CAPSTONE PROJECT

PREDICTING ELIGIBILITY FOR NSAP USING MACHINE LEARNING

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OUTLINE

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- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result**
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PROBLEM STATEMENT

Currently, the process of verifying applicant eligibility under the National Social Assistance Program (NSAP) is manually conducted by government staff. This process is time-consuming, error-prone, and often leads to delays in providing essential support to the elderly, widows, and persons with disabilities. Each sub-scheme under NSAP has specific eligibility criteria, and manually identifying the appropriate one for each applicant hampers timely financial assistance. There is a strong need for an intelligent system that can automatically determine the most appropriate scheme based on demographic and socio-economic data.

PROPOSED SOLUTION

The proposed system aims to develop a machine learning-based classification model to predict the most suitable NSAP scheme for an applicant using district-wise demographic and socio-economic data.

Key components of the solution include:

- **Data Acquisition**:
  Using the dataset from AI Kosh, which includes attributes like district, gender breakdown, caste demographics, etc.
- **Data Preprocessing**:
  Handling missing values, converting categorical data, and normalizing features.
- **Model Training**:
  Building a multi-class classification model to predict schemecode based on demographic features.
- **Deployment**:
  Hosting the model on IBM Watson Studio and exposing it as an API for integration.

SYSTEM APPROACH

- System requirements
  - Hardware - Laptop or desktop with minimum 4GB RAM, stable internet connection, and a modern web browser.
  - Software - No need to install additional software – all tools are cloud-based and accessible online.
- Library required to build the model
  - IBM Cloud
  - IBM Watsonx.ai Studio
  - IBM Watsonx.ai Runtime

ALGORITHM & DEPLOYMENT

Model Used:

- Decision Tree Classifier – selected as the best performing algorithm
- Enhanced through Auto AI with:
  - Feature Engineering (FE)
  - Hyperparameter Optimization (HPO-1,HPO-2)

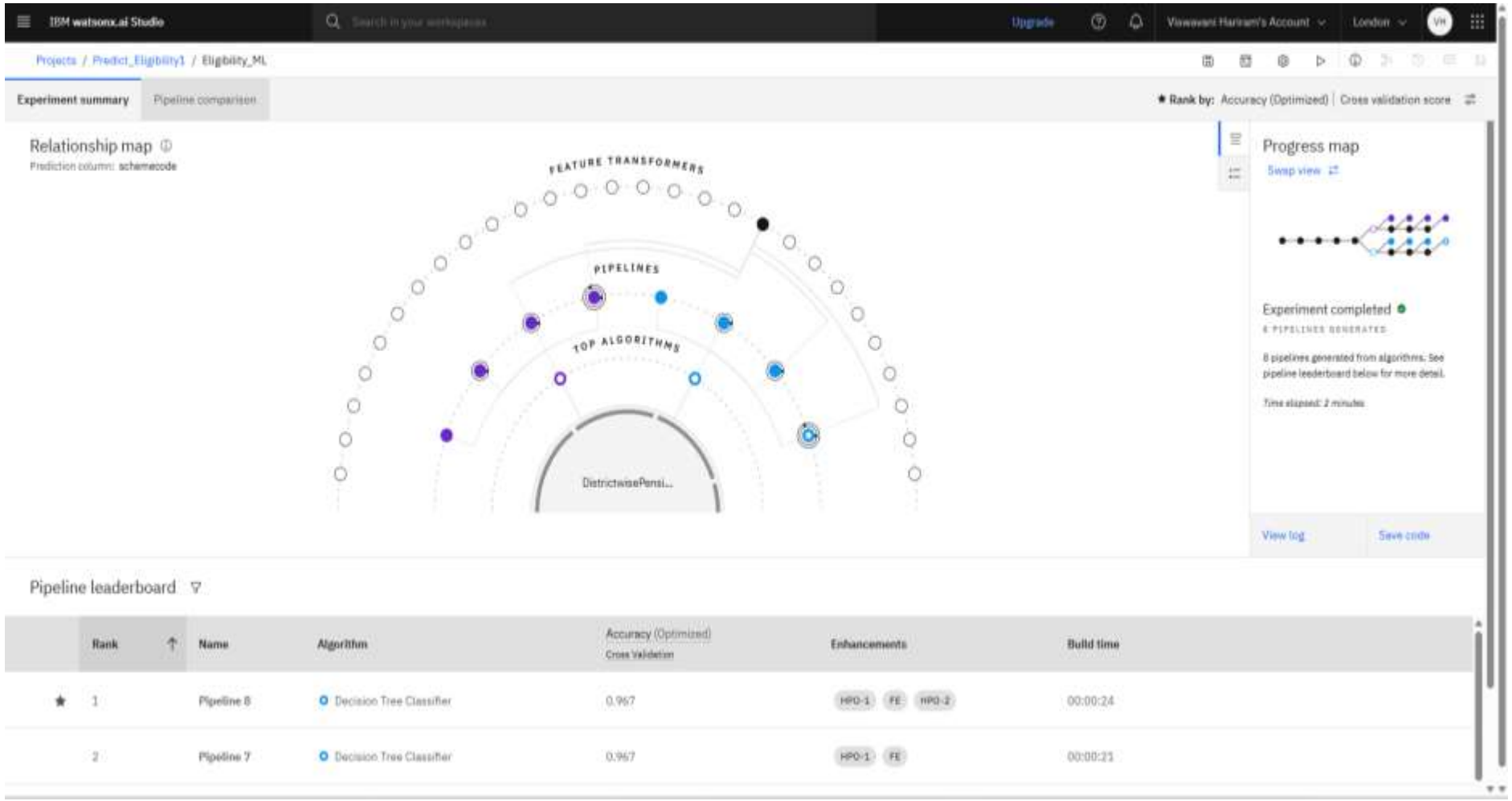
Model Performance:

