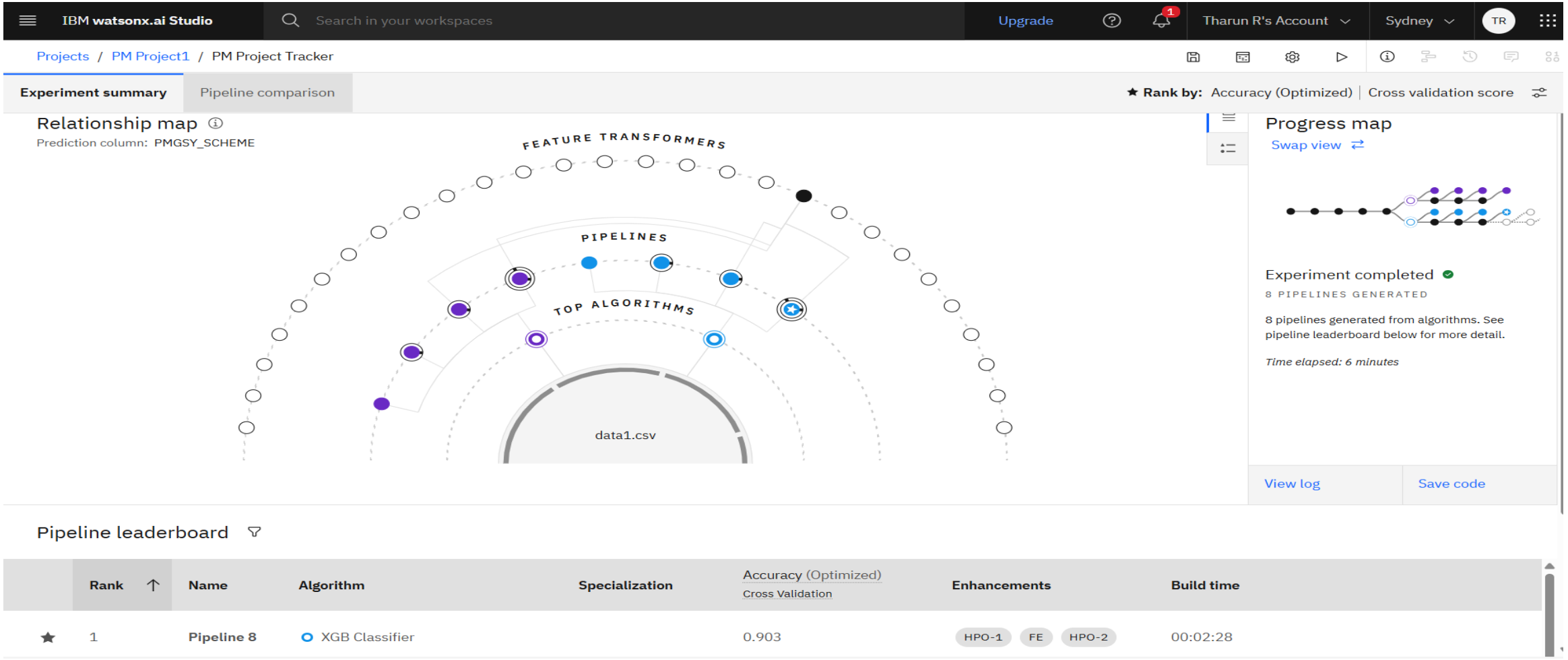
- Pipline creation of the Project



edunet foundation

RESULT

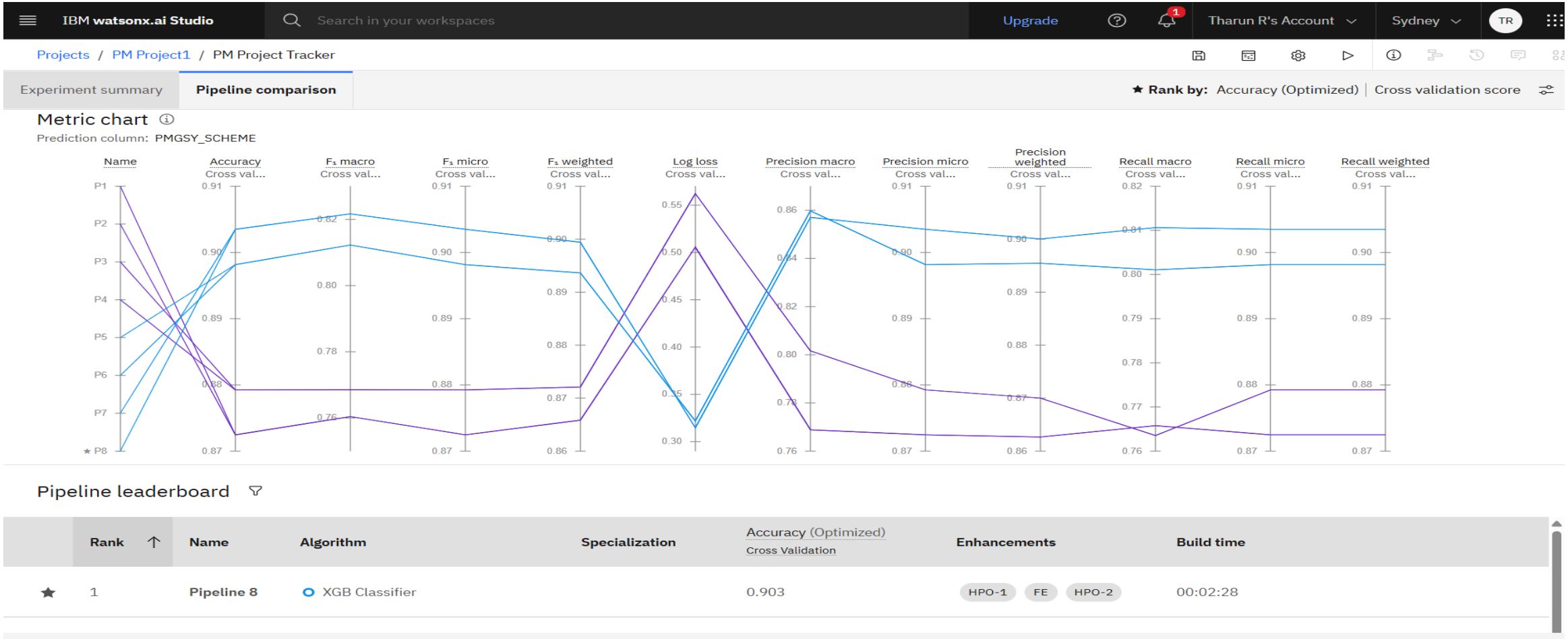
- Pipeline creation of the Project



edunet foundation

RESULT

- Pipeline comparison



