
CAPSTONE PROJECT

PREDICTING ELIGIBILITY FOR NATIONAL SOCIAL ASSISTANCE PROGRAMME (NSAP) SCHEMES USING MACHINE LEARNING

Presented By:

**1. BOOMIKA S – Vellore Institute of Technology – Department of
Computer Science and Engineering**

OUTLINE

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

PROBLEM STATEMENT

- The National Social Assistance Programme (NSAP) is a flagship welfare program by the Government of India. It provides financial support to elderly individuals, widows, and persons with disabilities from below-poverty-line (BPL) households through sub-schemes like IGNOAPS, IGNWPS, and IGNDPS.
- Currently, manual verification of applications and deciding the correct scheme is time-consuming and error-prone. This leads to delays or incorrect allocations, preventing timely support to truly deserving individuals.
- There is a need to automate the process of categorizing applicants into the most appropriate NSAP scheme based on their demographic and socio-economic data.

PROPOSED SOLUTION

- The project builds a multi-class classification model to automatically predict the most suitable NSAP sub-scheme (IGNOAPS, IGNWPS, IGNDPS) for applicants based on district-wise demographic and socio-economic data.
- Data Collection:
 - Use AI Kosh's district-wise NSAP pension dataset with demographic & socio-economic data.
 - Select key features: total beneficiaries, male/female counts, caste-wise counts, Aadhaar coverage.
- Data Preprocessing:
 - Handle missing values and encode categorical variables.
 - Engineer meaningful features (e.g., SC/ST percentage, gender ratio).
- Machine Learning Algorithm:
 - Build a multi-class classification model to predict schemecode.
 - Use IBM AutoAI to automatically train and pick the best model.
- Deployment:
 - Deploy as an online REST API on IBM Cloud Lite.
 - Enable real-time predictions for new applicant data.
- Evaluation:
 - Evaluate using Accuracy and F1-score.
 - Continuously monitor and fine-tune model performance.
 - Result: Automated scheme prediction improves speed and consistency.

SYSTEM APPROACH

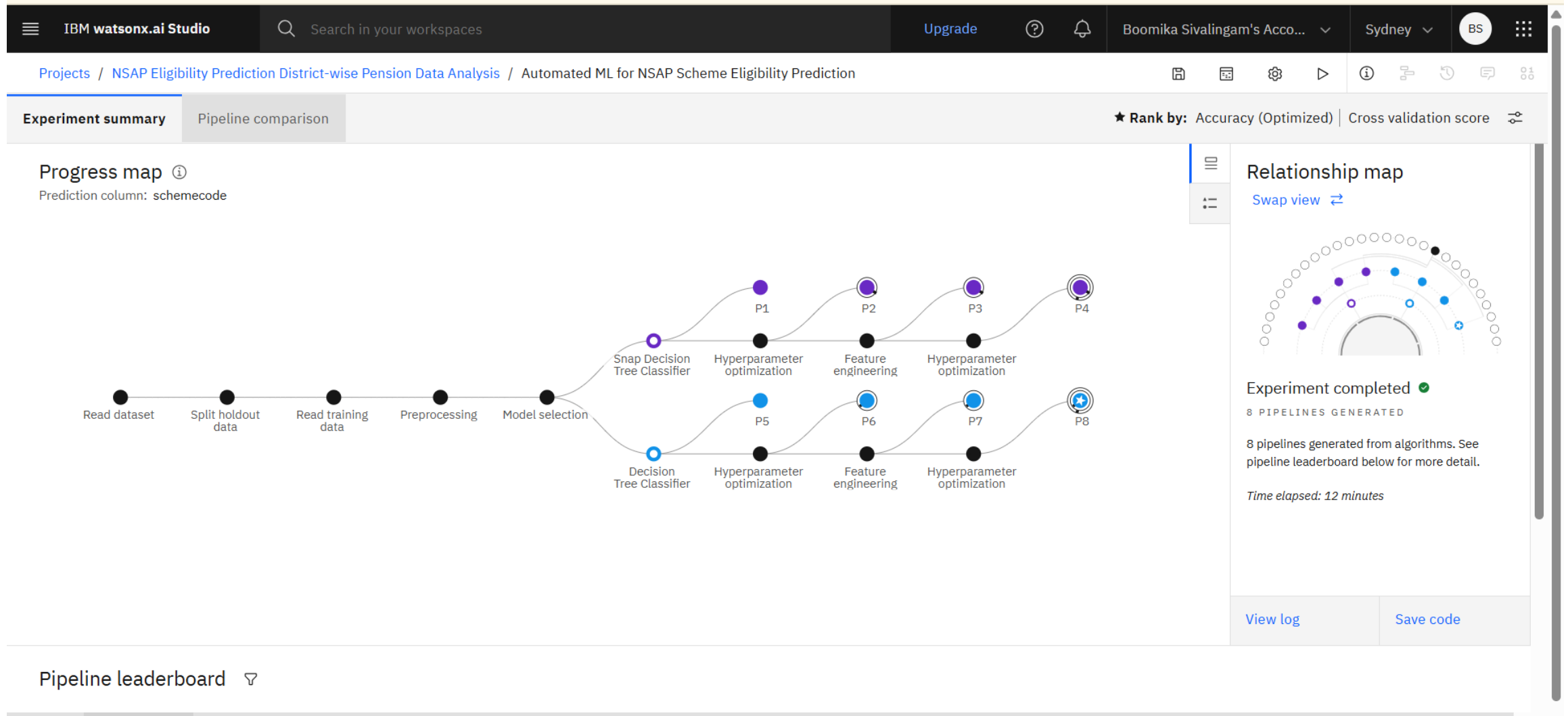
The “System Approach” section outlines the overall strategy and methodology for developing and implementing the NSAP scheme eligibility prediction system.

