
CAPSTONE PROJECT

NSAP ELIGIBILITY PREDICTION USING IBM WATSONX.AI

Presented By:

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OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

- The National Social Assistance Program (NSAP) is a flagship social security and welfare program by the Government of India. It aims to provide financial assistance to the elderly, widows, and persons with disabilities belonging to below-poverty-line (BPL) households. The program consists of several sub-schemes, each with specific eligibility criteria.
- Manually verifying applications and assigning the correct scheme can be a time-consuming and error-prone process. Delays or incorrect allocation can prevent deserving individuals from receiving timely financial aid.
- Your task is to design, build, and evaluate a multi-class classification model that can accurately predict the most appropriate NSAP scheme for an applicant based on their demographic and socio-economic data. The goal is to create a reliable tool that could assist government agencies in quickly and accurately categorizing applicants, ensuring that benefits are delivered to the right people efficiently.

PROPOSED SOLUTION

- To automate the classification of applicants into the correct NSAP sub-scheme using a machine learning model trained on demographic and socio-economic data, thereby reducing manual errors and accelerating benefit delivery
- **Data Collection:**
 - Gathered synthetic or real applicant data with features such as:
 - Age , Gender, Marital State, Disability Status etc.
- **Data Preprocessing:**
 - Clean and preprocess the collected data to handle missing values, outliers, and inconsistencies.
 - Feature engineering to extract relevant features from the data that might impact relevant schemes.
- **Machine Learning Algorithm:**
 - Explored multiple machine learning algorithm :
 - Snap Random Forest Classifier
 - Random Forest Classifier

PROPOSED SOLUTION

■ Deployment:

■ Algorithm Chosen:

- Decision Tree Classifier (with HPO and FE)
- Achieved highest accuracy of 0.980
- Snap Decision Tree Classifier also performed well

■ Model deployed in Watsonx.ai

■ Input interface supports table & JSON

■ Predictions exported in table and JSON format

■ Training Process:

- Used supervised learning on labeled scheme data
- Hyperparameter optimization (HPO-1 & HPO-2) and Feature Engineering (FE) applied

SYSTEM APPROACH

■ System Requirements:

- IBM Cloud (Lite – Mandatory)
- IBM Watsonx.ai Studio
- IBM Cloud Object Storage

■ Steps Followed:

- Data preprocessing and labeling
- AutoAI experiment to train multiple pipelines
- Model selection based on cross-validated accuracy
- Real-time prediction using Watson UI

ALGORITHM & DEPLOYMENT

■ Algorithm Selection:

- Decision Tree Classifier (with HPO-1,2 and FE)
- Achieved highest accuracy of 0.980
- Snap Decision Tree Classifier also performed well

■ Data Input:

- Age , Gender, Marital status, Aadhar number (optional), Mobile number , Category (obc, gen , sc and at).
- These features were selected because they directly correlate with eligibility conditions across various NSAP sub-schemes like:
 - IGNOAPS (Old Age Pension)
 - IGNWPS (Widow Pension)
 - IGNDPS (Disability Pension)

