CAPSTONE PROJECT

INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECT UNDER PMGSY

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PROBLEM STATEMENT

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a flagship Indian Government scheme aimed at developing rural road infrastructure to ensure all-weather connectivity to unconnected villages.

Over time, the PMGSY scheme has evolved into multiple phases:

PMGSY-I,PMGSY-II,RCPLWEA, etc.

Each of these sub-schemes has unique objectives, funding rules, technical specifications, and monitoring protocols.

Key Problem:

Thousands of road and bridge construction projects need to be classified into the correct scheme. Manual classification is:

Time-consuming

Error-prone

Not scalable

Proposed Solution:

To solve this challenge, we developed a machine learning model using IBM AutoAI that takes project characteristics (length, cost, duration, etc.) and predicts the appropriate PMGSY scheme. This automates classification and speeds up decision-making in government departments.

TECHNOLOGY USED

- **IBM Watson Studio** – for AutoAI model building
- **IBM AutoAI** – for automated machine learning pipeline generation
- **IBM Cloud Object Storage** – for uploading and managing datasets
- **IBM Watson Machine Learning** – for model deployment and serving
- **Dataset Source** – AI-KOSH Dataset for PMGSY

IBM CLOUD SERVICES USED

The following IBM Cloud services were used to implement this solution:

1. Watson Studio

Provides a Jupyter Notebook and AutoAI interface for developing and evaluating machine learning models.

2. AutoAI

AutoAI automatically:

•Preprocesses the data

•Selects suitable ML algorithms

•Performs hyperparameter optimization

•Ranks models based on accuracy and other metrics

3. Cloud Object Storage

Used to upload and store the .csv dataset containing project data.

4. Watson Machine Learning (WML)

Used to deploy the trained model as an API for real-world inference and integration into apps or dashboards.

WOW FACTORS

What makes this project innovative and impactful?

Auto-classification of infrastructure projects with high accuracy

Uses AutoAI – no manual code needed for model selection or optimization

Reduces classification time from hours to seconds

Enhances transparency and accuracy in fund allocation under PMGSY

Can be deployed as a REST API for integration into government dashboards

Model is continuously improvable with new data

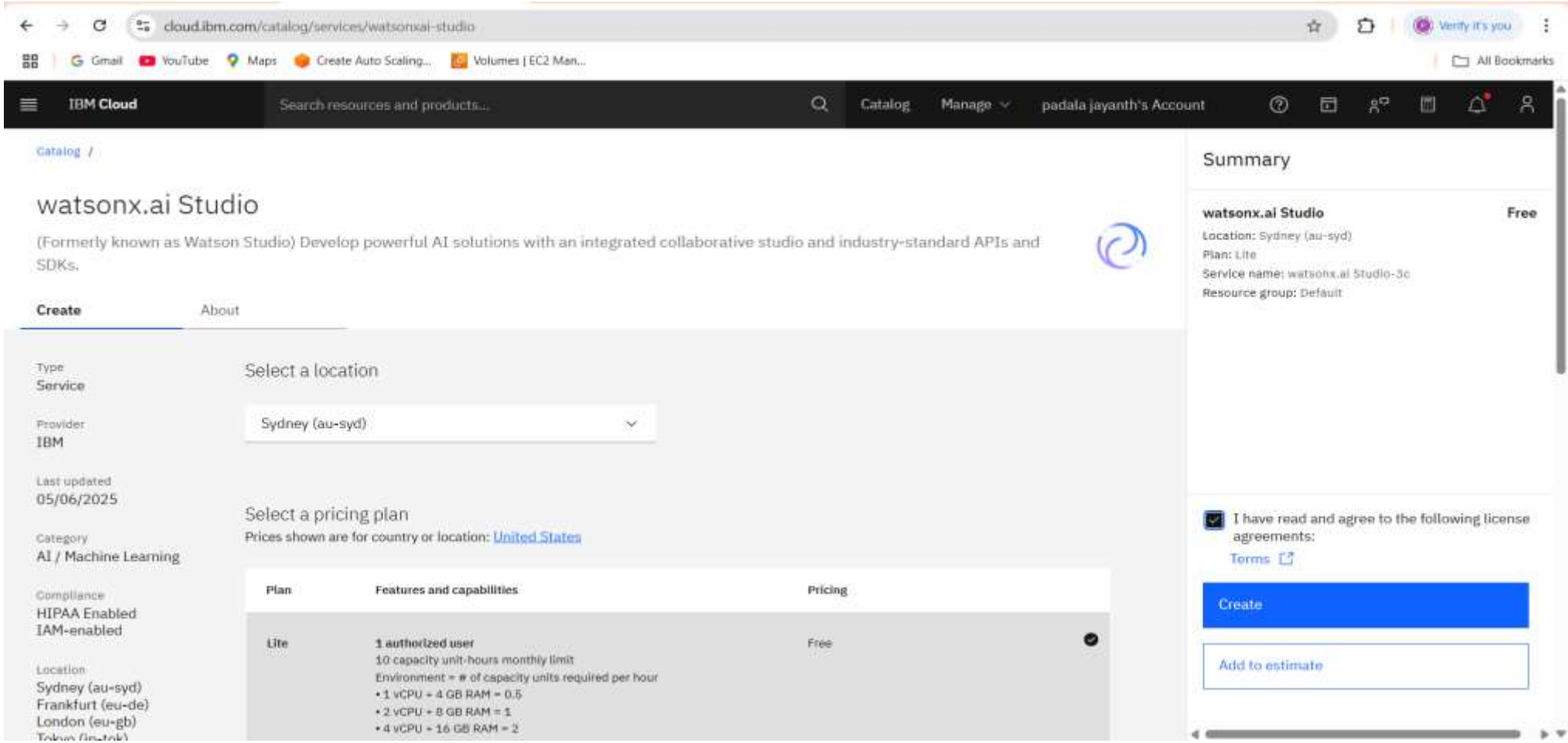
END USERS

This AI-based classification model can be used by:

- **Government Planning Officers** – For monitoring and scheme assignment
- **Rural Development Department Officials** – To track compliance and progress
- **Data Analysts in Public Sector** – For visualizing and reporting on infrastructure projects
- **MIS Dashboard Developers** – To integrate predictions into real-time decision systems

