
CAPSTONE PROJECT

TRACKING MATERNAL HEALTH PROGRESS TOWARD SDG 3.1: A GLOBAL DATA ANALYSIS

Presented By:

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OUTLINE

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

PROBLEM STATEMENT

Challenge :

The Sustainable Development Goal 3.1 aims to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. Monitoring progress towards this goal requires analyzing country-wise data on maternal mortality and associated health indicators such as antenatal care coverage, births attended by skilled personnel, adolescent birth rates, and healthcare expenditures. Despite global efforts, maternal health outcomes vary drastically between regions and income groups, raising the need for data-driven insights into the factors influencing maternal health.

PROPOSED SOLUTION

- **The proposed system aims to address the challenge of tracking the maternal health progress towards sustainable development goals 3.1 for a global data analysis. This involves leveraging data analytics and machine learning techniques to track patterns accurately. The solution will consist of the following components:**
 1. Login to the IBM cloud account
 2. Navigate to the menu now check the resource list whether it is empty if not delete them.
 3. Search for watsonx.ai studio service to create a project and launch it.
 4. To run and execute your project select provision watsonx.ai Runtime and click on next and create.
 5. Now create a new project with details such as name, adding cloud storage and create.
 6. Navigate to the manage tab and associate service to watsonx.ai Runtime service.
 7. Select build the machine learning models automatically to build the project..
 8. Enter the details of the project and click on create.
 9. Now add the dataset for the project once the dataset is loaded select time series analysis as no and select the prediction column and run the experiment.
 10. Auto AI runs the experiment to view select swap view and pipelines getting build can be seen and also pipeline shows the top performer algorithm for the project.

11. Save the most accurate model from the pipeline leaderboard, now choose model asset and create. After the model is saved successfully view in project.
12. Now promote it to a space and then create a new deployment.
13. Enter the deployment details such as space name and select the watsonx.ai Runtime as a runtime service and create and once prepared with the deployment space then promote.
14. Navigate to the deployment space and then click on asset name and now click on new deployment.
15. Select the deployment type as online and enter the name and create.
16. Model deployed, once it is deployed test the prediction with the new values.
17. It will predict the result with the accuracy score in percentage.

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the Tracking maternal health progress towards SDG 3.1 – A Global data analysis .

- System requirements
 - Laptop with strong internet connection
 - IBM cloud Account
 - watsonx.ai studio service
 - watsonx.ai runtime service to execute your project

The screenshot shows the Watsonx.ai Studio interface for creating a new AutoAI experiment. The main heading is "Build machine learning models automatically" with a subtext "Define the details to create an AutoAI experiment asset and open it in the AutoAI tool." The interface is divided into two main sections: "Define details" and "Define configuration".

Define details:

- Name:** A text input field containing "HEALTH_PROGRESS".
- Description (optional):** A text area with the placeholder "What's the purpose of this AutoAI experiment?".
- Tags (optional):** A text input field with the placeholder "Start typing to add tags" and a plus icon.

Define configuration:

- Environment definition:** A dropdown menu showing "Large: 8 CPU and 32 GB RAM".
- Runtime service instance:** A dropdown menu showing "watsonx.ai Runtime-zw".
- Capacity units:** A note stating "This environment definition consumes 20 capacity units per hour for training. For details, see [watsonx.ai Runtime plans](#)."

At the bottom, there are three buttons: "Cancel", "Back", and "Create".

- Library required to the model :
- Snap Random Forest Classifier algorithm is used for this project to track the progress which is the top result given by the pipeline leaderboard

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

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Projects / Track_MaternalHealth_Progress_SDG3.1 / HEALTH_PROGRESS

Experiment summary

Pipeline comparison

★ Rank by: Accuracy (Optimized) | Cross validation score

View log

Save code

Pipeline leaderboard

	Rank ↑	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time	
★	1	Pipeline 6	○ Snap Random Forest Classifier		0.994	TFE HPO-1	00:00:03	Save as
	2	Pipeline 9	⦿ Batched Tree Ensemble Classifier (Snap Random Forest Classifier)	INCR	0.993	TFE HPO-1 FE HPO-2 BATCH	00:00:38	
	3	Pipeline 8	○ Snap Random Forest Classifier		0.993	TFE HPO-1 FE HPO-2	00:00:35	
	4	Pipeline 7	○ Snap Random Forest Classifier		0.993	TFE HPO-1 FE	00:00:29	