ALGORITHM & DEPLOYMENT

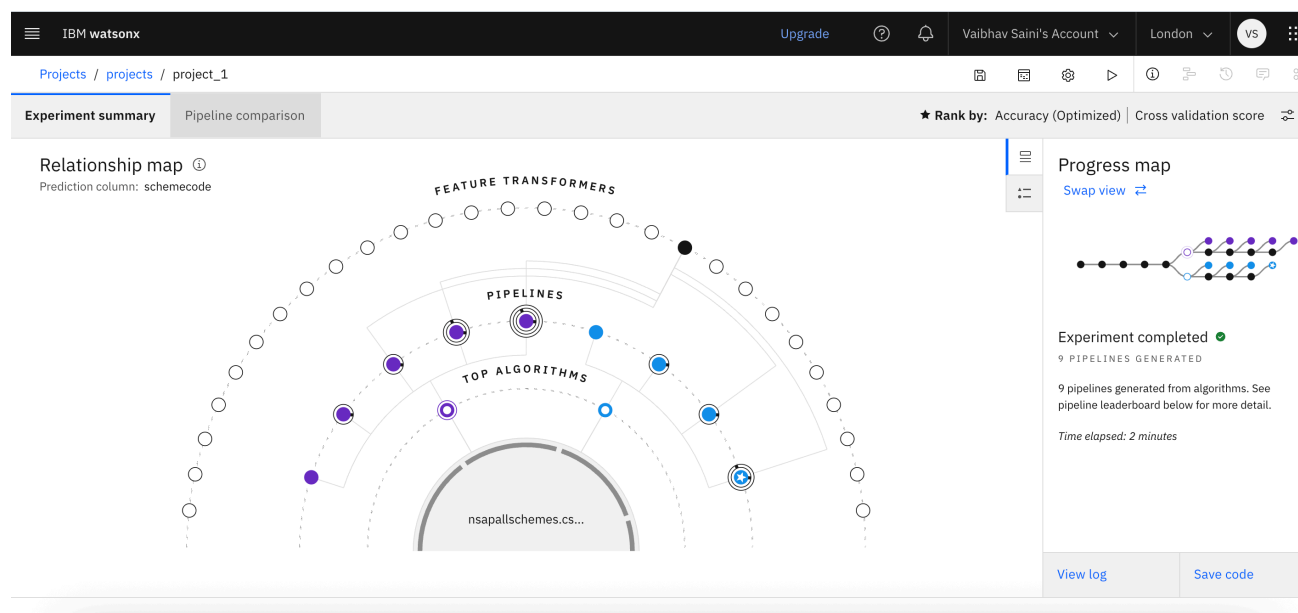
■ Training Process :

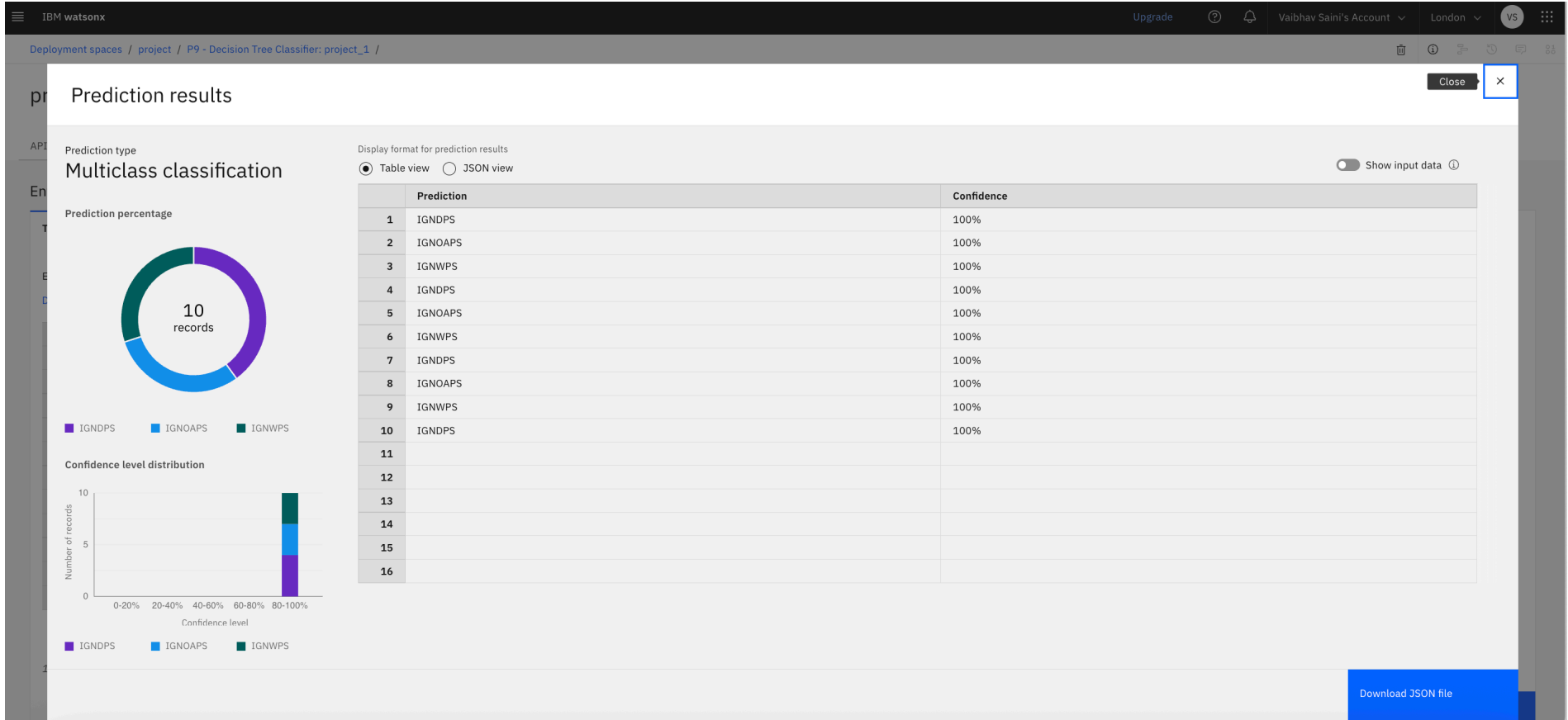
- Platform Used: IBM Watsonx.ai AutoAI
- Dataset Split: AutoAI handled training/validation split internally (typically 80:20 or with K-fold cross-validation)
- Preprocessing:
 - Categorical encoding (e.g., gender, pension type)
 - Handling of missing values
 - Automatic feature transformation by AutoAI