RESULTS

CREATING WATSONX.AI STUDIO



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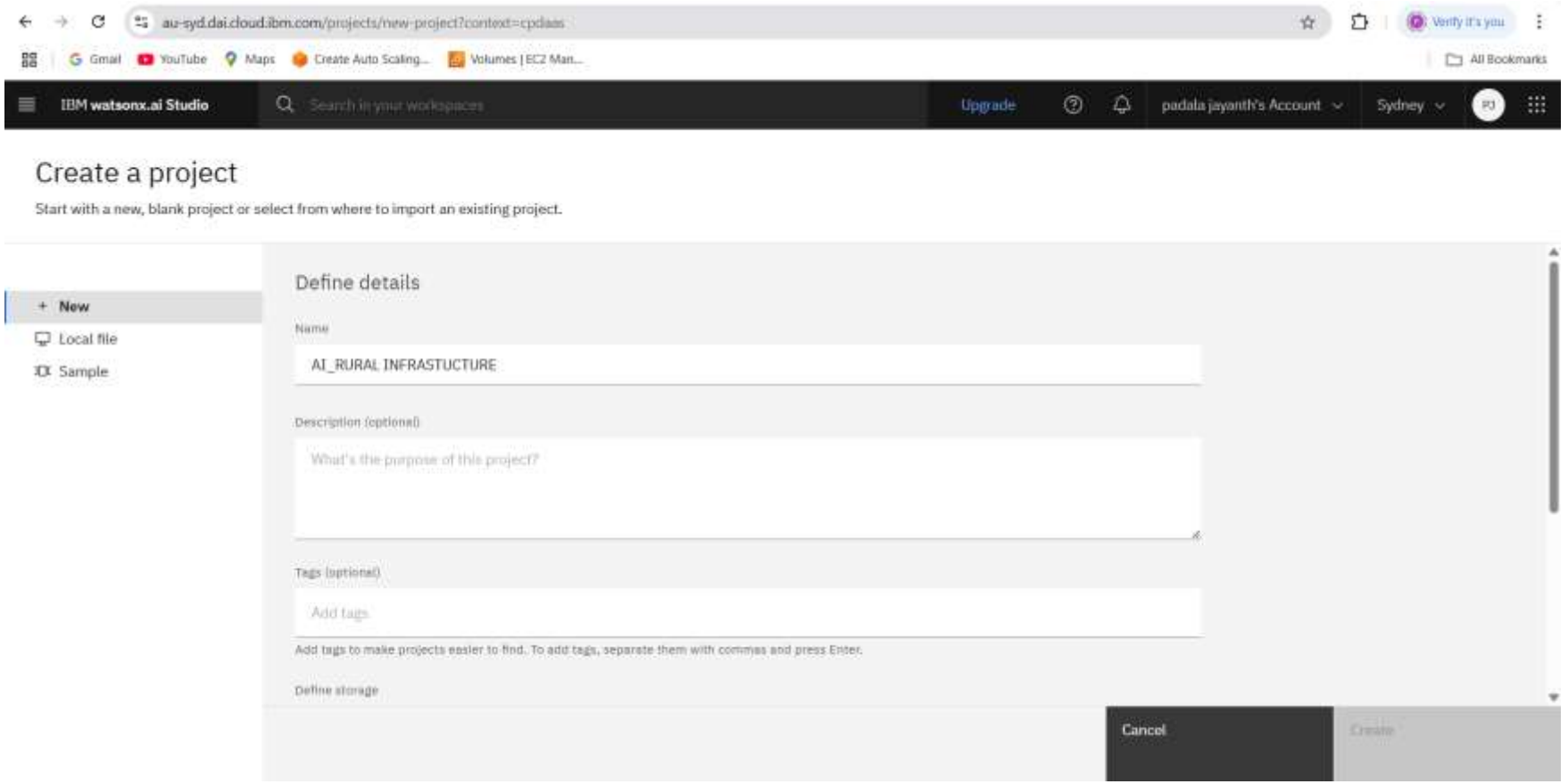
RESULTS