edunet foundation

RESULT

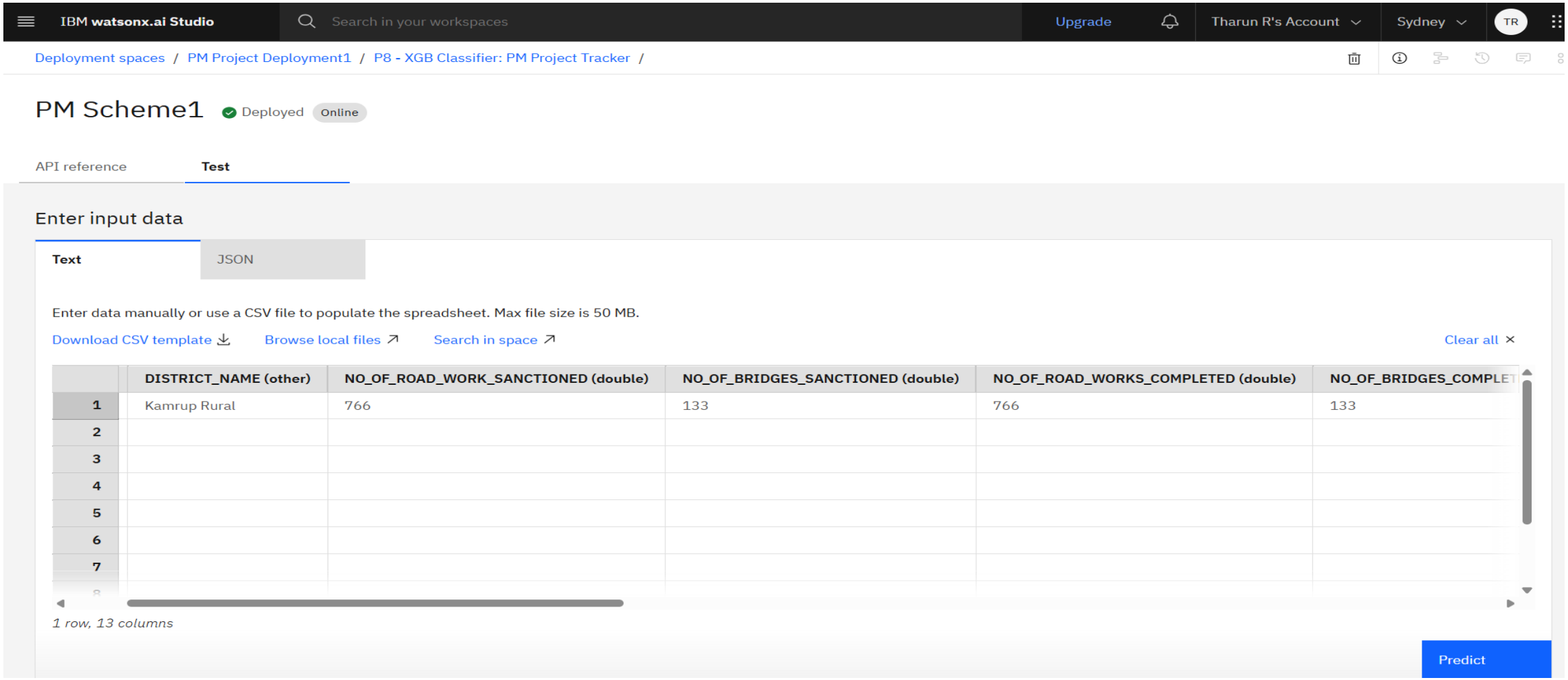
- Different Model's Accuracy

Pipeline leaderboard

	Rank	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	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