- **System requirements**
 - IBM Cloud Lite account with Watson Machine Learning service.
 - Storage: IBM Cloud Object Storage to store datasets and trained models.
- **Library required to build the model**
 - IBM AutoAI for automated ML model building and deployment.
 - Python (pandas, scikit-learn) for data preprocessing & testing.
 - AI Kosh dataset: District-wise Pension Data under NSAP

ALGORITHM & DEPLOYMENT

- For this project, a Decision Tree Classifier was chosen as the core machine learning algorithm within IBM AutoAI.
- Algorithm Selection:
 - Chose Decision Tree Classifier via AutoAI for its interpretability and suitability for multi-class classification.
- Data Input:
 - Used district, gender counts, caste counts, Aadhaar/mobile coverage as input features.
- Training Process:
 - AutoAI trained and evaluated multiple pipelines, selecting the best based on accuracy.
- Prediction Process:
 - Deployed as on online REST API to predict schemecode for new applicant data in real-time.

RESULT



RESULT

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

?

Boomika Sivalingam's Acco...

Sydney

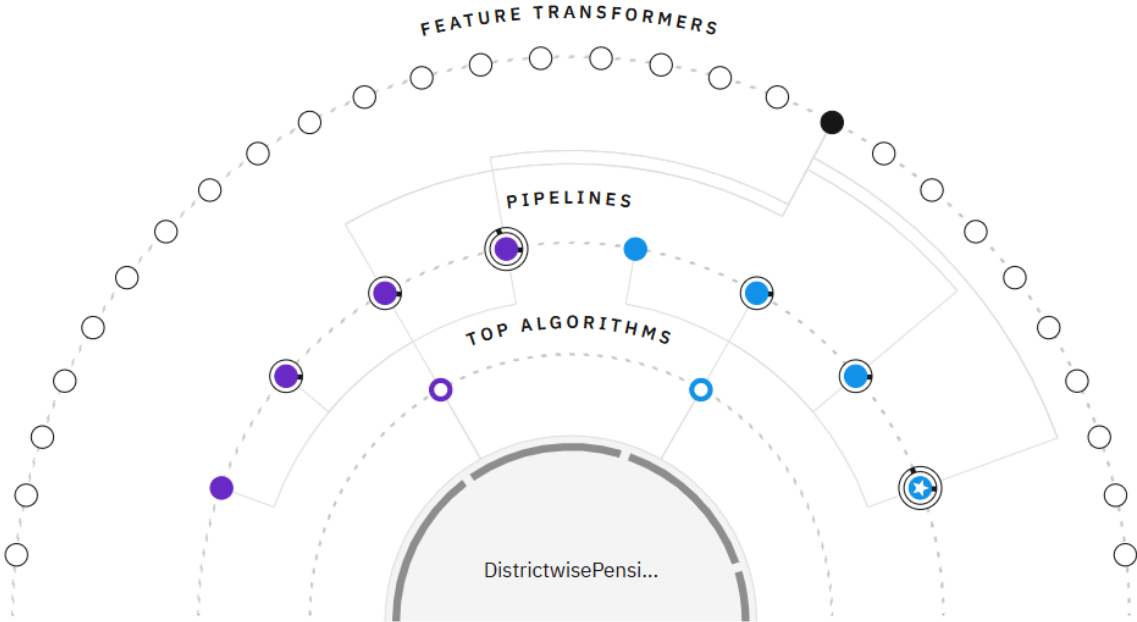
BS

Projects / NSAP Eligibility Prediction District-wise Pension Data Analysis / Automated ML for NSAP Scheme Eligibility Prediction