CREATING A PROJECT IN WATSONX AI



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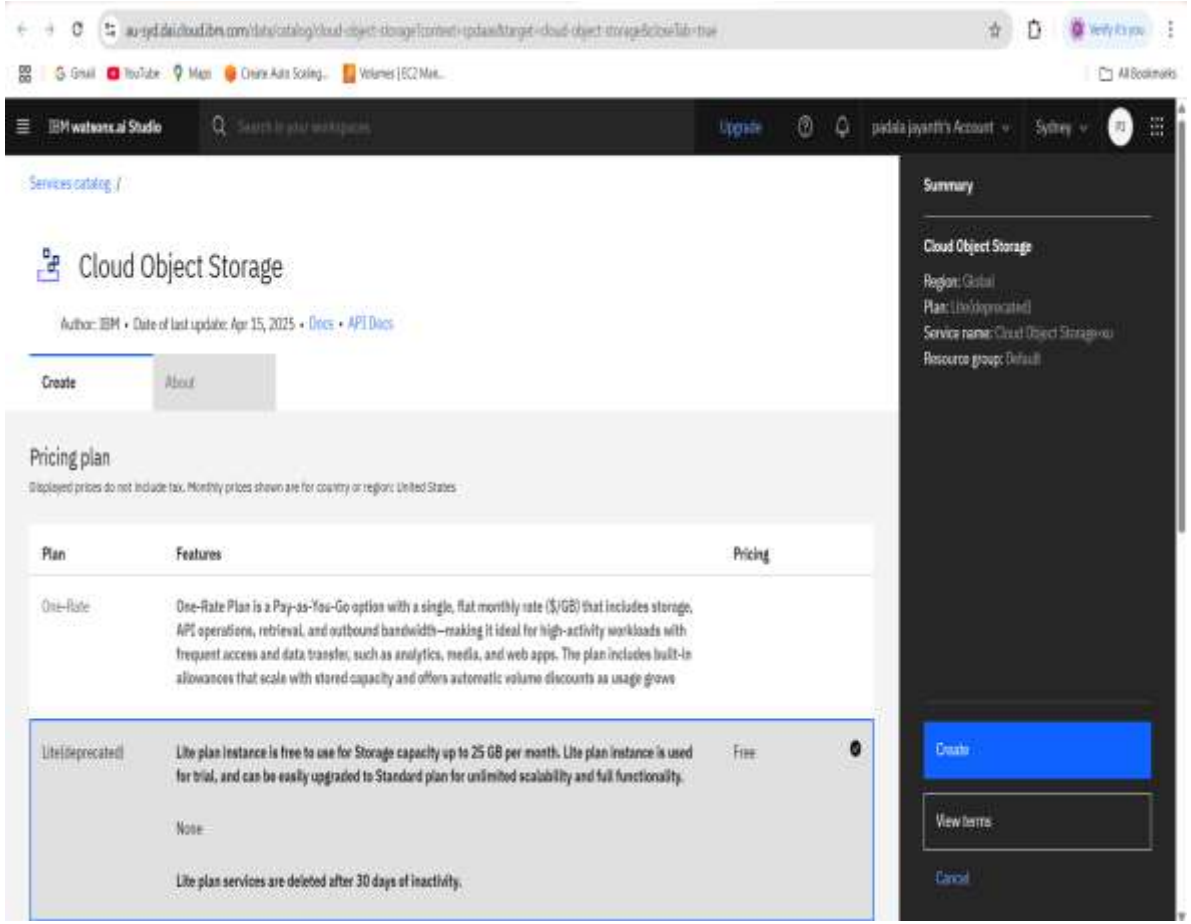
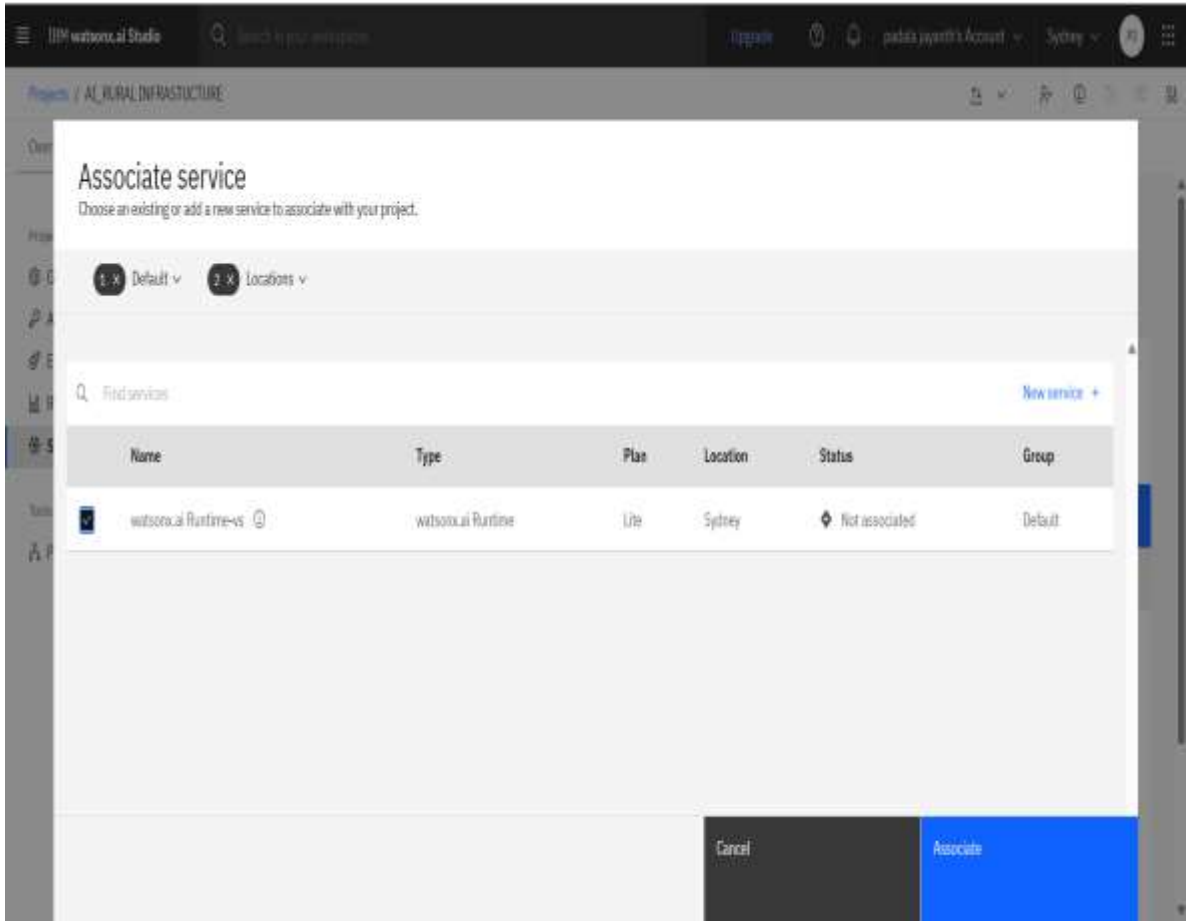
RESULTS

