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# **CAPSTONE PROJECT**

## **INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE**

**Presented By:**

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# OUTLINE

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

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# PROBLEM STATEMENT

The Pradhan Mantri Gram Sadak Yojana (PMGSY) aims to improve rural connectivity by developing all-weather roads and bridges. With multiple schemes under its umbrella (PMGSY-I, PMGSY-II, RCPLWEA, etc.), each having unique objectives and funding structures, accurate classification of projects is critical for monitoring progress, optimizing resource allocation, and policy evaluation.

However, manual classification of thousands of infrastructure projects based on physical and financial features is time-consuming, error-prone, and non-scalable. The challenge is to **design and develop a machine learning model that can automatically classify a project into its correct PMGSY\_SCHEME**, enabling faster, more reliable, and scalable decision-making support for planners and analysts.

# PROPOSED SOLUTION

To address the classification challenge, we propose building a supervised machine learning model that can automatically categorize road and bridge construction projects into the correct PMGSY scheme based on their physical and financial attributes.

## ■ Key Components

- **Data Collection:** Use the AI Kosh Dataset on PMGSY.
- **Data Preprocessing:** Clean and normalize the data.
- **Feature Engineering:** Selecting impactful attributes for classification.
- **Model Selection:** Comparing algorithms like Random Forest, XGBoost, etc.
- **Model Evaluation:** Using accuracy, F1-score, and confusion matrix.

# SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the rental bike prediction system. Here's a suggested structure for this section:

## ■ System requirements

- IBM Cloud (Mandatory)
- IBM Watson Studio for model development and deployment
- IBM Cloud Object Storage for dataset handling
- Utilized AutoAI for automated model building and selection

# ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**

- XGB Classifier

- **Data Input:**

- No of road work sanctioned, Length of road work sanctioned, No of bridges sanctioned and Cost of work sanctioned from dataset.

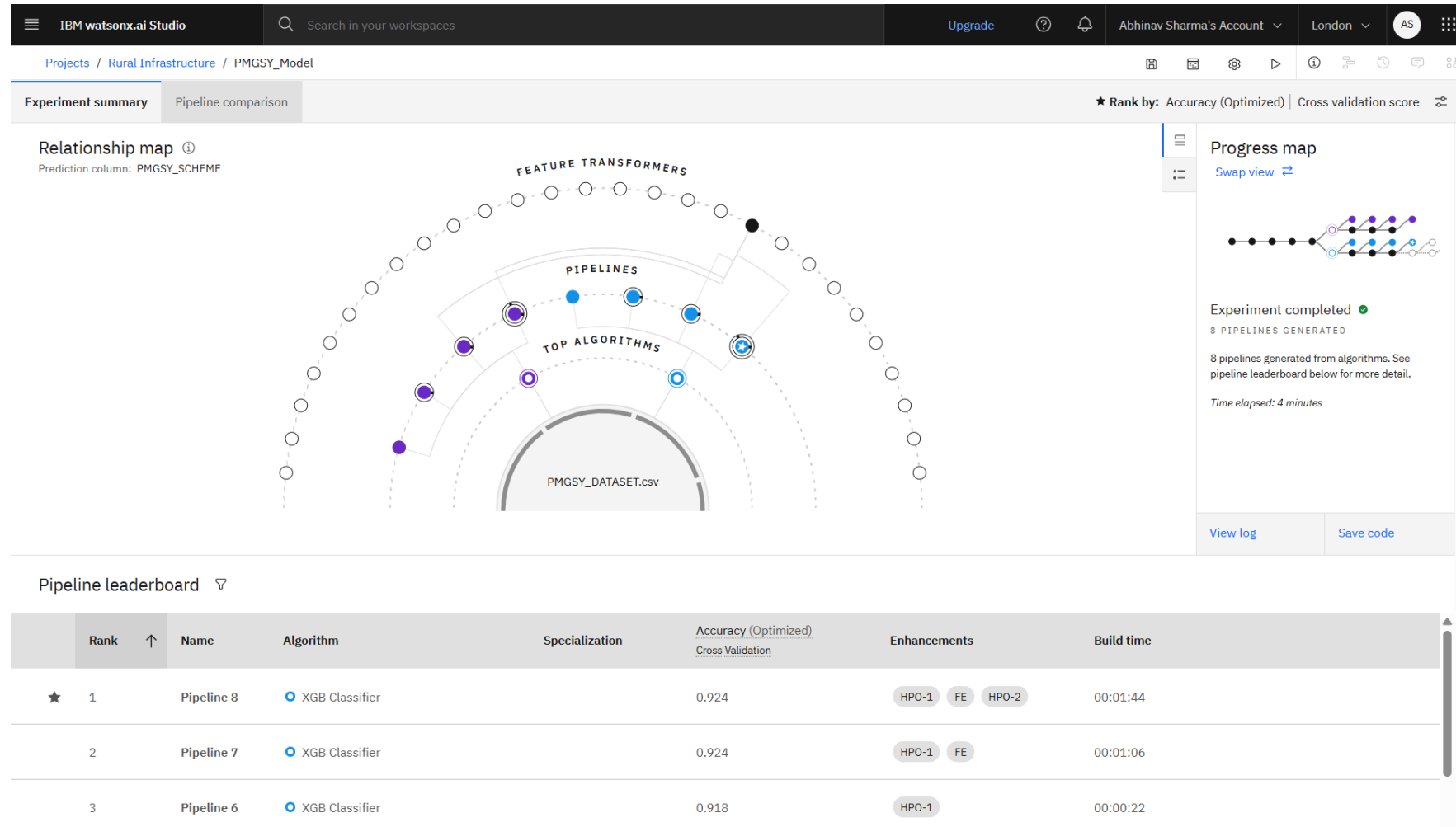
- **Training Process:**

- Supervised Learning using labelled PMGSY Scheme.