Experiment summaryPipeline comparison

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

Relationship map ⓘ
Prediction column: schemecode



Progress map
[Swap view](#)



Experiment completed ✓
8 PIPELINES GENERATED
8 pipelines generated from algorithms. See pipeline leaderboard below for more detail.
Time elapsed: 12 minutes

[View log](#)[Save code](#)

Pipeline leaderboard

RESULT

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

Boomika Sivalingam's Acco... ▾

Sydney ▾

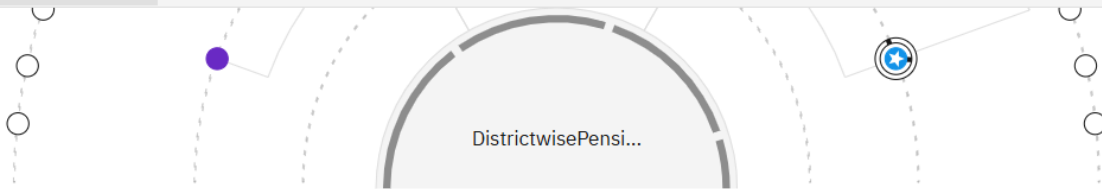
BS

Projects / NSAP Eligibility Prediction District-wise Pension Data Analysis / Automated ML for NSAP Scheme Eligibility Prediction