CREATING CLOUD STORAGE OBJECT & ASSOCIATE SERVICE





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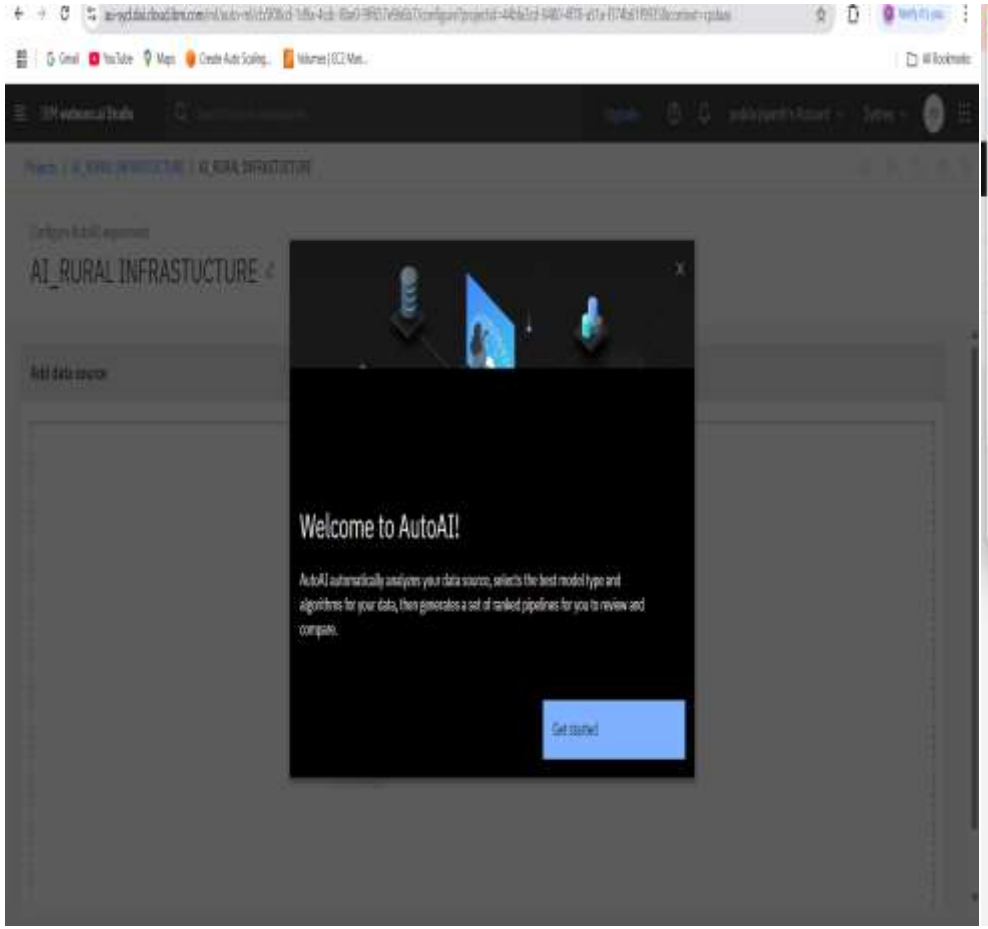
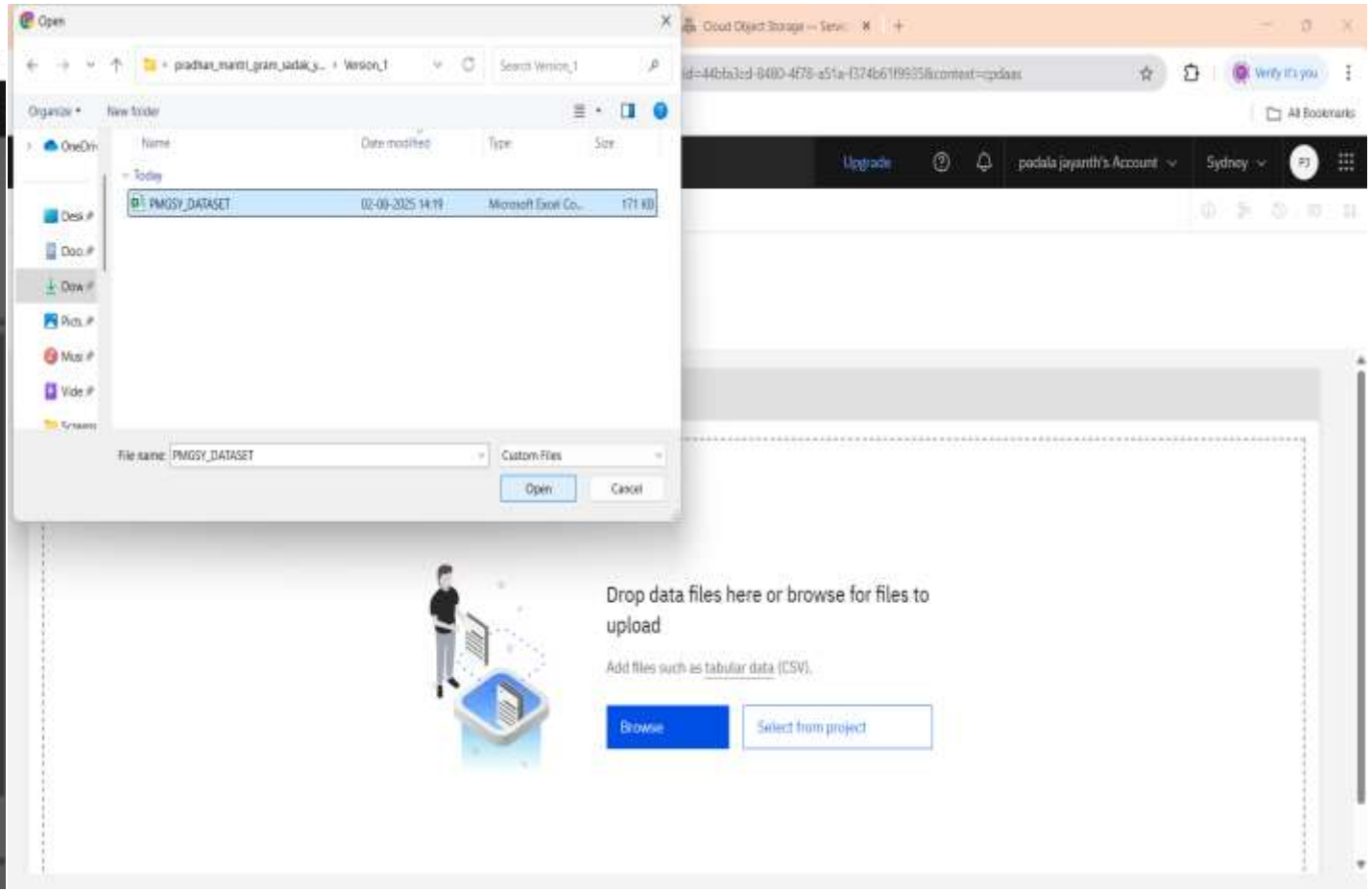
RESULTS