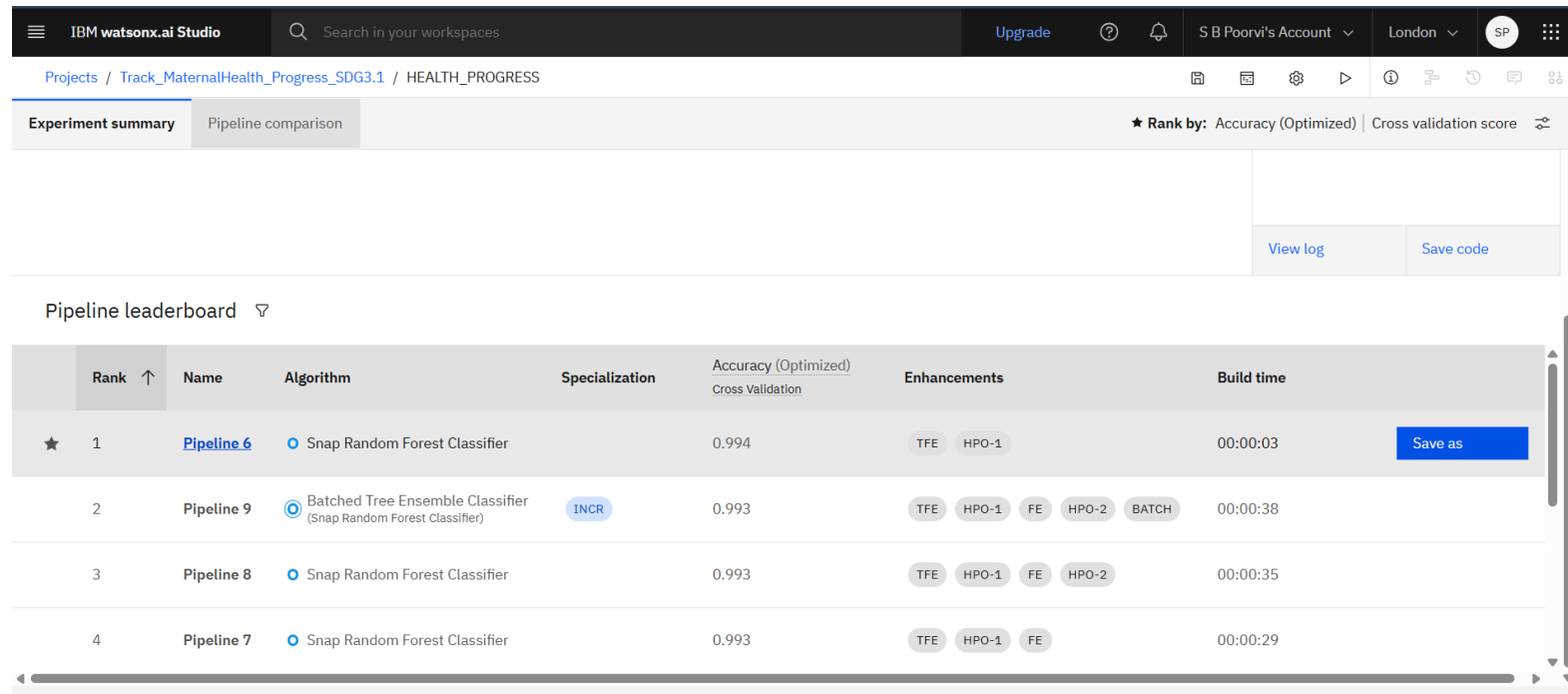
ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for tracking maternal health progress towards SDG 3.1. Here's an structure for this section:

- **Algorithm Selection:**

Algorithm selection includes the top performer of the pipeline during the process of building the model.

Algorithm used in this project is – Snap Random Forest Tree Classifier.



The screenshot shows the IBM Watsonx.ai Studio interface. At the top, there's a navigation bar with 'IBM watsonx.ai Studio', a search bar, and user account information. Below this, the breadcrumb trail reads 'Projects / Track_MaternalHealth_Progress_SDG3.1 / HEALTH_PROGRESS'. The main content area has two tabs: 'Experiment summary' (selected) and 'Pipeline comparison'. A 'Rank by' dropdown is set to 'Accuracy (Optimized)'. Below the tabs, there's a 'Pipeline leaderboard' section. It contains a table with columns: Rank, Name, Algorithm, Specialization, Accuracy (Optimized) Cross Validation, Enhancements, and Build time. The table lists four pipelines, with Pipeline 6 at the top. Pipeline 9 is highlighted with a blue circle and 'INCR' label. Pipeline 7 has a 'Save as' button next to it.