- Best model: Pipeline 8
- Accuracy (Cross-Validated): 96.7%
- Time to train: 24 seconds

Deployment:

- Model deployed using IBM Watson Machine Learning
- Exposed as a REST API endpoint (for potential integration into real-time apps or dashboards)

RESULT



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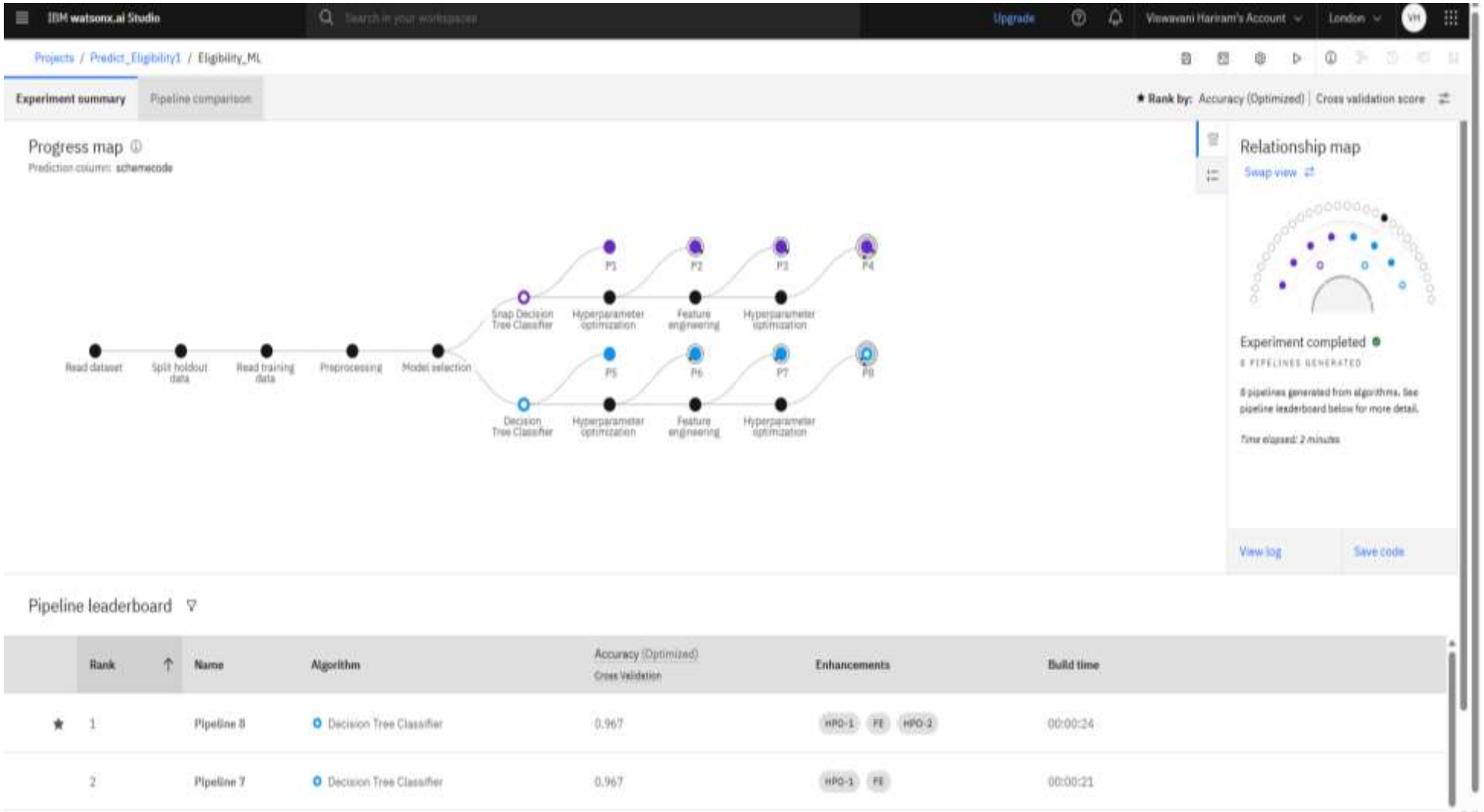
RESULT