- AUTO AI & UPLOAD DATASET





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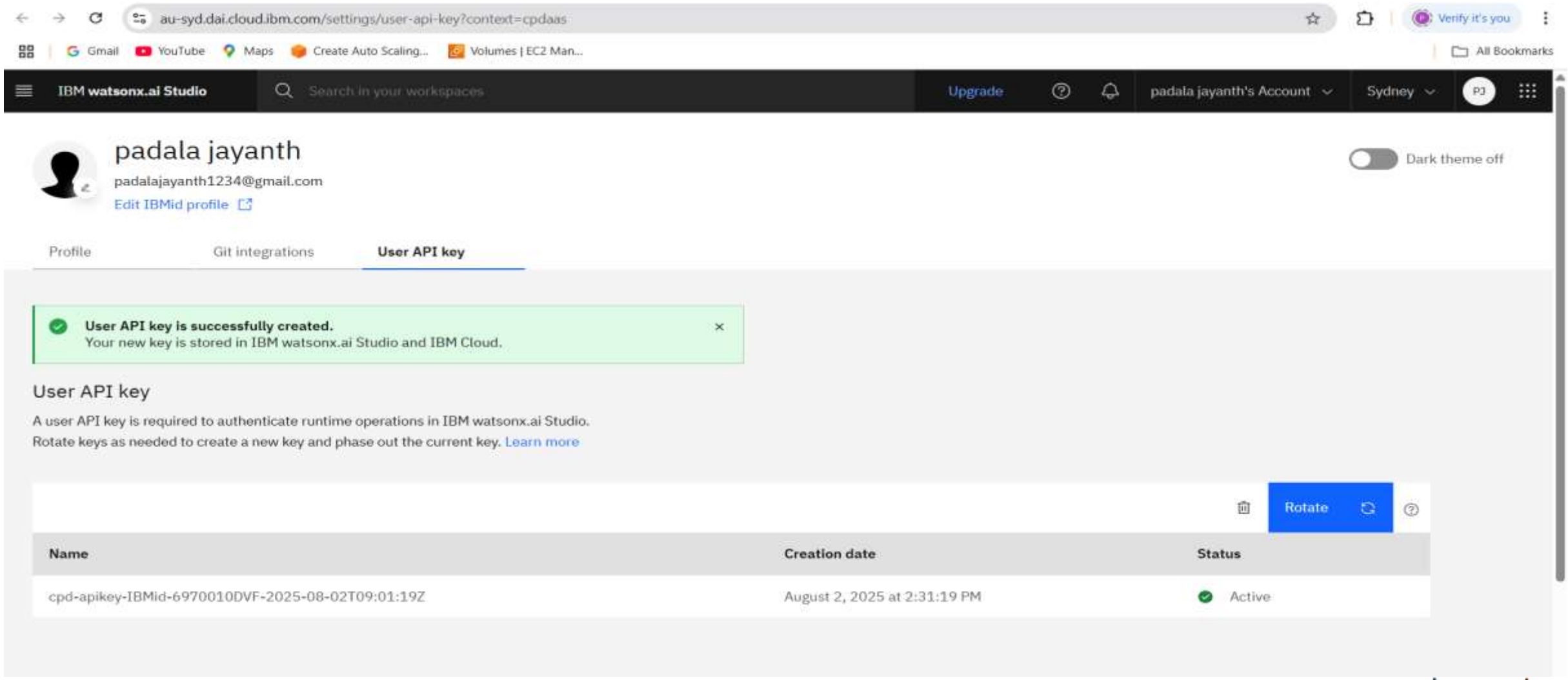
RESULTS

