
CAPSTONE PROJECT

PENSION ELIGIBILITY UNDER NSAP

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OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach**
- **Algorithm & Deployment**
- **Result**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

- **The Challenge:** using Machine Learning 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

- We propose a Machine Learning-based classification system using IBM Watson AutoAI to predict the most suitable NSAP scheme for applicants. The model uses demographic and socio-economic factors like age, widowhood, disability, and BPL status. This ensures quick, accurate, and automated eligibility verification, reducing manual errors and delays
- **Data Collection:**
 - Dataset sourced from **AI Kosh** containing NSAP pension scheme distribution.
 - **Utilize real-time data sources**, Includes demographic & socio-economic details of beneficiaries **to enhance prediction accuracy**.
- **Data Preprocessing:**
 - **Irrelevant columns removed** (e.g., applicant names, IDs, location codes).
 - **New features engineered** based on NSAP criteria.
 - **Target Column: Schemecode** (IGNOAPS, IGNWPS, IGNDPS).
- **Machine Learning Algorithm:**
 - **Approach:** Multi-Class Classification.
 - **Platform:** IBM Watson AutoAI.
 - **AutoAI Performed Feature engineering**, trained multiple ML algorithms(Logistic Regression, Decision Trees, Gradient Boosted Trees, etc.).
- **Deployment:**
 - Best performing pipeline saved as a model in Watson Studio.
 - Model deployed via **Online Deployment** for real-time predictions.
- **Evaluation:**
 - Model tested with sample cases.
 - Achieved high accuracy in correctly predicting schemes. Confusion Matrix & Accuracy metrics verified through AutoAI leaderboard.

SYSTEM APPROACH

- System Requirements:**

IBM Watson Studio, Cloud Object Storage, Python/AutoAI.

- Data Preprocessing:**

Cleaned dataset with added columns: is_BPL, is_Widow, is_Disabled, Age.

Removed irrelevant columns like district codes and applicant IDs.

- Libraries Used:**

IBM AutoAI (no manual library installation needed).

ALGORITHM & DEPLOYMENT

- Machine Learning Algorithm

- Approach: Multi-Class Classification for scheme prediction.

- Tool: IBM Watson AutoAI.

- Process:

AutoAI automatically tried multiple models (e.g., Logistic Regression, Decision Trees, Gradient Boosted Trees).

Performed **feature selection** and **hyperparameter tuning**.

Chose the best performing pipeline based on evaluation metrics.

- Testing & Validation

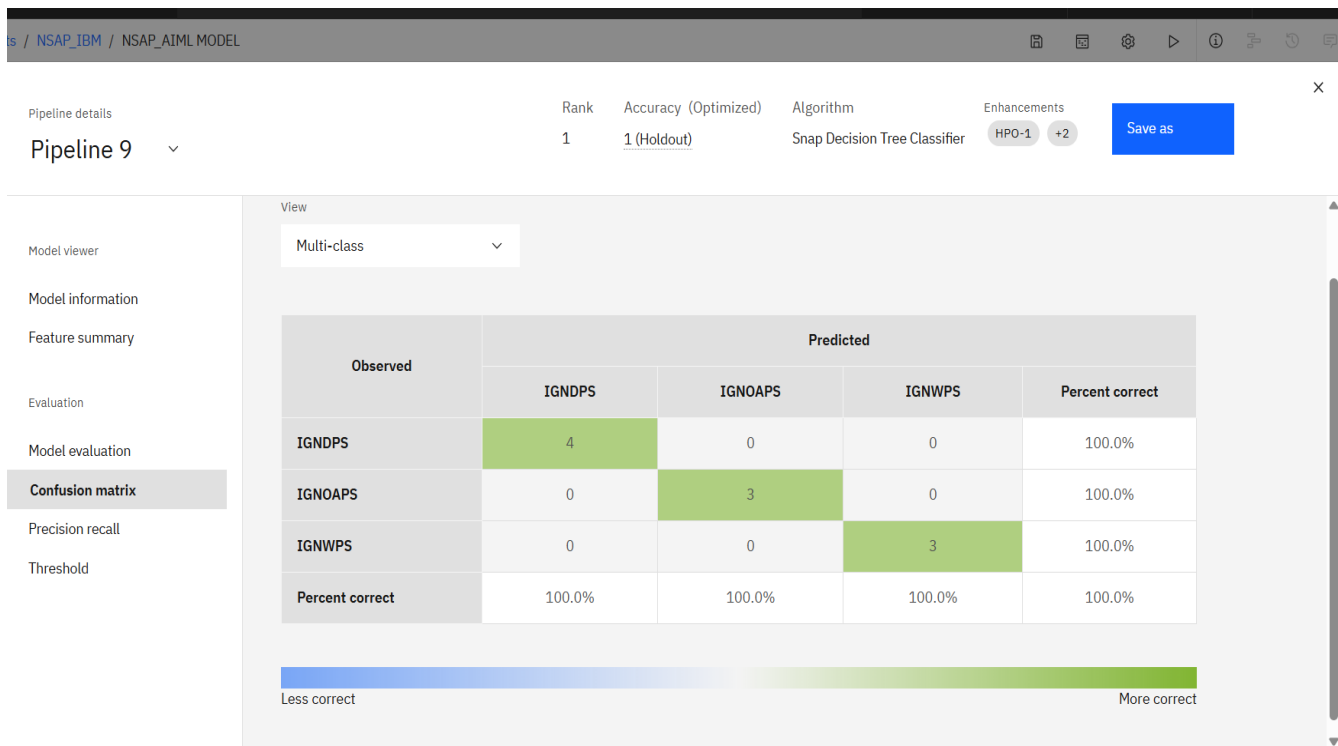
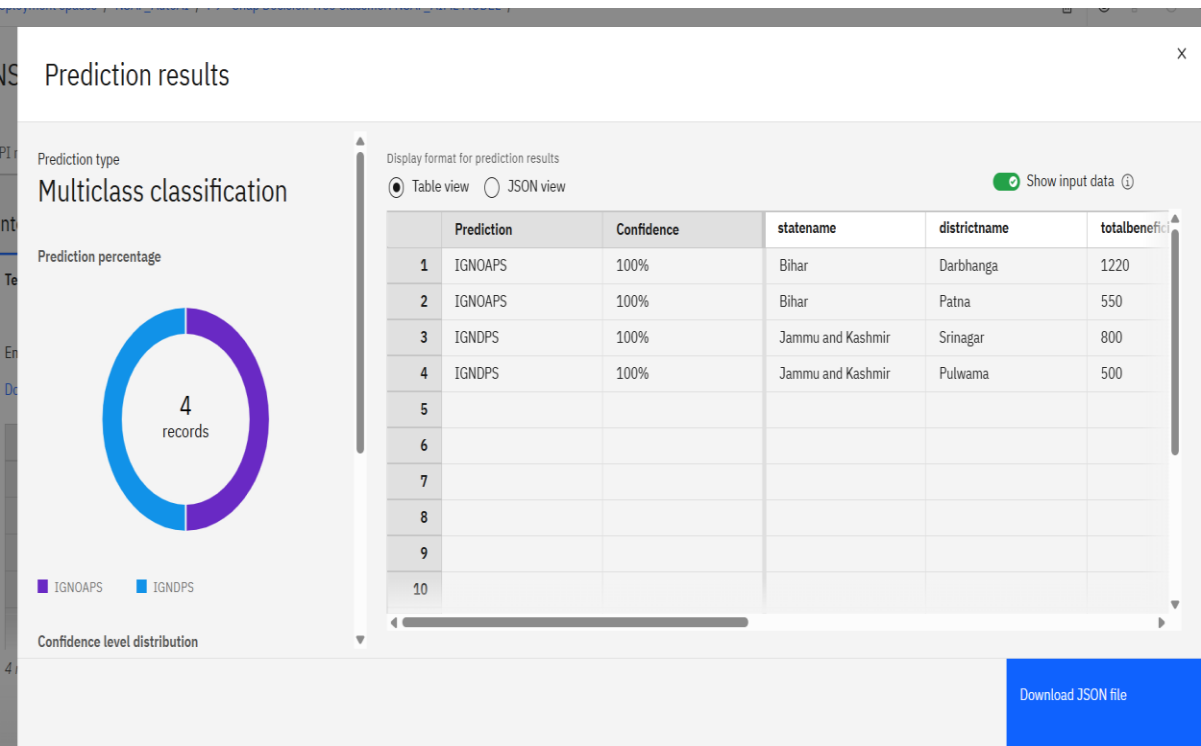
Test cases created for elderly, widows, and disabled applicants.

Model predictions validated against NSAP eligibility rules.

Dataset → AutoAI Training → Best Pipeline → Deployment → User Input → Scheme Prediction

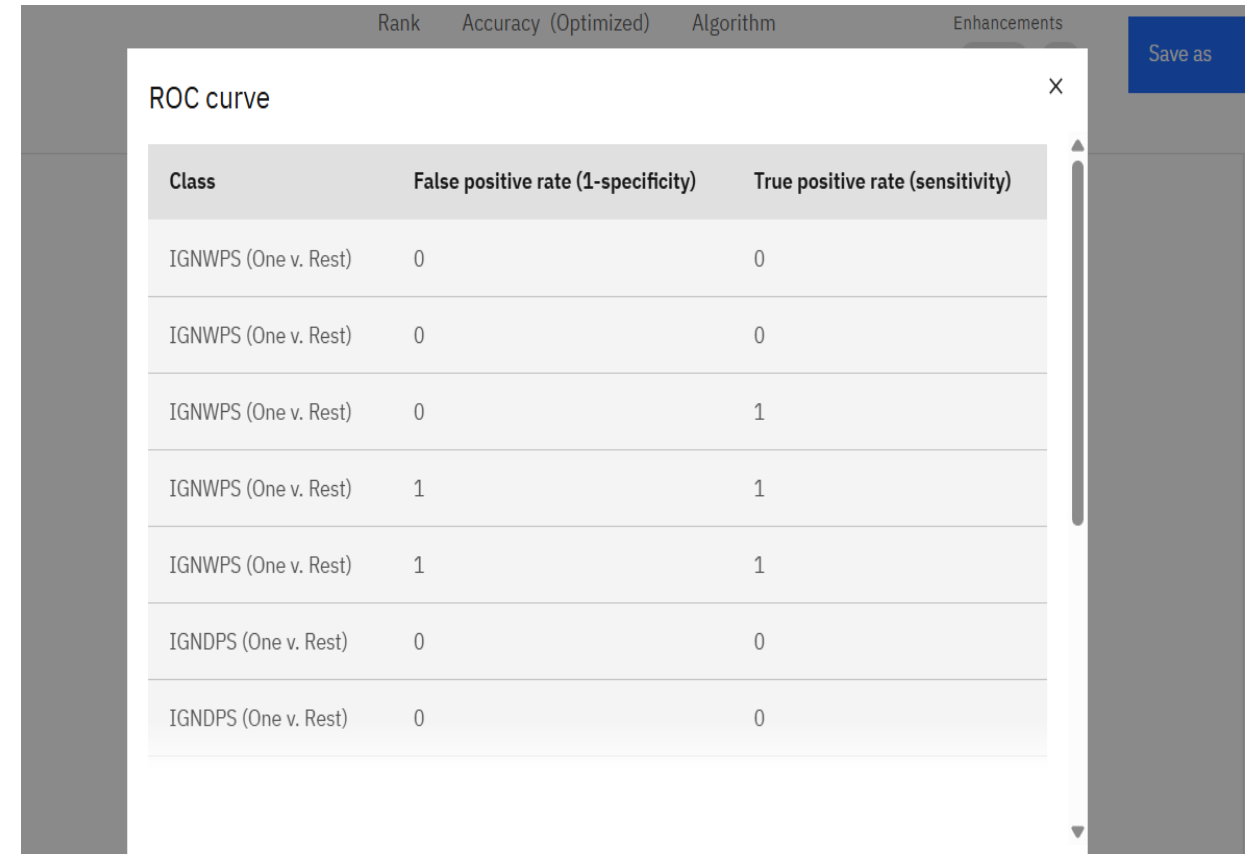
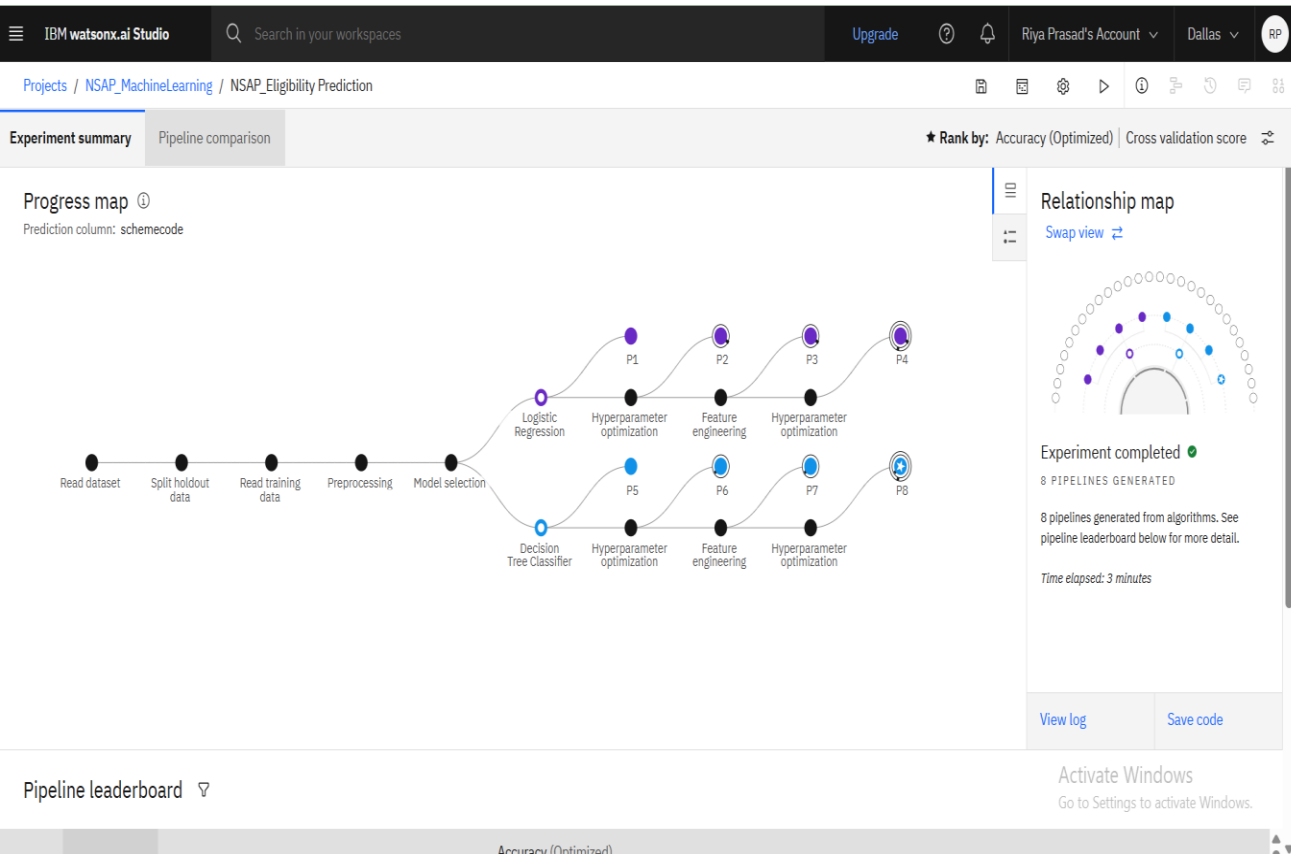
RESULT

State	is_Elderly	is_Widow	is_Disabled	Predicted Scheme
J&K	Yes	No	No	IGNOAPS
Bihar	Yes	Yes	No	IGNWPS
J&K	Yes	No	Yes	IGNDPS
Bihar	Yes	No	No	IGNOAPS



CONCLUSION

- The proposed ML model accurately predicts NSAP eligibility.
- Significantly reduces manual effort and time.
- Ensures benefits reach the right beneficiaries quickly.
- Can be easily adopted by government agencies for welfare delivery.



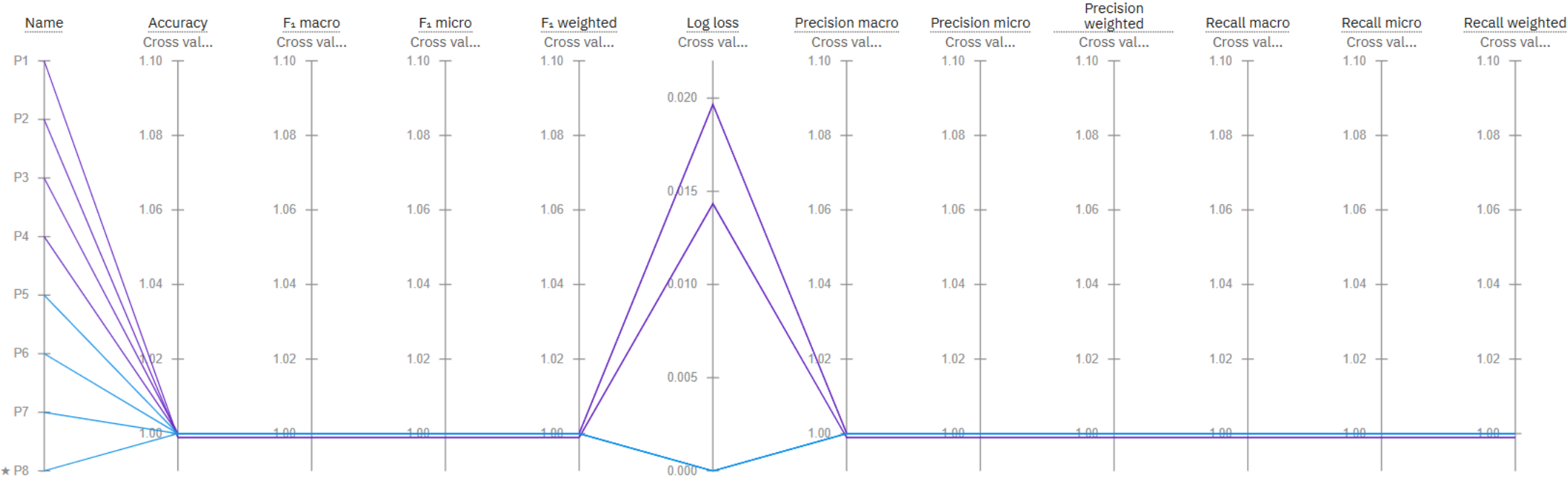
Experiment summary

Pipeline comparison

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

Metric chart ⓘ

Prediction column: schemecode



Pipeline leaderboard ⌵

Activate Windows
Go to Settings to activate Windows.

Rank	↑	Name	Algorithm	Accuracy (Optimized) Cross Validation	Enhancements	Build time
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FUTURE SCOPE

- **Expand the dataset with real applicant-level data.**
- **Include additional features like income, education, and health status.**
- **Integrate with Aadhaar and government portals for automated verification.**
- **Deploy as a mobile/web app for field officers.**

REFERENCES

- **Government of India** – National Social Assistance Programme (NSAP).
- IBM Watson Studio Documentation.
- **AI Kosh Dataset** – NSAP Schemes.
- Machine Learning research papers on classification techniques.
- **ChatGPT**
- **Data Collected:** Districtwise Pension data under the National Social Assistance Programme

GITHUB LINK: [HTTPS://GITHUB.COM/RIYAPRASAD802/NSAP_PREDICTOR.GIT](https://github.com/RIYAPRASAD802/NSAP_PREDICTOR.GIT)

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THANK YOU