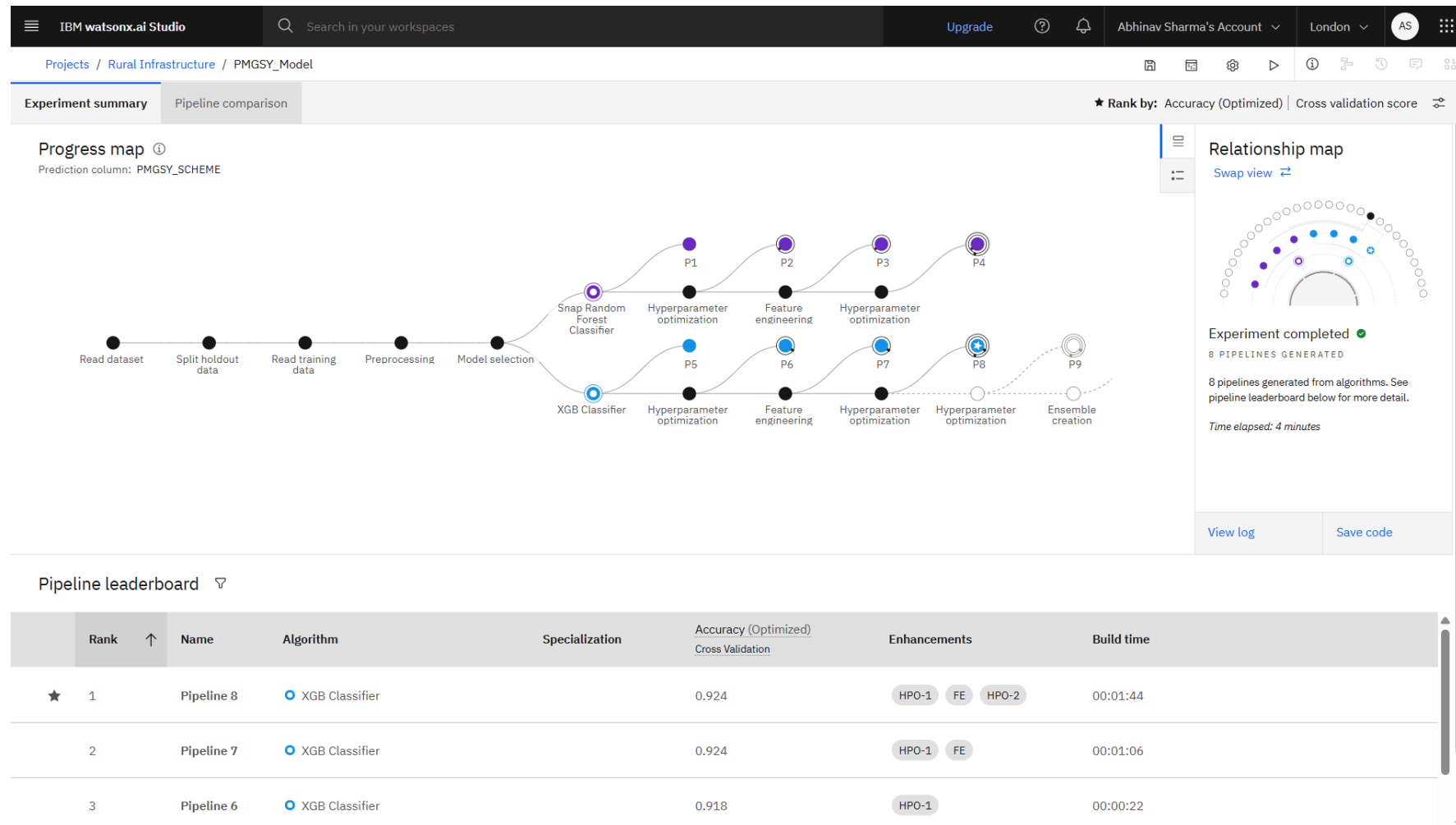
- **Prediction Process:**

- The model takes physical and financial features of a project as input and predicts the corresponding PMGSY scheme with API end-points for real-time prediction.

# RESULT



# RESULT





# RESULT

IBM watsonx.ai Studio

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Deployment spaces / Rural Infrastructure 0 / P8 - XGB Classifier: PMGSY\_Model