- CREATING USER API



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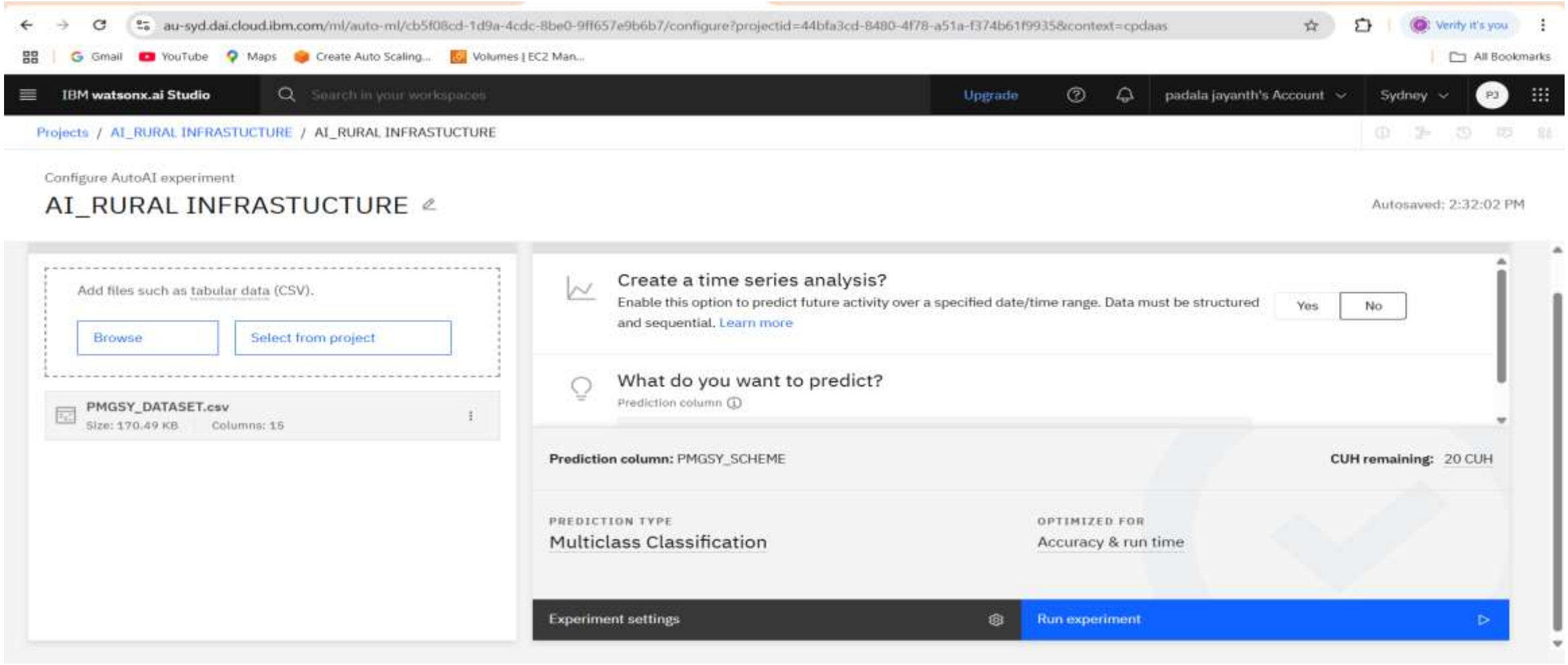
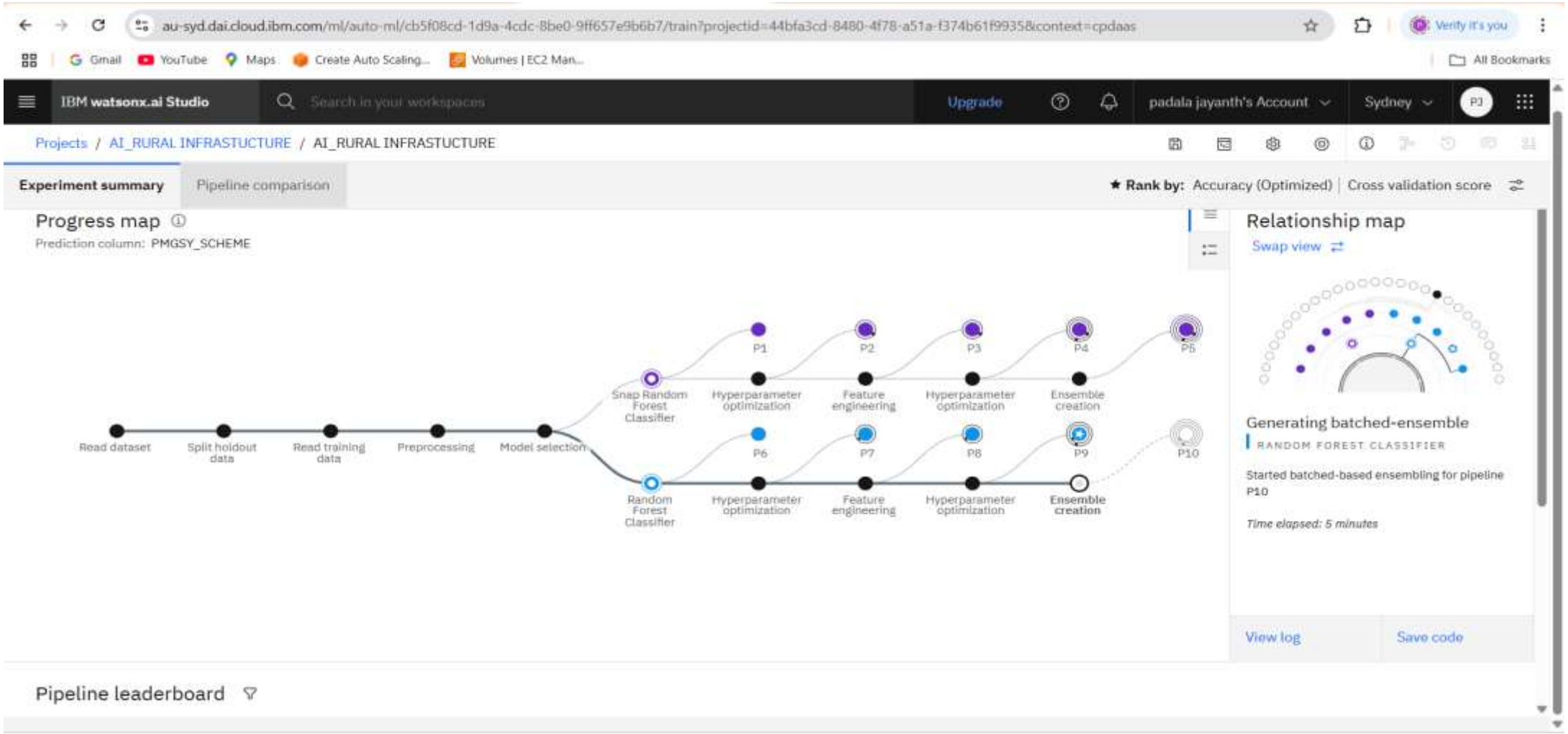
RESULTS