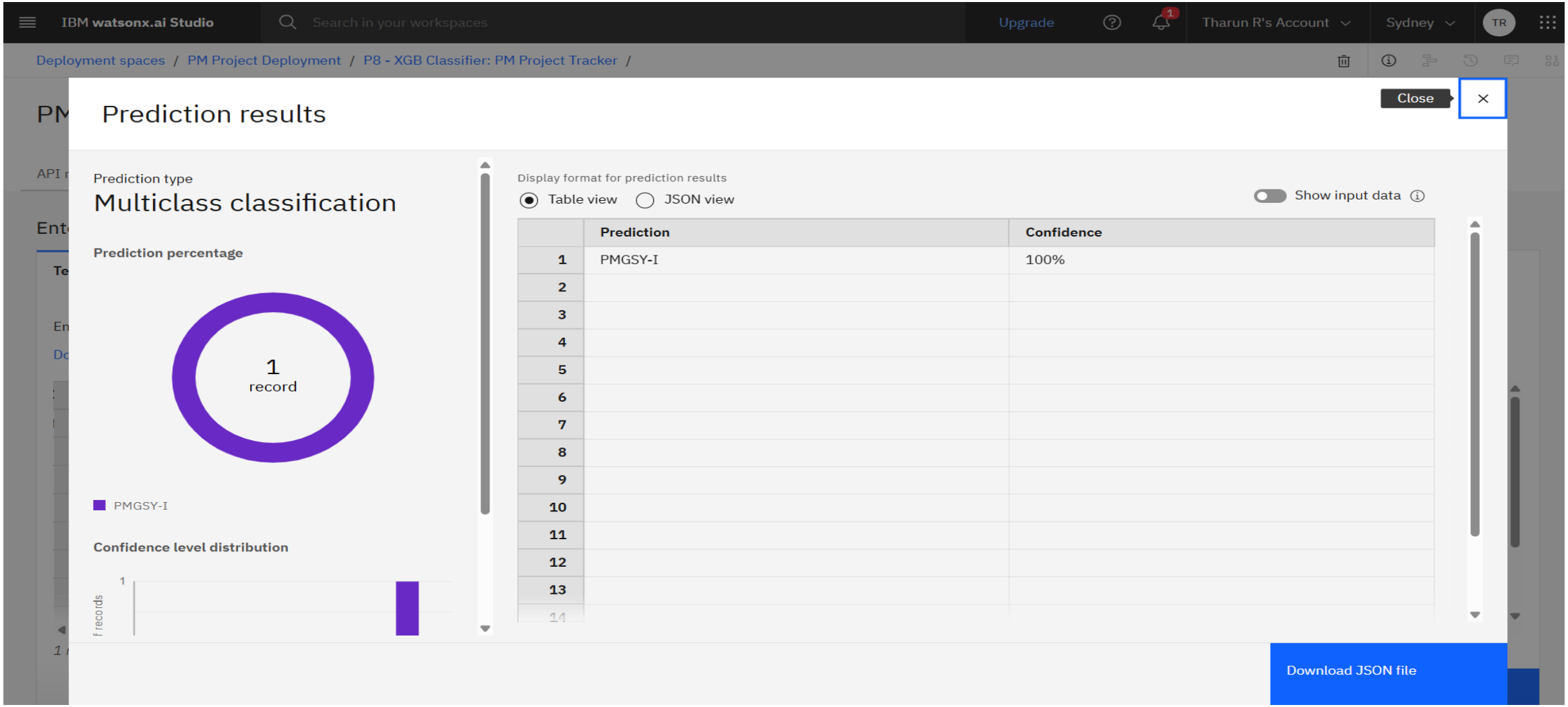
- Give input to the model



edunet foundation

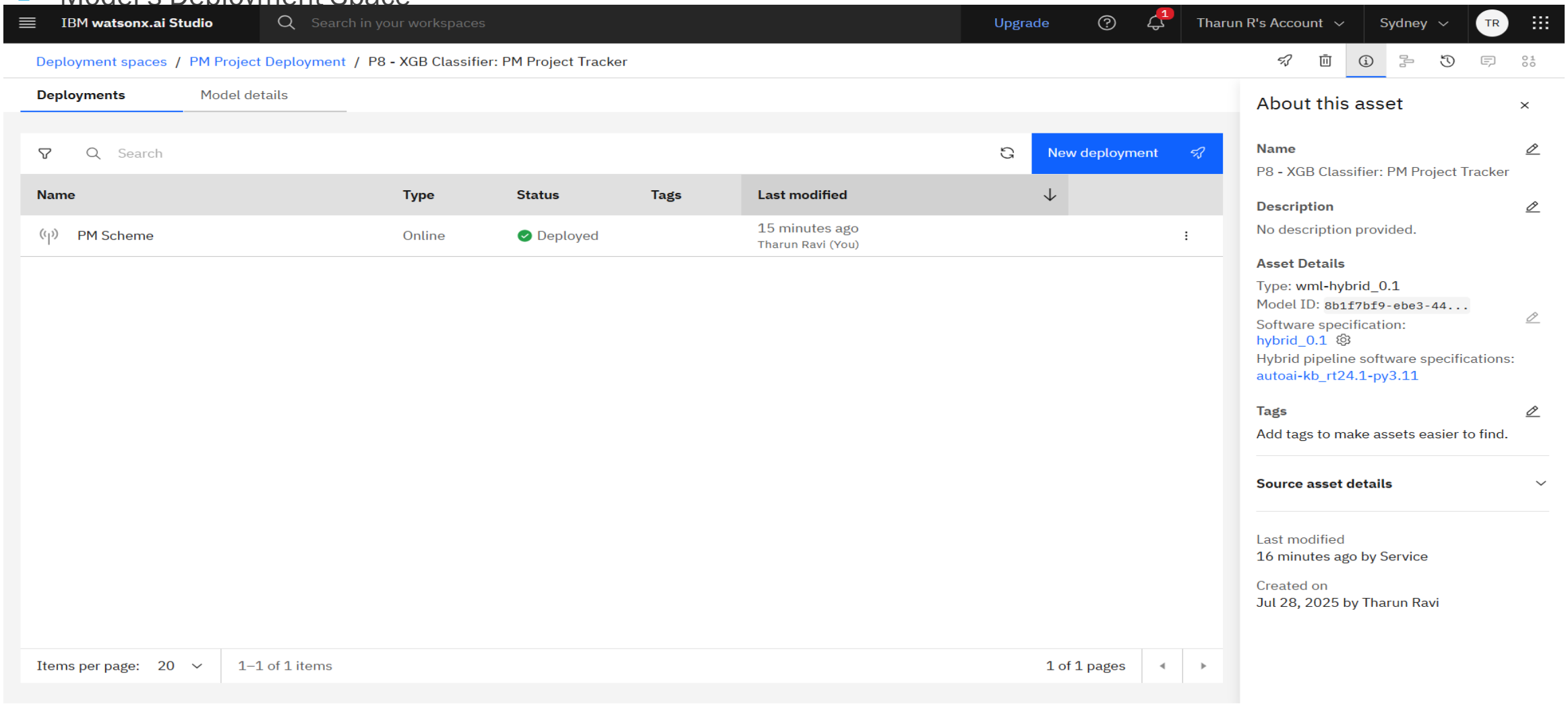
RESULT

- Model Prediction Result



RESULT

- Model's Deployment Space



edunet foundation

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.