Rank	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★ 1	Pipeline 6	○ Snap Random Forest Classifier		0.994	TFE HPO-1	00:00:03 Save as
2	Pipeline 9	● Batched Tree Ensemble Classifier (Snap Random Forest Classifier)	INCR	0.993	TFE HPO-1 FE HPO-2 BATCH	00:00:38
3	Pipeline 8	○ Snap Random Forest Classifier		0.993	TFE HPO-1 FE HPO-2	00:00:35
4	Pipeline 7	○ Snap Random Forest Classifier		0.993	TFE HPO-1 FE	00:00:29

■ Data Input:

Input field includes the field such as country-wise data on maternal mortality and associated health indicators such as antenatal care coverage, births attended by skilled personnel, adolescent birth rates, and healthcare expenditures.

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Deployment spaces / SDG_healthprogress / P6 - Snap Random Forest Classifier: HEALTH_PROGRESS /

Maternal_health_progress ✓ 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

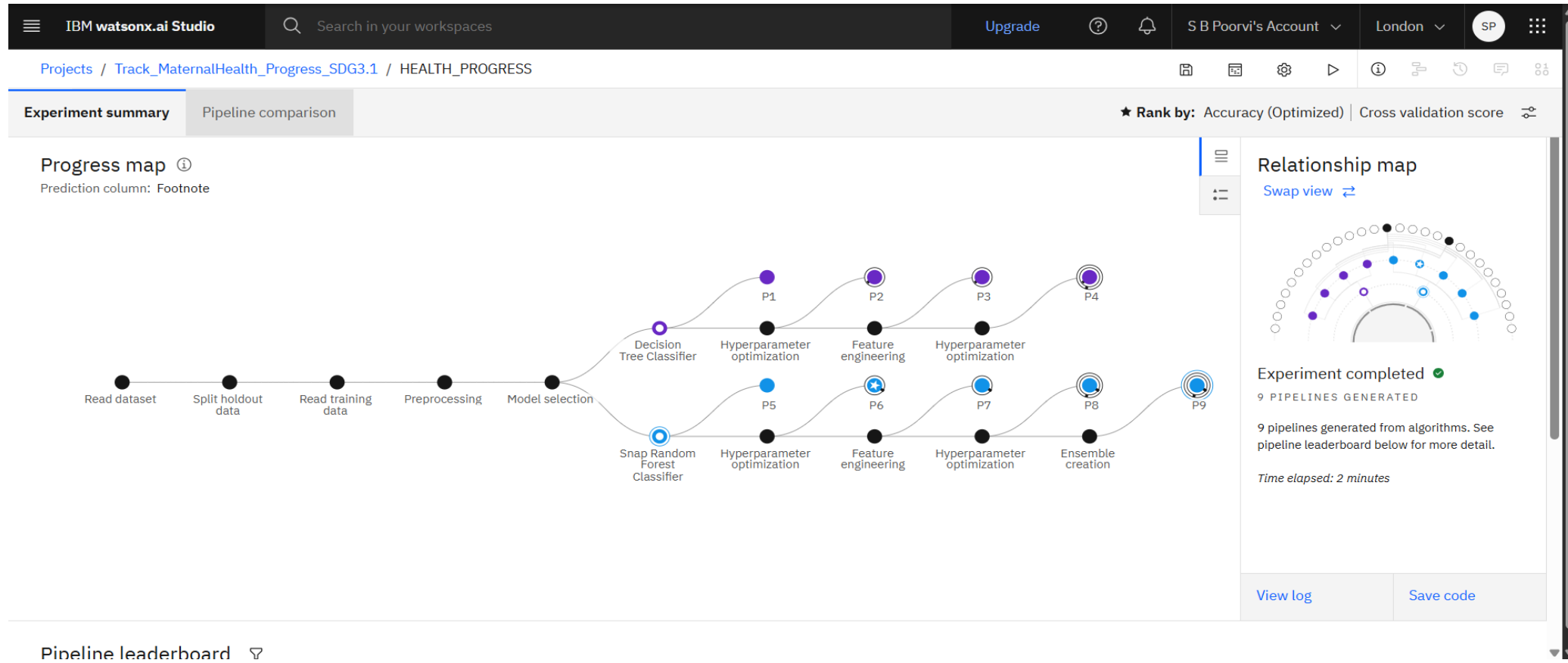
	Subsector (other)	Goal (other)	Target (other)	Indicator (other)	Unit (other)	SubgroupDimension (other)	Subgroup (other)	SubgroupOrder (double)	DataValue (other)
1	Health Care	3: Ensure he	3.c: Substanti	3.c.1: Total physi	Percent	Location	Total	1	37.6
2	Health Care	3: Ensure he	3.c: Substanti	3.c.1: Total physi	Percent	Core Capacity	C1 Legislation an	5	70
3									

2 rows, 14 columns

Predict

■ Training process

Auto AI trains the model by itself.