- SELECTING PREDICTING COLUMN:-PMGSY_SCHEME



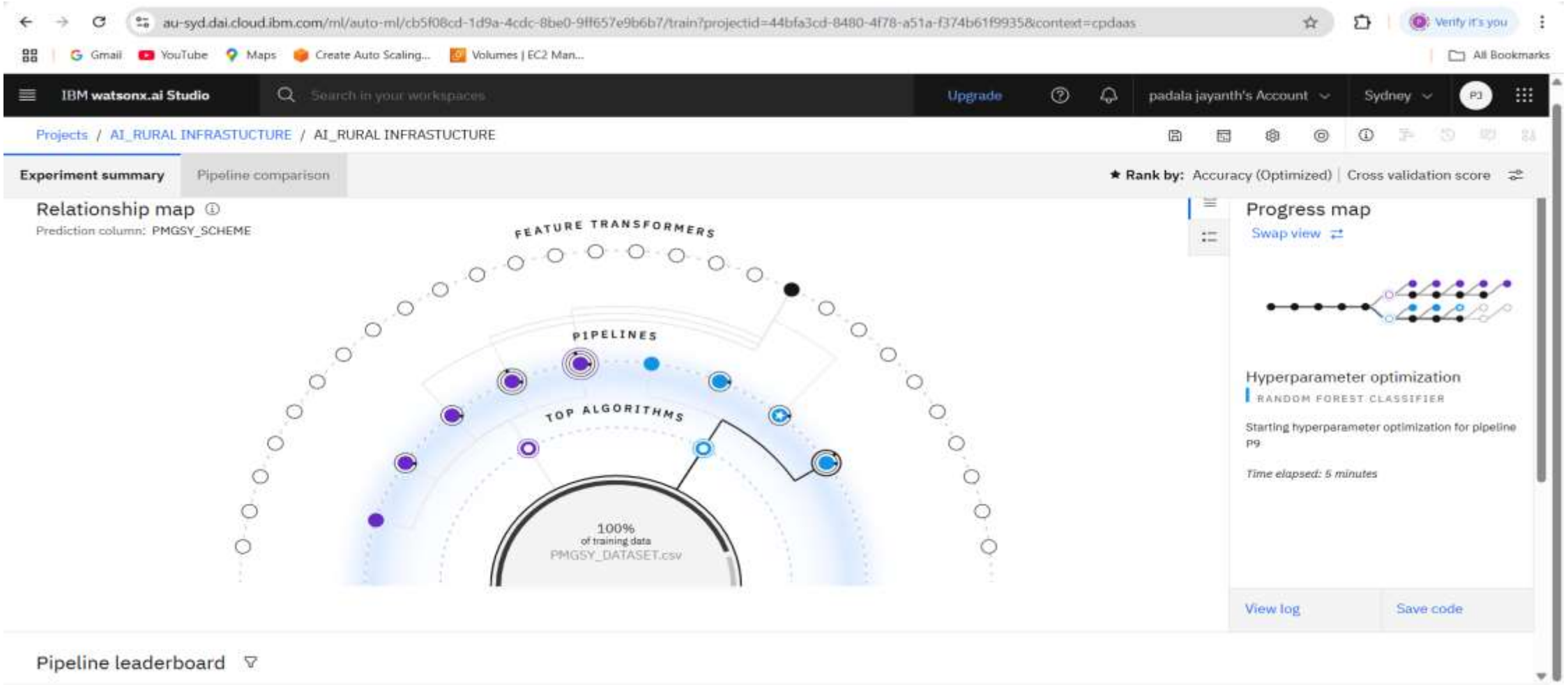
RESULTS

- REALATIONSHIP MAP



RESULTS

- PROGRESS MAP



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RESULTS

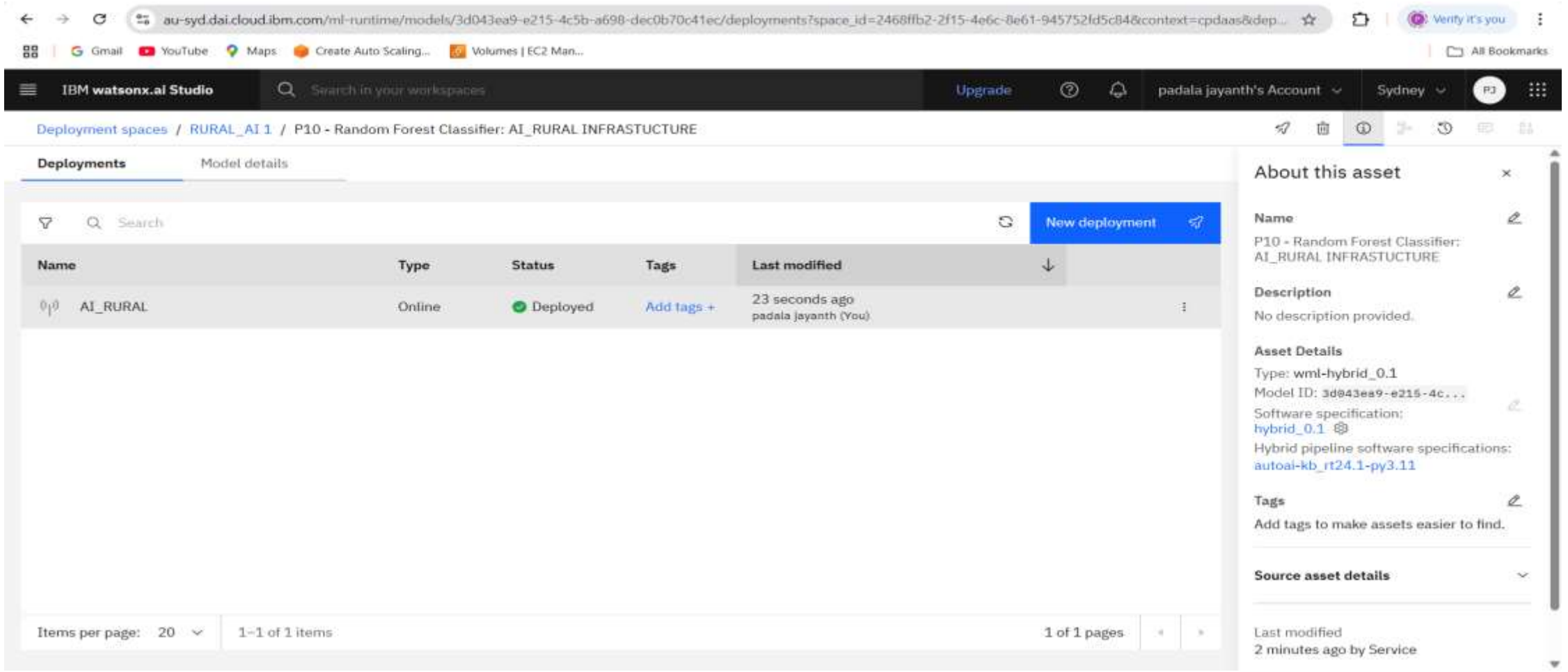
- PIPELINE LEADER BOARD

Pipeline leaderboard

	Rank	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 10	Batched Tree Ensemble Classifier (Random Forest Classifier)	INCR	0.902	HPO-1 FE HPO-2 BATCH	00:00:53
	2	Pipeline 9	Random Forest Classifier		0.902	HPO-1 FE HPO-2	00:00:49
	3	Pipeline 8	Random Forest Classifier		0.902	HPO-1 FE	00:00:34
	4	Pipeline 5	Batched Tree Ensemble Classifier (Snap Random Forest Classifier)	INCR	0.899	HPO-1 FE HPO-2 BATCH	00:01:28

