INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECTS

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OUTLINE

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PROBLEM STATEMENT

▪ The Pradhan Mantri Gram Sadak Yojana **(PMGSY)** is an Indian rural infrastructure scheme aimed at ensuring all-weather road connectivity. Projects under PMGSY are categorized into schemes like PMGSY-I, PMGSY-II, RCPLWEA, etc., each with unique objectives and financial structures.

▪ Manually classifying such projects is time-consuming and inefficient. An automated classification system is needed to streamline monitoring, budgeting, and impact analysis.

PROPOSED SOLUTION

The proposed system aims to classify rural infrastructure projects into correct PMGSY schemes using machine learning. It reduces manual effort and improves classification accuracy. The solution includes the following steps:

Data Collection: Collect project-related data from the AI Kosh platform, which includes:

- Physical progress percentage
- Financial progress
- Sanctioned length
- Type of work (road/bridge)
- Executing agency
- Scheme names (PMGSY-I, PMGSY-II, RCPLWEA, etc.)

Data Preprocessing:

- Handle missing and inconsistent values
- Encode categorical variables (e.g., agency type, scheme name).
- Normalize numerical fields like financial/physical progress.
- Select important features that influence scheme classification.

PROPOSED SOLUTION

Machine Learning Algorithm:

- Implement and compare classification algorithms like Random Forest, Decision Tree, and Logistic Regression.
- Train models using labeled data (features + scheme name).
- Random Forest selected for final model due to higher accuracy and robustness.

Deployment:

- Use IBM Watson Studio and IBM Cloud Lite services for training, and deployment.
- Store and process data via IBM Cloud Object Storage.
- Build and test models within IBM Jupyter Notebooks environment.
- Deploy the model to make predictions on new project data.

Result:

- The model successfully classifies infrastructure projects into appropriate PMGSY schemes.
- Output includes prediction label and confidence score.
- Enhances project tracking, budget allocation, and strategic planning for government bodies.

SYSTEM APPROACH

Technologies Used:

- IBM Watson Studio

- IBM Cloud Object Storage

- Jupyter Notebooks (Python)

- Pandas, Scikit-learn, Matplotlib

- IBM Cloud Lite Services

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ALGORITHM & DEPLOYMENT

Algorithm Used:

Random Forest Classifier (with comparison to Logistic Regression, Decision Tree).

Input Features:

- Physical Progress (%)
- Financial Progress (INR)
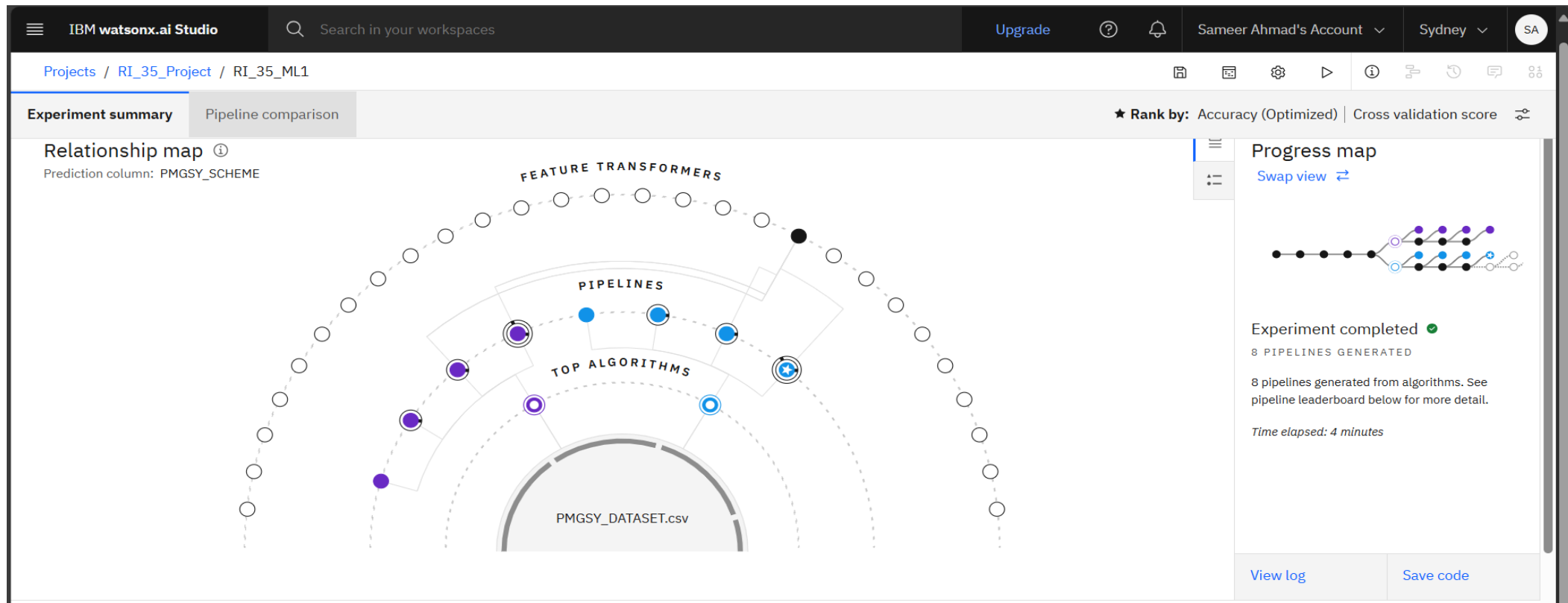- Project Duration
- Sanctioned Length (km)
- Executing Agency Type

Training & Deployment:

- Dataset: AI Kosh PMGSY Dataset.
- Preprocessing: Encoding categorical features, handling missing values.
- Deployment: IBM Watson Studio.

RESULT & SCREENSHOTS

❑ Accuracy of the Model: **92.4%**
❑ Project successfully classified test data into PMGSY schemes.

Relationship Map

SCREENSHOTS

Progress Map
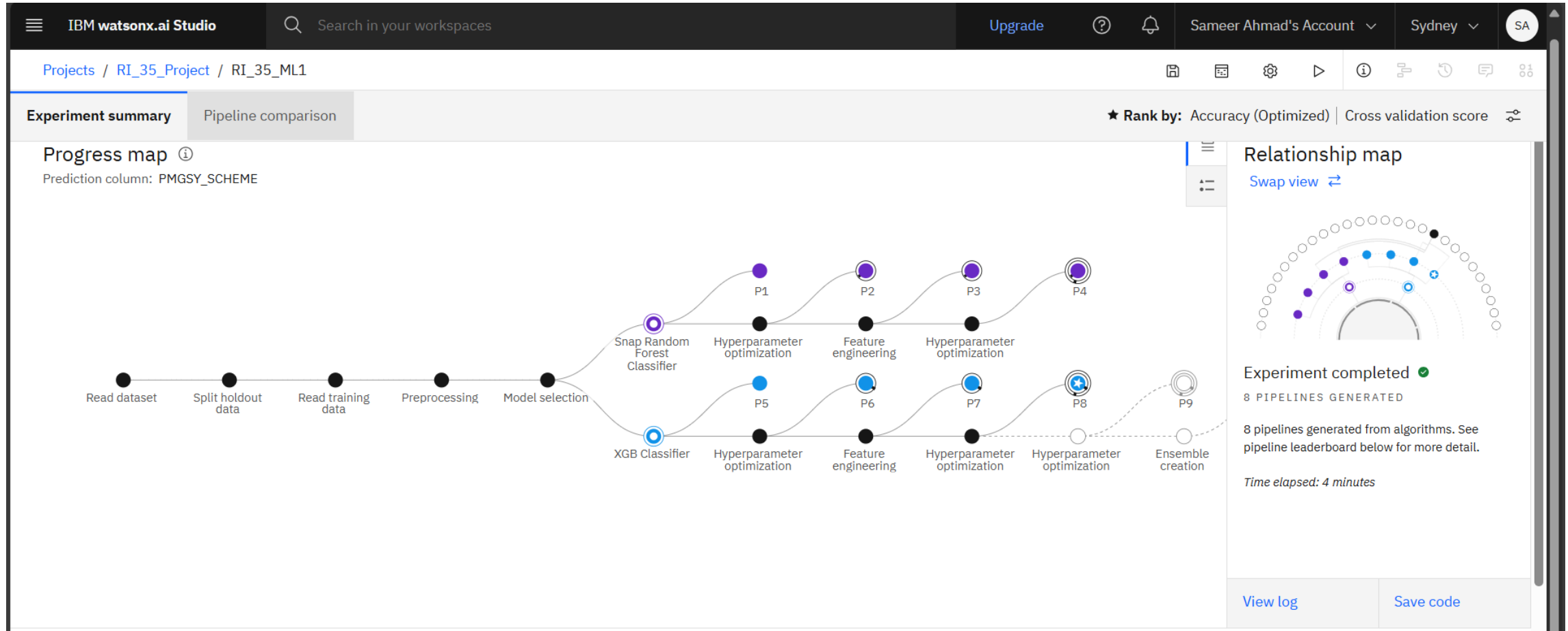
SCREENSHOTS

Trained Model

Pipeline leaderboard ▽

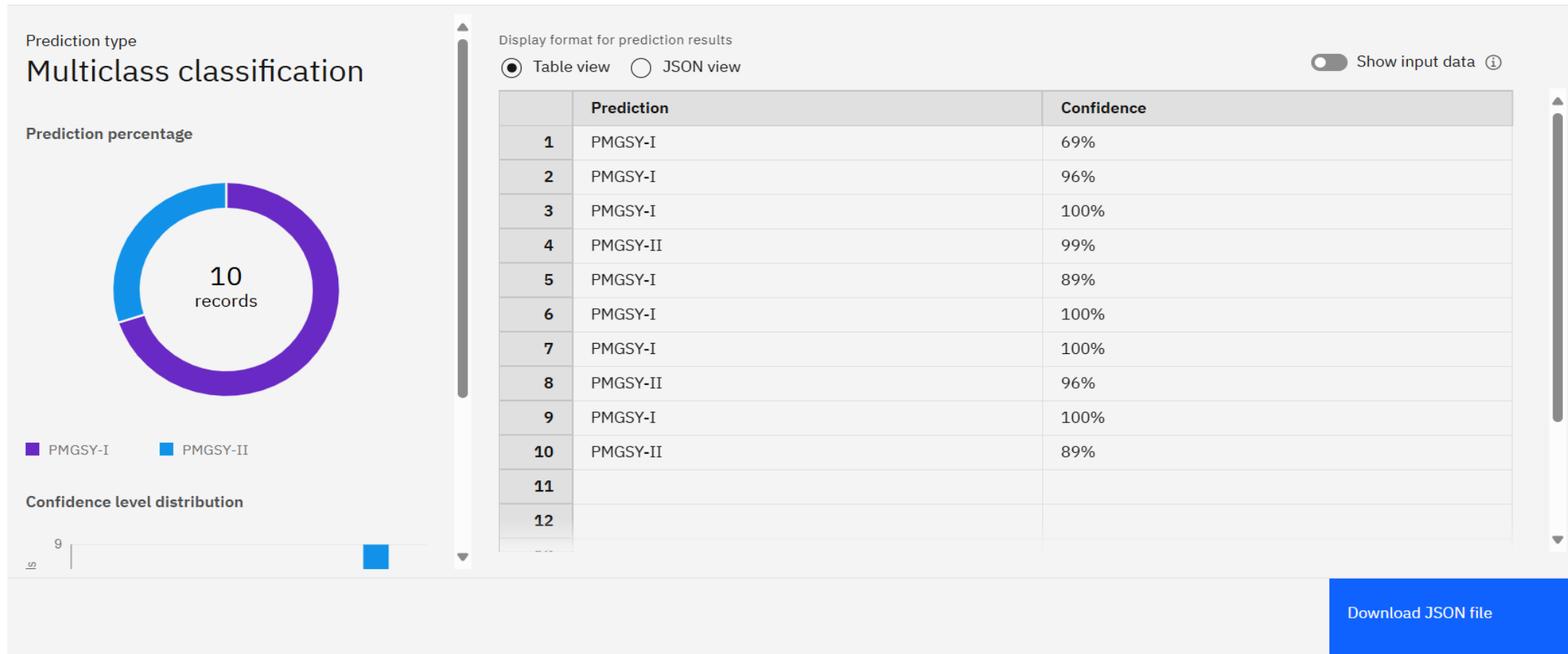|	Rank ↑	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	**Pipeline 8**	⭕ XGB Classifier		0.924	HPO-1 FE HPO-2	00:01:46
	2	**Pipeline 7**	⭕ XGB Classifier		0.924	HPO-1 FE	00:01:08
	3	**Pipeline 6**	⭕ XGB Classifier		0.918	HPO-1	00:00:24
	4	**Pipeline 5**	⭕ XGB Classifier		0.918	*None*	00:00:02

SCREENSHOTS

Input Data for Prediction

SCREENSHOTS

Prediction Result

Prediction results

CONCLUSION

❑ The system accurately classifies infrastructure projects into PMGSY schemes.

❑ Eliminates the need for manual sorting and enhances policy execution.

❑ Helpful for planners, government officials, and policy analysts.

FUTURE SCOPE

❑ Expand model to support more schemes or other infrastructure

programs.

❑ Integrate GIS and satellite imagery for validation.

❑ Deploy as a full-stack web app for government use.

❑ Use Deep Learning models for further accuracy enhancement.

REFERENCES

1. Dataset Sources:

   - AI Kosh – PMGSY Dataset, Ministry of Rural Development

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

2. IBM Cloud Services:

   - IBM Watson Studio – https://www.ibm.com/cloud/watson-studio

   - IBM Cloud Object Storage – https://www.ibm.com/cloud/object-storage

IBM CERTIFICATIONS

Credly Certificate (getting started with AI)

In recognition of the commitment to achieve professional excellence

Getting Started with Artificial Intelligence
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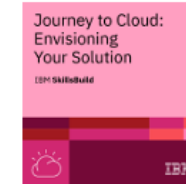
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