■ Prediction Process

Predicts the output based on the dataset and the algorithm used to track the health progress towards SDG 3.1 once the model is deployed .

IBM watsonx.ai Studio

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Deployment spaces / SDG_healthprogress / P6 - Snap Random Forest Classifier: HEALTH_PROGRESS

Create a deployment

P6 - Snap Random Forest Classifier: HEALTH_PROGRESS

Deployment type

Online ☒

Run the model on data in real-time, as data is received by a web service.

Batch ☐

Run the model against data as a batch process.

Name

Maternal_health_progress

Serving name

Deployment serving name

Enter a short name to be used as the serving name for the deployment. The name must be

Cancel Create

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

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Projects / Track_MaternalHealth_Progress_SDG3.1 / HEALTH_PROGRESS

Save as

Select asset type

Model

Create a watsonx.ai Runtime model asset that you can test with new data, deploy to generate predictions, and trace lineage activity.

Notebook

Create a notebook if you want to view the code that created this model pipeline or interact with with the model programatically.

Define details

Name

P6 - Snap Random Forest Classifier: HEALTH_PROGRESS

Description (optional)

Model description

Tags

Add tags to make assets easier to find.

Add a tag

Add a tag

Cancel

Create

RESULT

health_progress ✓ 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](#)

	Subsector (other)	Goal (other)	Target (other)	Indicator (other)	Unit (other)	SubgroupDimension (other)	Subgroup (other)	SubgroupOrder (double)	DataValue (other)
1	Population	1: End pover	1.1: By 2030,	1.1.1: Poverty Ga	Percent	Urbanization	Rural	1	5.05
2									
3									
4									
5									

1 row, 14 columns

Predict

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

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2

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Deployment spaces / New / P9 - Snap Random Forest Classifier: Maternal_health_progress

Prediction results

Close

×

Prediction type

Multiclass classification

Prediction percentage

1

record

■

 NA

Confidence level distribution

Display format for prediction results

☒ Table view

☐ JSON view

Show input data

ⓘ

	Prediction	Confidence
1	NA	100%
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Download JSON file

Maternal_health_progress

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

	Subsector (other)	Goal (other)	Target (other)	Indicator (other)	Unit (other)	SubgroupDimension (other)	Subgroup (other)	SubgroupOrder (double)	DataValue (other)
1	Health Care	3: Ensure he	3.c: Substanti	3.c.1: Total physi	Percent	Location	Total	1	37.6
2	Health Care	3: Ensure he	3.c: Substanti	3.c.1: Total physi	Percent	Core Capacity	C1 Legislation and	5	70
3									

2 rows, 14 columns

Predict

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

?

1

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Deployment spaces / SDG_healthprogress / P6 - Snap Random Forest Classifier: HEALTH_PROGRESS /

Ma

Prediction results

Prediction type

Multiclass classification

Prediction percentage

2

records

Display format for prediction results

☒ Table view

☐ JSON view

Show input data

	Prediction	Confidence
1	Base population taken as 130 Cr	91%
2	NA	71%
3		
4		
5		
6		
7		
8		
9		

Download JSON file

CONCLUSION

- The analysis of global maternal health indicators using AI and cloud technologies has provided valuable insights into disparities in maternal mortality across regions and income groups. By leveraging IBM Cloud Lite services and the AI Kosh dataset, this project successfully identified key factors—such as antenatal care coverage, skilled birth attendance, adolescent birth rates, and healthcare expenditures—that influence maternal health outcomes. The findings underscore the importance of targeted interventions and data-driven policymaking to accelerate progress toward achieving SDG 3.1. This project demonstrates how cloud-based machine learning can empower global health monitoring and support evidence-based strategies to reduce maternal mortality.