RESULTS

DEPLOYED MODEL



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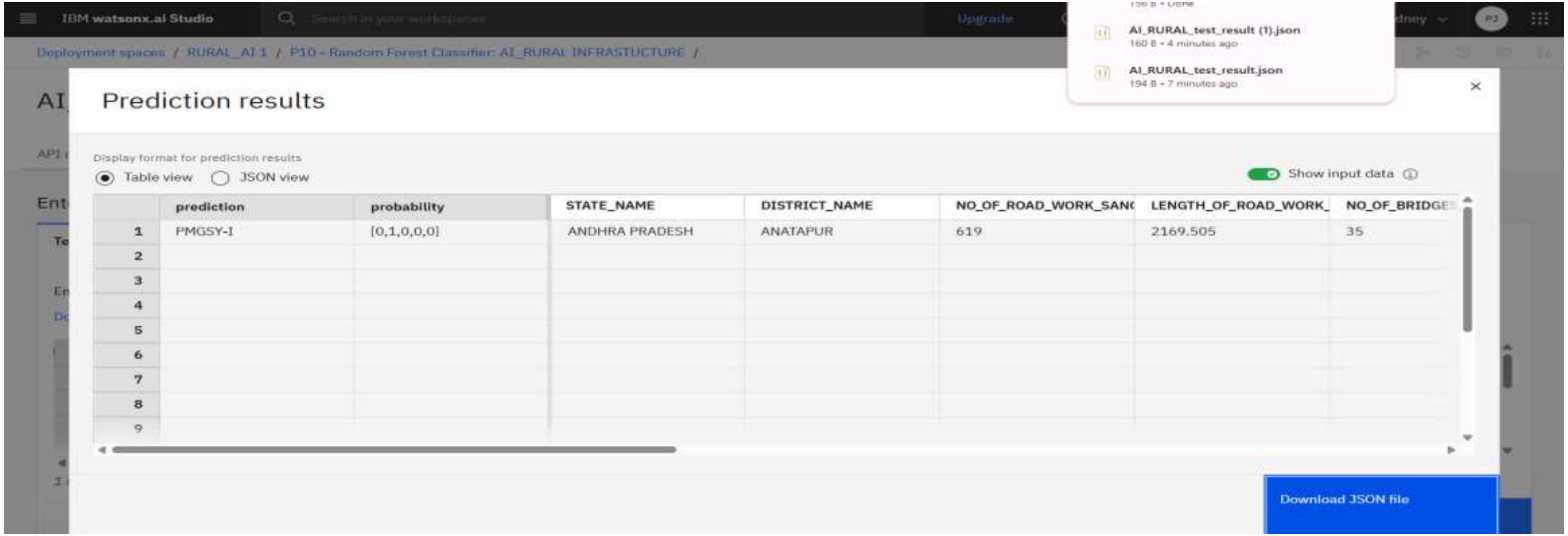
RESULTS

PREDICITION RESULTS



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CONCLUSION

This project solves a real-world problem using the power of AI and IBM Cloud services.

- It automates a complex classification task
- Ensures government schemes are accurately tracked and managed
- Reduces errors and manual workload
- Scales easily to thousands of new infrastructure records

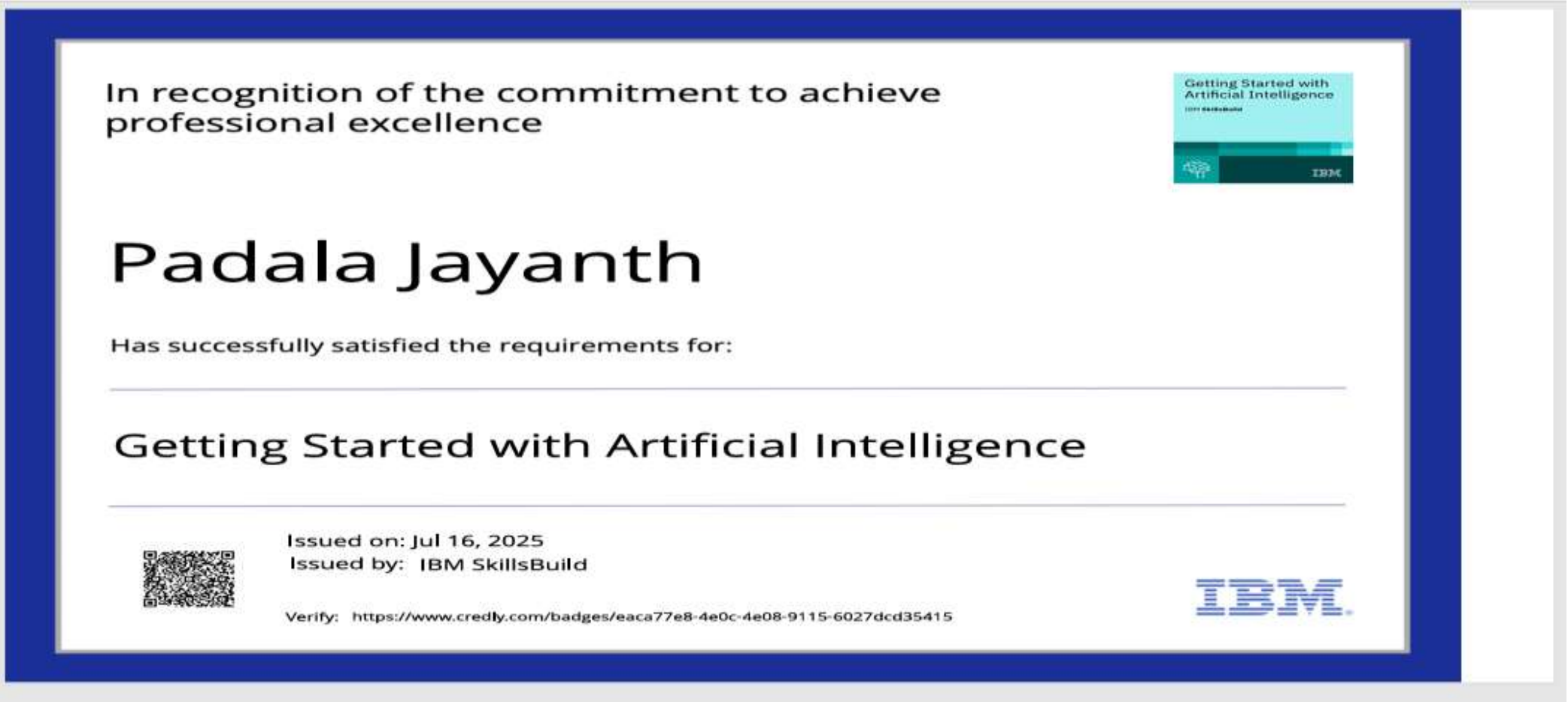
The approach demonstrates the value of combining open government data with enterprise-grade cloud AI tools like AutoAI.

FUTURE SCOPE

- **Add Location Features**: Include GPS coordinates for better regional prediction
- **Time-Series Integration**: Track how schemes evolve across time
- **Explainable AI (XAI)**: Add interpretability for planners
- **Integration with GIS/MIS Tools**: Real-time visualization and alerts
- **Scale to Other Schemes**: Adapt model for Pradhan Mantri Awas Yojana, Jal Jeevan Mission,

IBM CERTIFICATIONS

GETTING STARTED WITH AI



JOURNEY TO CLOUD

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Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution

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According to the Adobe Learning Manager system of record

Completion date: 18 Jul 2025 (GMT) **Learning hours:** 20 mins

GITHUB LINK

- GITHUB LINK :- padalajayanth/RURAL_INFRASTUCTURE_PMGSY

THANK YOU

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