IBM CERTIFICATIONS

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Journey to Cloud: Envisioning Your Solution
IBM SkillsBuild

IBM

Tharun R

Has successfully satisfied the requirements for:

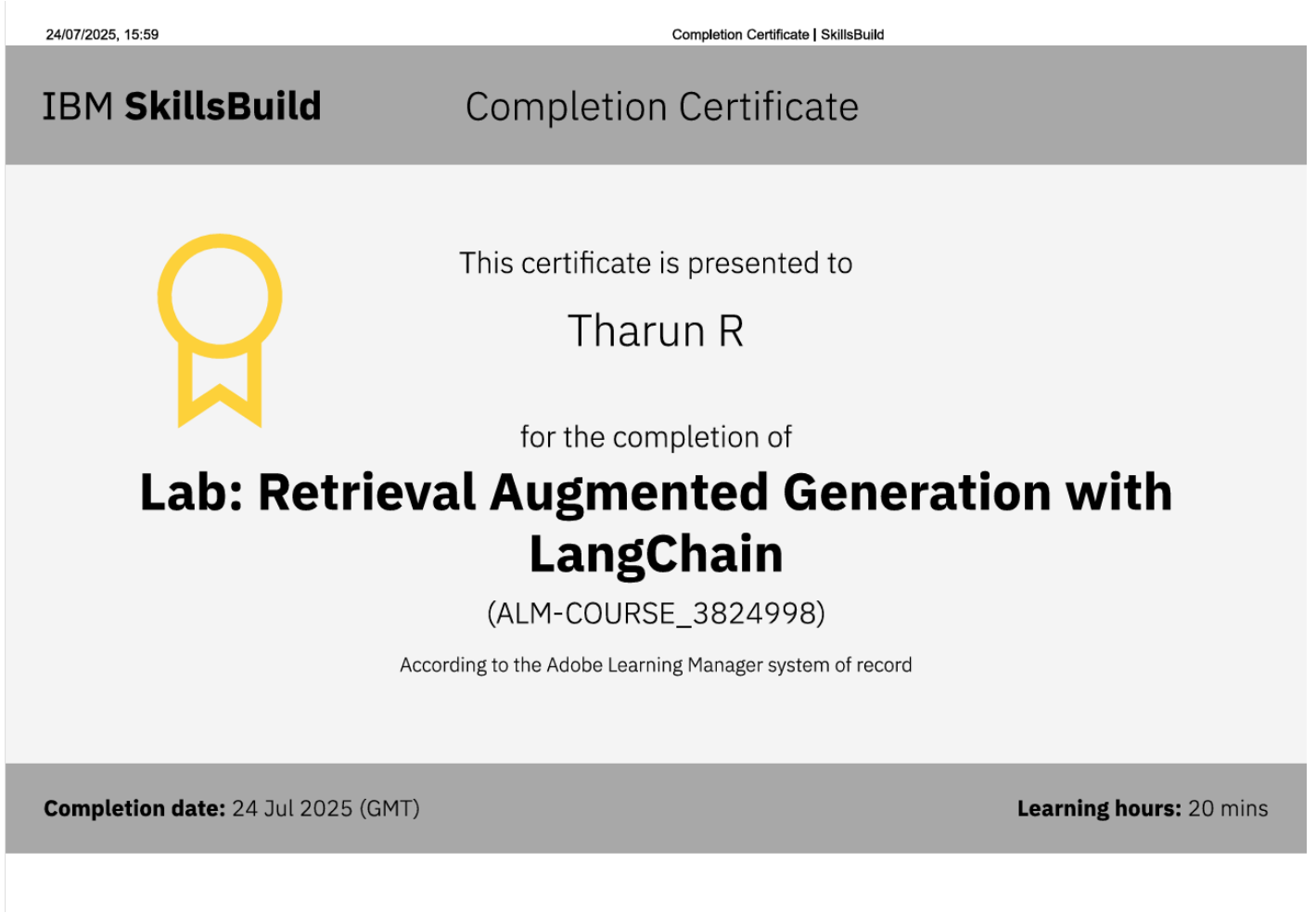
Journey to Cloud: Envisioning Your Solution

Issued on: Jul 18, 2025
Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/e5ecbb4a-6fe9-49b9-8e74-6686014e2741

IBM

IBM CERTIFICATIONS



24/07/2025, 15:59 Completion Certificate | SkillsBuild

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Tharun R

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT) **Learning hours:** 20 mins

THANK YOU

edunet foundation