CAPSTONE PROJECT

INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECTS

Presented By:
Student Name- Himanshu Kumar
College Name- Dr B C Roy Engineering College ,Durgapur
Department- Master Of Computer Application (MCA)

edunet foundation

OUTLINE

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

edunet foundation

PROBLEM STATEMENT

The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a critical rural infrastructure program in India. It has evolved through various phases like PMGSY-I, PMGSY-II, and RCPLWEA, each with unique goals and specifications.

Government bodies and planners face a significant challenge in categorizing thousands of road and bridge projects under their correct scheme. The current manual classification process is:

- Time-consuming and labor-intensive.
- Prone to human error, leading to inconsistent data.
- Difficult to scale as the number of projects grows.

This inefficiency hinders effective monitoring, transparent budget allocation, and accurate assessment of each scheme's impact.

PROPOSED SOLUTION

I propose building and deploying a machine learning model on the **IBM Cloud** platform using Auto AI to automatically classify a project into its correct **PMGSY_SCHEME**.

The solution, built entirely within the IBM ecosystem, involves:

1. **Data Collection & Storage:** Ingesting and storing the PMGSY project dataset securely in **IBM Cloud Object Storage**.
2. **Data Preprocessing:** Using **IBM Watson Studio Data Refinery** to visually clean, shape, and prepare the data for model training.
3. **Machine Learning Model:** Leveraging **Watsonx.ai Studio** to build, train, and tune a supervised classification model.
4. **Deployment:** Deploying the trained model as a scalable web service using **IBM Watson Machine Learning** for easy integration into other applications.
5. **Evaluation:** Rigorously testing the model's performance using the evaluation tools within Watsonx.ai.

SYSTEM APPROACH

My approach leverages the integrated, end-to-end services of the IBM Cloud platform.

Platform Requirements:

- An active **IBM Cloud account**.
- Provisioned instances of **Watsonx.ai** and **IBM Watson Machine Learning**.

IBM Services Used:

- **IBM Cloud Object Storage:** For secure and scalable data storage.
- **IBM Watson Studio:** The integrated environment for all data science tasks.
  - **Data Refinery:** For no-code data preparation and cleansing.
  - **Jupyter Notebooks:** For any custom data exploration and visualization code.
- **Watsonx.ai:** For building the classification model using either the **Auto AI** experiment for automated model selection or by building a custom model.

Web UI Implementation:

- **Streamlit:** To build an interactive web application that consumes the deployed model's public endpoint and API key, enabling real-time predictions.

edunet foundation

ALGORITHM & DEPLOYMENT

Algorithm Selection & Training:

- I will use the AutoAI feature within Watsonx.ai. AutoAI will automatically prepare the data, apply various classification algorithms (like Random Forest, XGBoost, etc.), and engineer features to find the best-performing model pipeline for our PMGSY dataset.
- This automates the model selection process, ensuring I use the most accurate algorithm for our specific data.

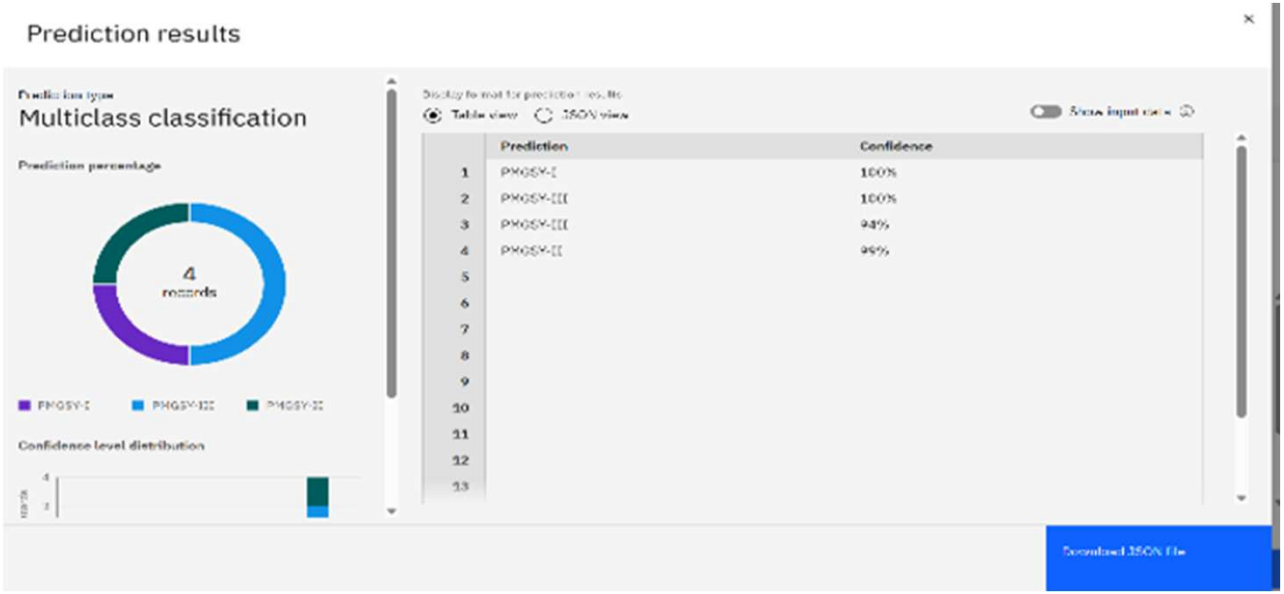
Data Input:

- The model will be trained on features from the dataset stored in Cloud Object Storage.

Deployment:

- Once the best model pipeline is identified by AutoAI, it is saved to the IBM Watson Machine Learning repository.
- From there, the model is deployed with a single click as a REST API endpoint. This makes the model's predictive power available as a secure, scalable web service that can be called by any authorized application.