Model Selection: The pipeline with highest accuracy (98%) using Decision Tree Classifier.

RESULT

- 9 ML Pipelines trained using AutoAI in 2 minutes.
- Best Model: Batched Tree Ensemble Classifier (Snap Random Forest Classifier)
- Example Prediction: IGNDPS with probability 98%





RESULT

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Navigation Menu / project_1

Experiment summary Pipeline comparison ★ Rank by: Accuracy (Optimized) | Cross validation score

nsapallschemes.cs...

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

Pipeline leaderboard ▾

	Rank ↑	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 9	Decision Tree Classifier		0.980	HPD-1 FE HPO-2	00:00:04
	2	Pipeline 8	Decision Tree Classifier		0.980	HPD-1 FE	00:00:57
	3	Pipeline 2	Snap Random Forest Classifier		0.978	HPD-1	00:00:08
	4	Pipeline 1	Snap Random Forest Classifier		0.978	None	00:00:01

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Deployment spaces / project / IP - Decision Tree Classifier: project_1 /

Prediction results

Prediction type: Multiclass classification

Display format for prediction results: ☒ Table view ☐ JSON view ☐ Show input data ⓘ

Prediction percentage: 10 records

Confidence level distribution

Legend: IGNDPS (purple), IGNDAPS (blue), IGNDWPS (green)

Prediction	Confidence
1 IGNDPS	100%
2 IGNDAPS	100%
3 IGNDWPS	100%
4 IGNDPS	100%
5 IGNDAPS	100%
6 IGNDWPS	100%
7 IGNDPS	100%
8 IGNDAPS	100%
9 IGNDWPS	100%
10 IGNDPS	100%
11	
12	
13	
14	
15	
16	

[Download JSON file](#)

CONCLUSION

- Automated prediction improves efficiency and reduces manual errors.
- Watsonx.ai supports scalable deployment and real-time predictions.
- Model helps ensure timely scheme allocation to eligible citizens.

FUTURE SCOPE

- Expand to cover more NSAP schemes and complex eligibility rules.
- Hybrid ML + Rule-based logic integration.
- Aadhaar and real-time ID verification integration.
- API-based bulk processing and feedback loop for retraining.

REFERENCES

- AI Kosh Dataset: <https://aikosh.indiaai.gov.in>
- IBM Watson Studio & Cloud Documentation
- NSAP Guidelines – Ministry of Rural Development
- IBM AutoAI Technical Docs

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Learning hours: 20 mins



THANK YOU