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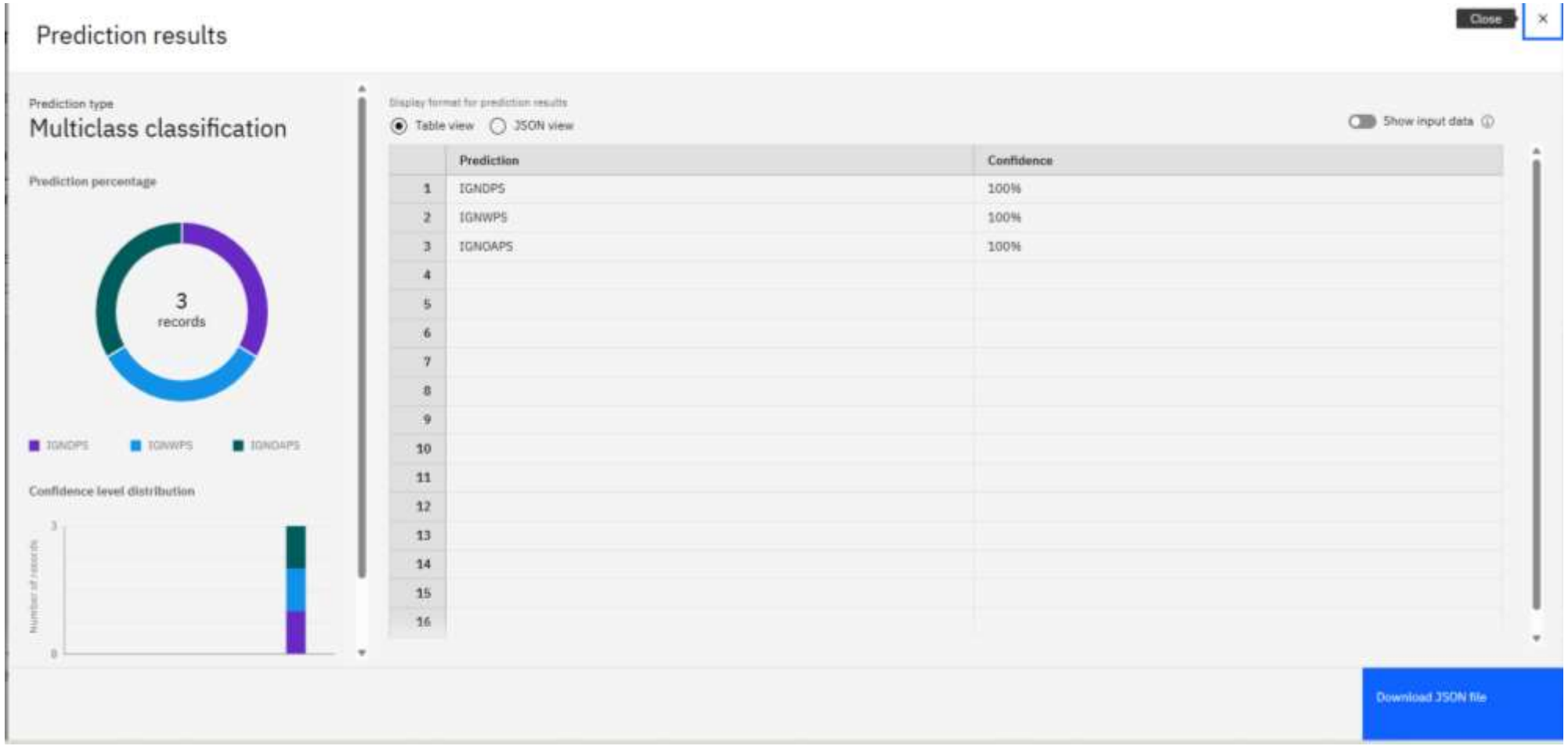
RESULT

Pipeline leaderboard

	Rank	Name	Algorithm	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 8	Decision Tree Classifier	0.967	HPO-1 FE HPO-2	00:00:24
	2	Pipeline 7	Decision Tree Classifier	0.967	HPO-1 FE	00:00:21
	3	Pipeline 4	Snap Decision Tree Classifier	0.967	HPO-1 FE HPO-2	00:00:28
	4	Pipeline 3	Snap Decision Tree Classifier	0.967	HPO-1 FE	00:00:24

RESULT



CONCLUSION

- The machine learning-based NSAP eligibility predictor provides a fast, scalable, and accurate alternative to manual verification processes.
- Reduces human error, speeds up beneficiary classification, and ensures that financial aid reaches the deserving population on time. This approach modernizes welfare distribution using data-driven techniques.

FUTURE SCOPE

- In the future, this system can be made better by using individual-level data for more accurate and personalized results. It can also be expanded to work through mobile apps or kiosks, making it easier to access in rural areas. Adding support for state-level schemes can increase its usefulness. To improve accuracy, advanced models like XGBoost or BERT can be used. Adding multi-language support, such as Tamil or Hindi, will help more people use the system easily.

REFERENCES

- National Social Assistance Program (NSAP) - https://nsap.nic.in
- AI Kosh Dataset link - https://aikosh.indiaai.gov.in/web/datasets/details/district_wise_pension_data_under_the_national_social_assistance_programme_nsap_1.html
- Platform Documentation: IBM Cloud & Watsonx.ai Studio Official Documentation
- GitHub Repository Link: https://github.com/Viswavani/IBM-Cloud-Project.git

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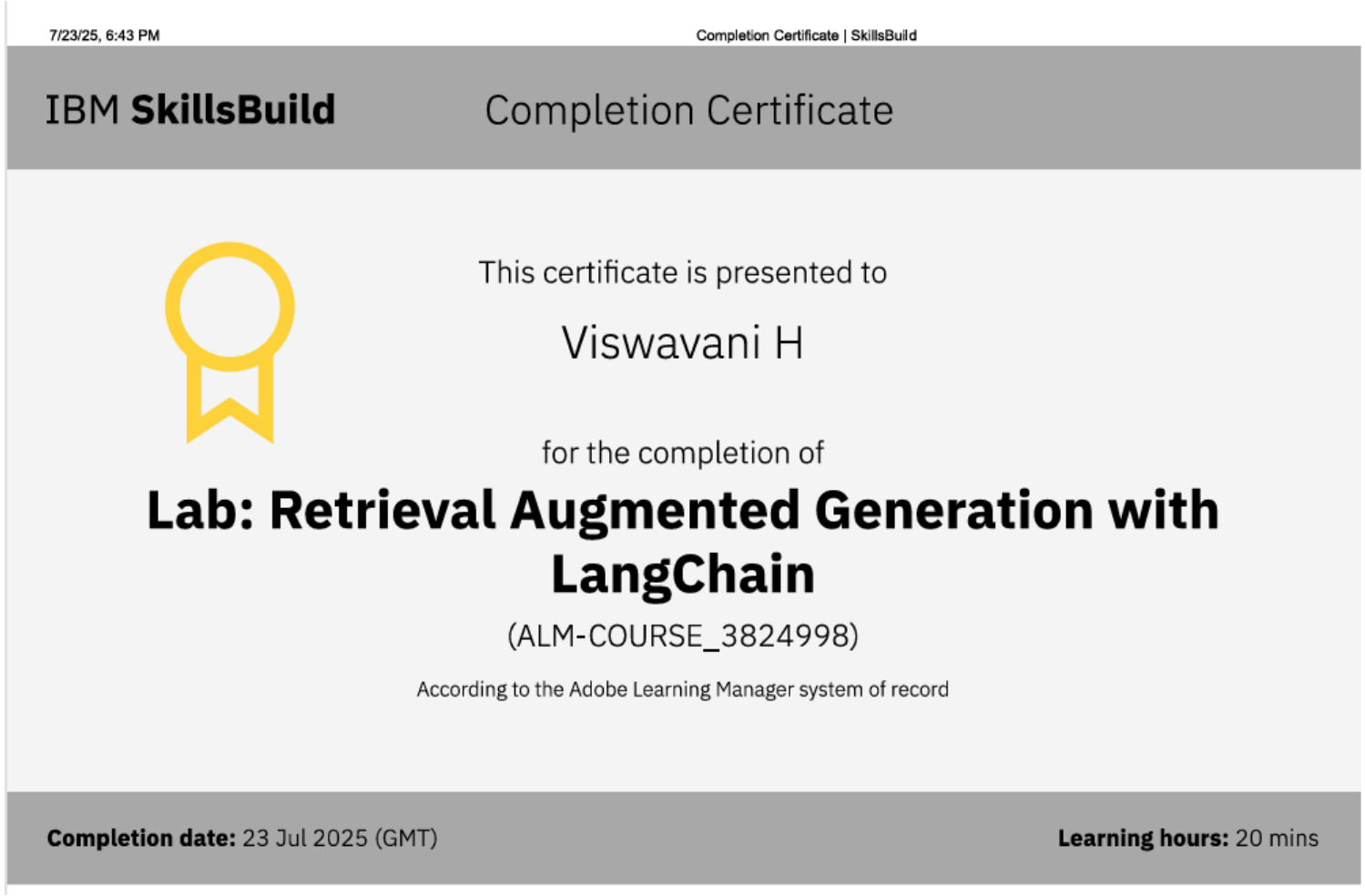

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