FUTURE SCOPE

- Predictive modeling for high – risk regions
- Integration with real-time health data
- Policy Simulation Tools
- Cross Sector Collaboration
- Scalable Cloud Deployment
- Localization and Language support

REFERENCES

- Dataset :
- AI Kosh dataset link:
 - ✓ <https://www.data.gov.in/resource/sustainable-development-goals-national-indicator-framework-version-31-2021>
- Developing and deploying project : IBM cloud

IBM CERTIFICATIONS

- Certificates screenshots – Getting started with Artificial Intelligence



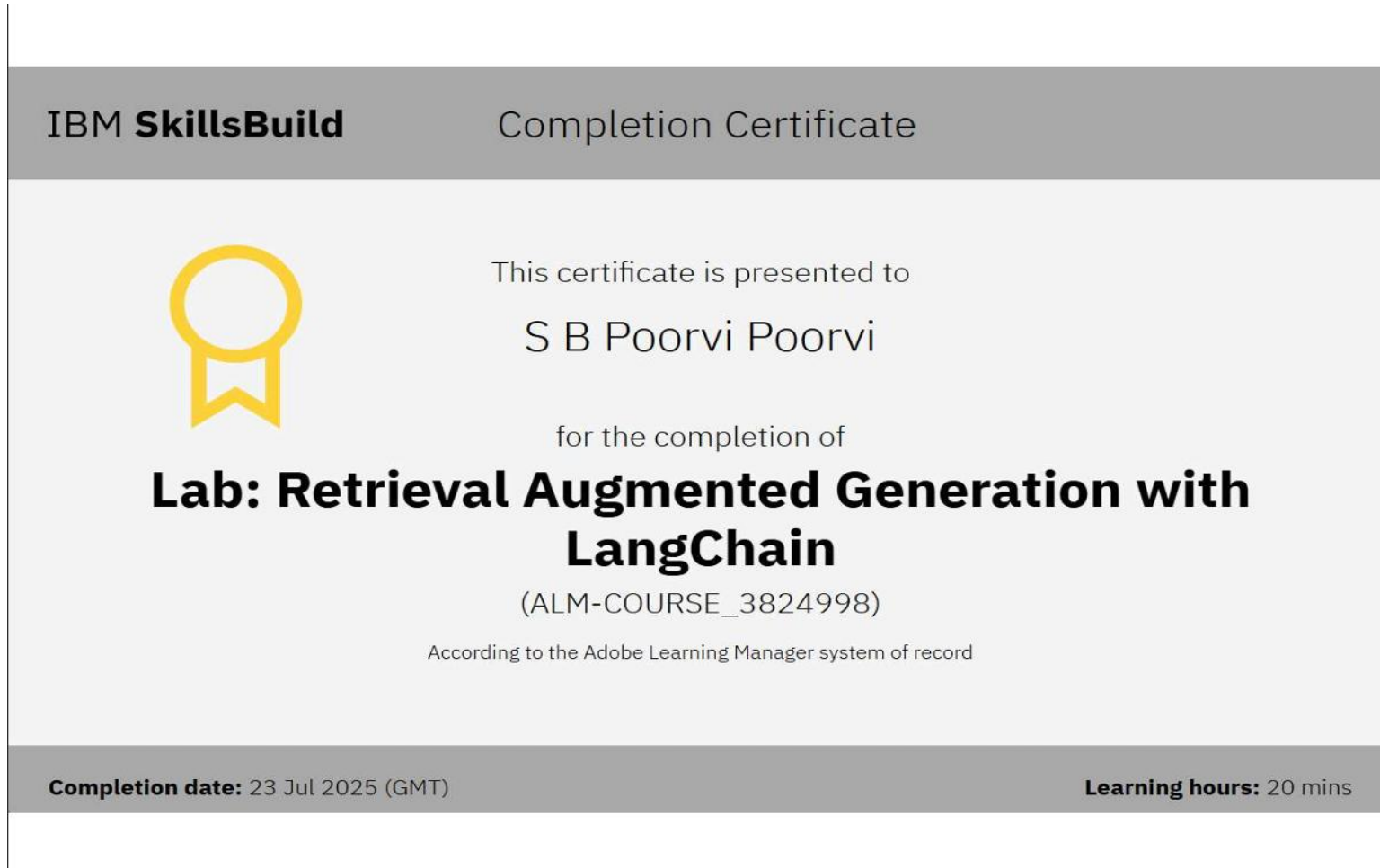
IBM CERTIFICATIONS

- Certificate screenshot - Journey to cloud



IBM CERTIFICATIONS

- Certificate screenshot(RAG Lab)





THANK YOU