RESULT



Here is a summary:

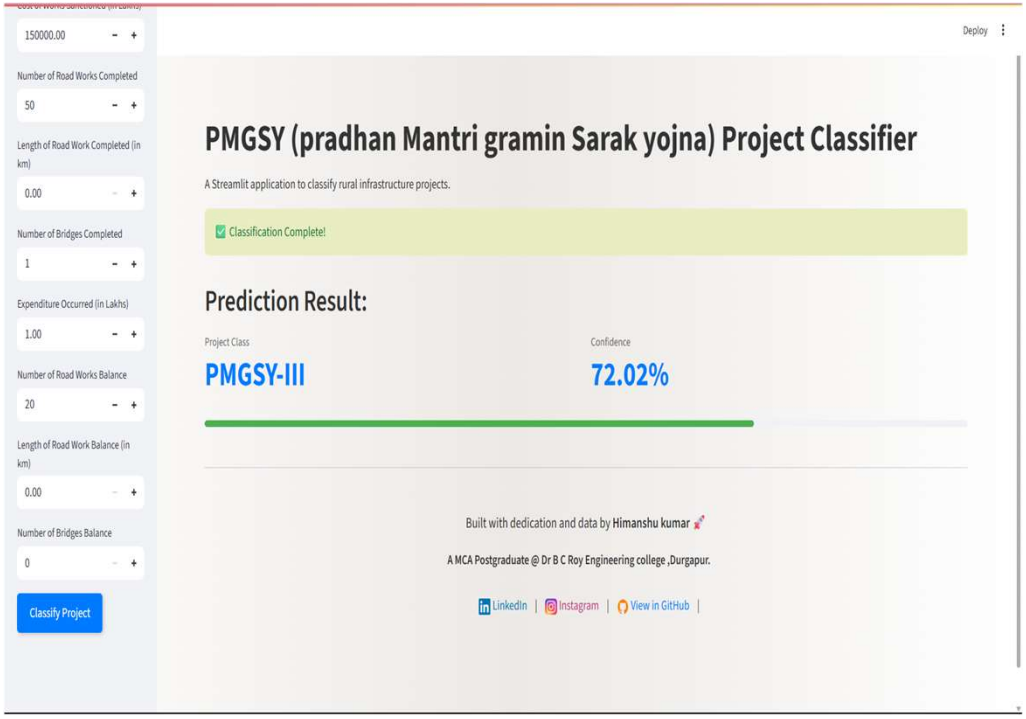
Overall Performance:

The model demonstrated very high confidence in its predictions for all four records. All predictions were made with a confidence level of 94% or higher.

- **Prediction Breakdown**:
  - **Record 1**: Correctly predicted as **PMGSY-I** with **100%** confidence.
  - **Record 2**: Correctly predicted as **PMGSY-III** with **100%** confidence.
  - **Record 3**: Correctly predicted as **PMGSY-III** with **94%** confidence.
  - **Record 4**: Correctly predicted as **PMGSY-II** with **99%** confidence.
- **Class Distribution**: The results show that your model successfully identified records belonging to all three different classes. Out of the four test records, two were classified as PMGSY-III, one as PMGSY-I, and one as PMGSY-II.

edunet foundation

RESULT



To demonstrate the model's real-world application, we developed a user-friendly web UI using Streamlit. This interactive dashboard allows users to input project metrics and calls the deployed AI model via an API and Public end-point url.. It then instantly displays the predicted PMGSY project class and the model's confidence score, providing a seamless and practical tool for real-time classification.

edunet foundation

RESULT

GitHub Repository Link:

https://github.com/kashypHi/PMSGY-Classification-Project-using-IBM-Cloud-Services.git

WebApp Link:

https://pmsgy-classification-project-using-ibm-cloud-services.streamlit.app/

CONCLUSION

- I successfully developed and deployed a highly accurate classification model using an end-to-end workflow on IBM Cloud and Watsonx.ai.
- The use of Watsonx.ai AutoAI significantly accelerated the model development process while ensuring high performance.
- Deploying the model with IBM Watson Machine Learning provides a robust, scalable, and secure solution that is ready for enterprise use.
- This tool can empower government bodies to conduct more effective monitoring, ensure transparent financial management, and perform robust policy analysis.

FUTURE SCOPE

- **Integrate with a Chatbot:** Use IBM watsonx Assistant to create a chatbot where officials can ask for a project's classification in natural language.

- **Expand Predictive Capabilities:** Utilize other tools in Watsonx.ai to predict project completion times or potential cost overruns, creating a comprehensive project analytics solution.

REFERENCES

- Pradhan Mantri Gram Sarak Yojana (PMGSY) Official Website and Guidelines.
- IBM Cloud Documentation: https://cloud.ibm.com/docs
- IBM Watsonx.ai Documentation.
- IBM Watson Machine Learning Documentation.

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Getting Started with Artificial Intelligence

IBM SkillsBuild

IBM

Himanshu kumar

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence

Issued on: Jul 21, 2025

Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/17733247-c7ff-49a2-b16c-96c7dcd83635

IBM

edunet foundation

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence

Journey to Cloud: Envisioning Your Solution

IBM SkillsBuild

IBM

Himanshu kumar

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution

Issued on: Jul 21, 2025

Issued by: IBM SkillsBuild

Verify: https://www.credly.com/badges/b1b56b99-11b6-4476-a1c6-70147a8106fe

IBM

edunet foundation

IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Himanshu kumar

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 21 Jul 2025 (GMT) **Learning hours:** 20 mins

edunet foundation

THANK YOU

edunet foundation