Experiment summary

Pipeline comparison

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



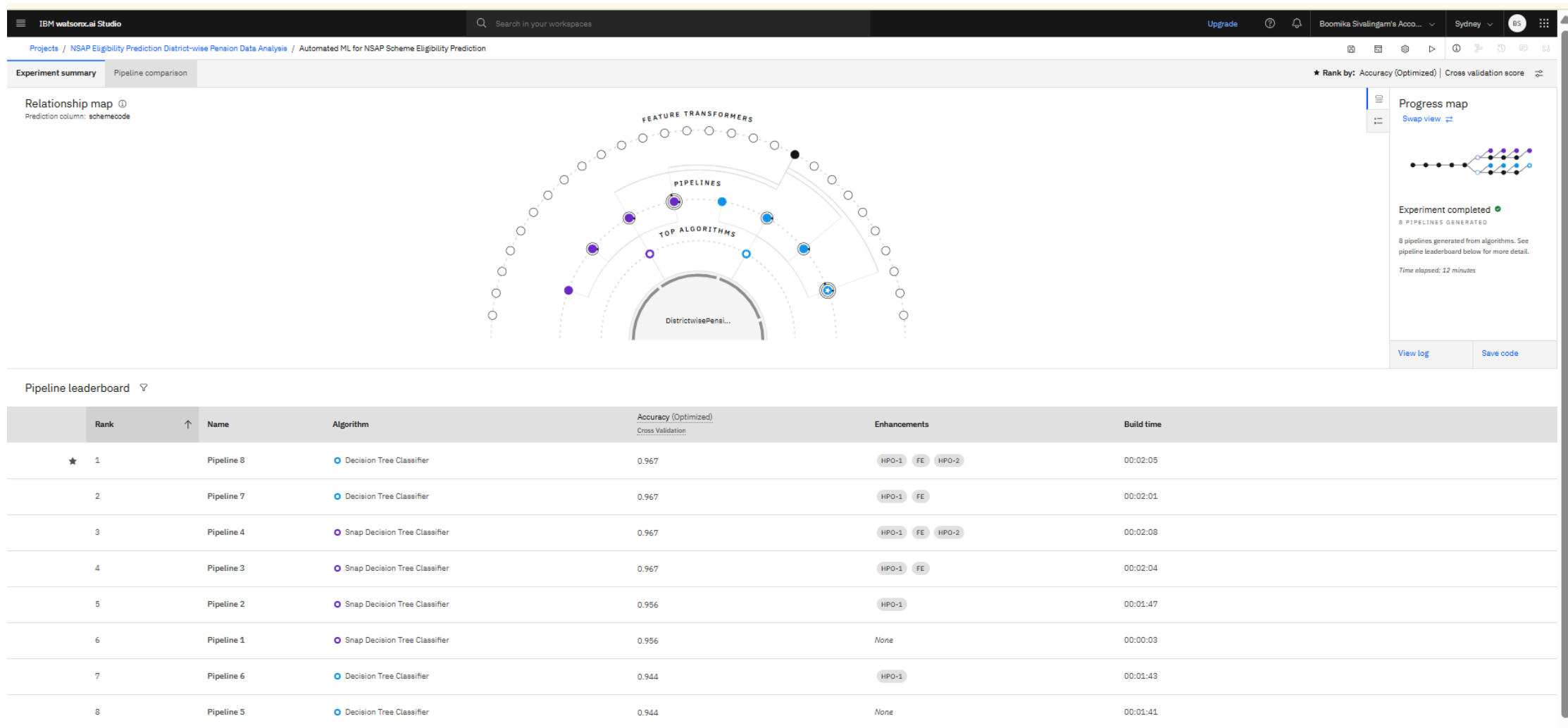
View log

Save code

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	00:02:05
	2		Pipeline 7	Decision Tree Classifier	0.967	HPO-1 FE	00:02:01
	3		Pipeline 4	Snap Decision Tree Classifier	0.967	HPO-1 FE HPO-2	00:02:08
	4		Pipeline 3	Snap Decision Tree Classifier	0.967	HPO-1 FE	00:02:04

RESULT



RESULT

IBM watsonx.ai Studio

Search in your workspaces

Upgrade

?

1

Boomika Sivalingam's Acco...

Sydney

BS



Deployment spaces / ... / P8 - Decision Tree Classifier: Automated ML for NSAP Scheme Eligibility Prediction

Deployments

Model details

Search

New deployment

Name	Type	Status	Tags	Last modified	
 NSAP Scheme Eligibility Prediction	Online	 Deployed		21 seconds ago Boomika Sivalingam (You)	<div></div>

Items per page: 20 1-1 of 1 items 1 of 1 pages

About this asset

Name

P8 - Decision Tree Classifier: Automated ML for NSAP Scheme Eligibility Prediction

Description

This AutoAI experiment builds and evaluates a decision tree classifier to predict the most suitable National Social Assistance Programme (NSAP) sub-scheme for applicants based on district-wise demographic and socio-economic data. The model aims to improve accuracy and speed of eligibility classification, supporting fair and timely welfare distribution.

Asset Details

Type: wml-hybrid_0.1

Model ID: 5a968d10-43b0-42...

Software specification: hybrid_0.1

Hybrid pipeline software specifications: autoai-kb_rt24.1-py3.11

Tags

Add tags to make assets easier to find.

RESULT

IBM watsonx.ai Studio

Search in your workspaces

Upgrade



Boomika Sivalingam's Acco...

Sydney

BS



Deployment spaces / NSAP Scheme Eligibility Prediction / P8 - Decision Tree Classifier: Automated ML for NSAP Scheme Eligibility Prediction /



NSAP Scheme Eligibility Prediction ✓ 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](#) ↗