PMGSY\_Dep

Deployed

Online

API reference

Test

Enter input data

Text

JSON

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

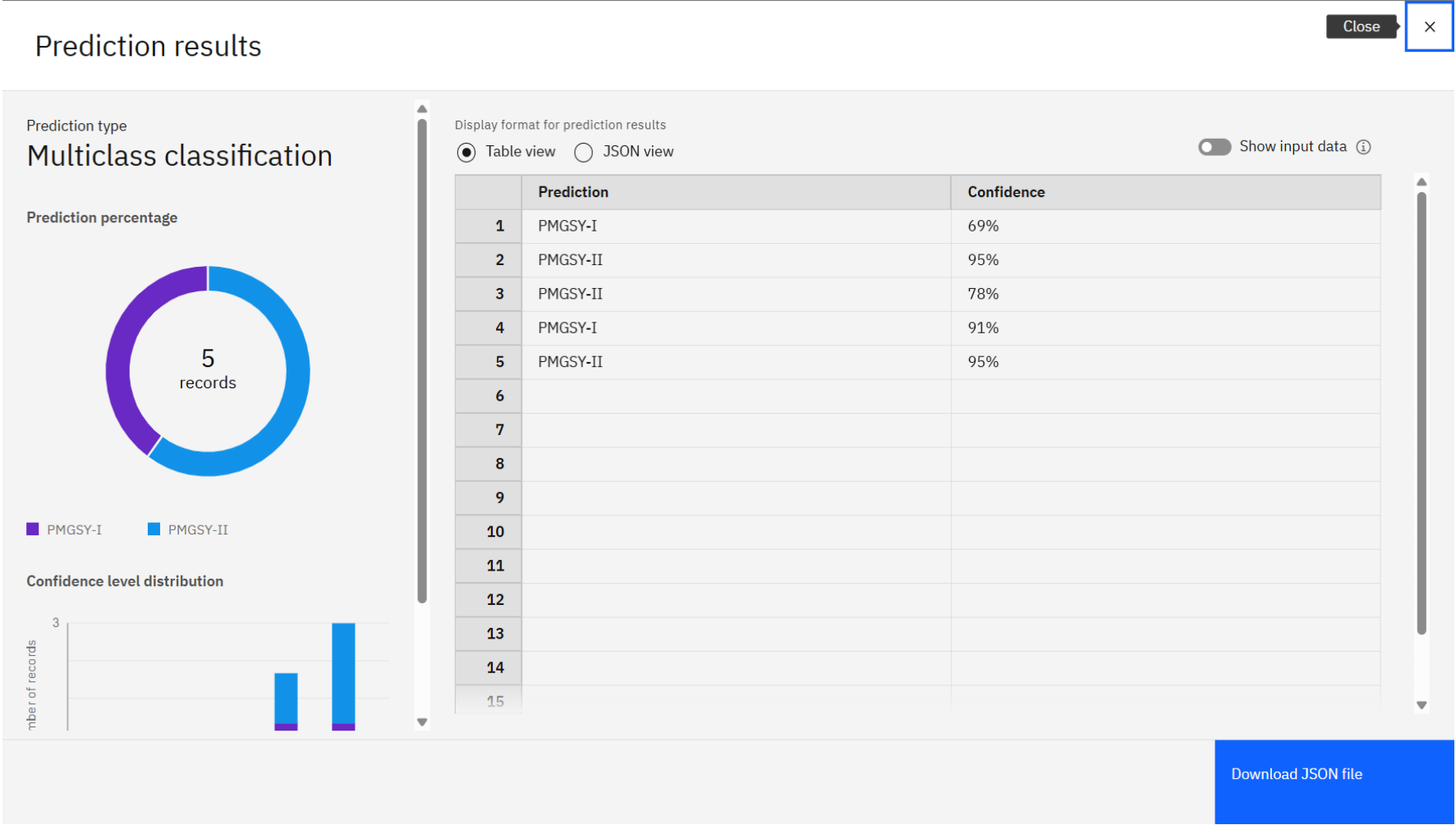
Clear all

	NO_OF_ROAD_WORK_SANCTIONED (double)	LENGTH_OF_ROAD_WORK_SANCTIONED (double)	NO_OF_BRIDGES_SANCTIONED (double)	COST_OF_WORKS_SANCTIONED (double)	NO_OF...
1	3	2.969	0	1.3857	3
2	2	3.24	1	2.4353	2
3	1	1.32	0	0.786	1
4	3	2.2131	1	1.242	3
5	2	3.212	0	2.3231	2
6					
7					
8					
9					

5 rows, 14 columns

Predict

# RESULT



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# CONCLUSION

This project successfully demonstrates how machine learning can streamline infrastructure management under the Pradhan Mantri Gram Sadak Yojana (PMGSY). Using the XGBoost Classifier within IBM Cloud's Watson Studio, we built an accurate and scalable model that automatically classifies road and bridge construction projects into their correct PMGSY schemes based on physical and financial parameters.

This automated approach minimizes manual effort, reduces classification errors, and enables faster, data-driven decision-making for government agencies and planners. It paves the way for more transparent monitoring, optimized resource allocation, and improved policy implementation in rural development programs.

# FUTURE SCOPE

- **Model Generalization:** Extend the model to handle new or evolving schemes under PMGSY with minimal retraining.
- **Real-time Dashboard:** Deploy the model within an interactive dashboard for real-time scheme classification and project monitoring.
- **Explainability:** Integrate SHAP or LIME for better model interpretability to support transparent decision-making.
- **Scalability:** Expand the solution to cover other government infrastructure schemes beyond PMGSY.

# REFERENCES

- Ministry of Rural Development – PMGSY Official Website
  - <https://pmgsy.nic.in>
- IBM Cloud – Watson Studio Documentation
  - <https://www.ibm.com/cloud/watson-studio>
- AI Kosh dataset
  - [https://aikosh.indiaai.gov.in/web/datasets/details/pradhan\\_mantri\\_gram\\_sadak\\_yojna\\_pmgsy.html](https://aikosh.indiaai.gov.in/web/datasets/details/pradhan_mantri_gram_sadak_yojna_pmgsy.html)

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**THANK YOU**