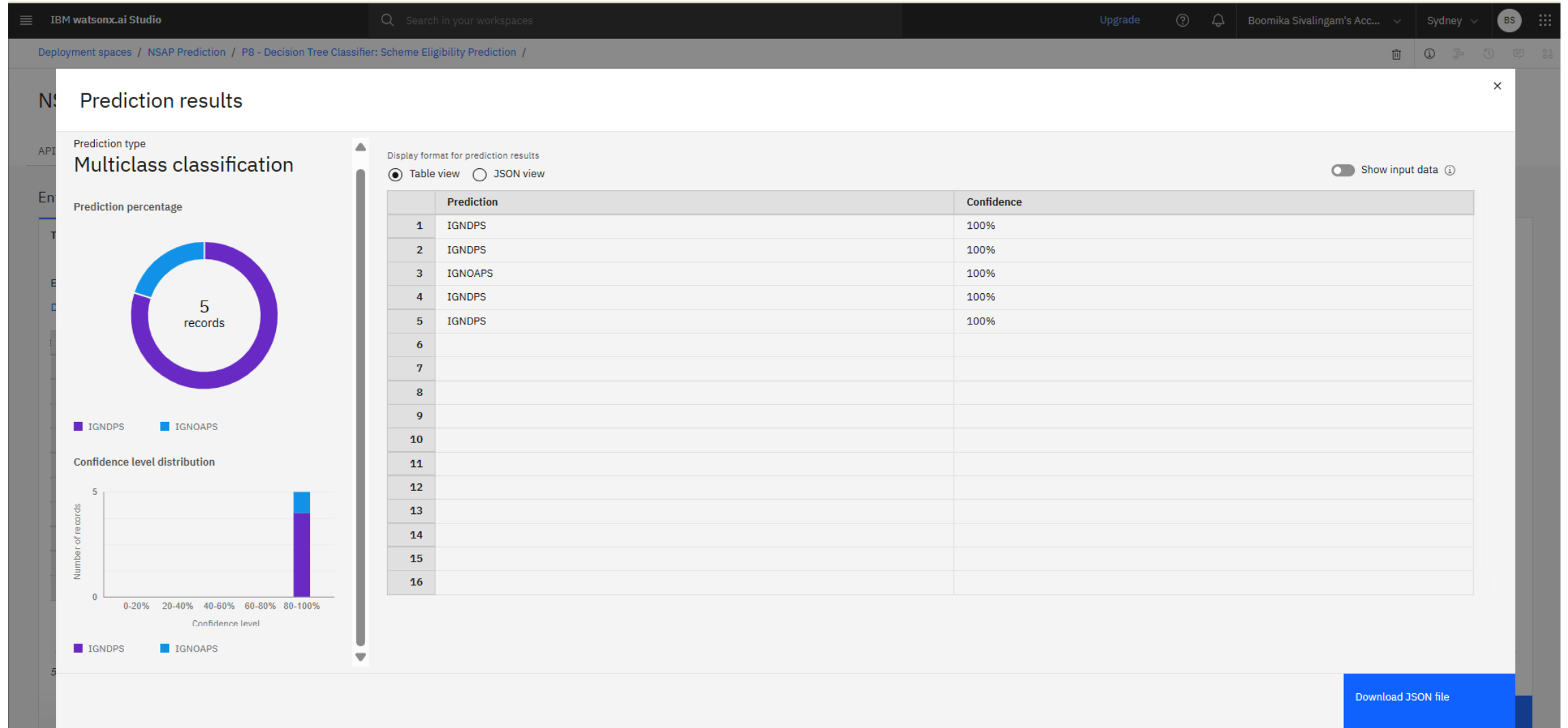
[Clear all](#) ×

	finyear (other)	lgdstatecode (double)	statename (other)	lgddistrictcode (double)	districtname (other)	totalbeneficiaries (double)	totalmale (double)	totalfemale (double)	totaltransgender (double)
1	2025-2026	10	BIHAR	188	ARARIA	1200	600	600	0
2	2025-2026	1	JAMMU AND KASH	11	PULWAMA	800	450	350	0
3	2025-2026	10	BIHAR	194	BUXAR	5000	2600	2400	0
4	2025-2026	1	JAMMU AND KASH	12	RAJAURI	3000	1600	1400	0
5	2025-2026	10	BIHAR	199	JEHANABAD	700	350	350	0
6									
7									

5 rows, 15 columns

Predict

RESULT



CONCLUSION

- The project successfully demonstrates how machine learning can automate the process of NSAP scheme eligibility prediction.
By using demographic and district-wise data, the model reduces manual verification efforts and ensures timely benefit delivery.
- The deployed API enables real-time predictions, supporting transparent and efficient social welfare distribution.

FUTURE SCOPE

- Incorporate applicant-level data for more personalized prediction.
- Add more features: age, income, disability percentage, etc.
- Improve model using advanced algorithms like ensemble methods or deep learning.
- Extend system to other welfare schemes beyond NSAP.

REFERENCES

- AI Kosh dataset: [District-wise Pension Data under NSAP](#).
- IBM Cloud documentation and AutoAI user guides.
- Machine Learning texts and online resources on multi-class classification.

IBM CERTIFICATIONS - GETTING STARTED WITH AI

In recognition of the commitment to achieve
professional excellence



Boomika S

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 20, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/0c45fb45-bc64-46b0-b2b2-cb161980f722>



IBM CERTIFICATIONS - JOURNEY TO CLOUD

In recognition of the commitment to achieve
professional excellence



Boomika S

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution



Issued on: Jul 20, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/eb3d9b68-e2f0-4774-ba3e-6c1f8c7261ee>



IBM CERTIFICATIONS - RAG LAB

24/07/2025, 22:05

Completion Certificate | SkillsBuild

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Boomika S

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU