CAPSTONE PROJECT

PREDICTING ELIGIBILITY FOR NSAP SCHEMES USING MACHINE LEARNING AND IBM CLOUD SERVICES

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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 Programme (NSAP) provides financial aid to vulnerable groups. Manual eligibility checks are time-consuming and error-prone, delaying support. A machine learning model is needed to classify applicants into the correct NSAP scheme based on their demographic and socio-economic data. This will ensure faster and more accurate benefit distribution.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of accurately classifying applicants into appropriate NSAP schemes, improving efficiency and reducing manual errors in benefit distribution. This involves leveraging data analytics and machine learning techniques to automate scheme allocation.
- **Data Collection:**
  - Use the AI_KOSH dataset, which includes demographic and socio-economic attributes of applicants.
  - Ensure relevant features like age, gender, income, disability status, and marital status are captured for training.
- **Data Preprocessing:**
  - Handle missing values, duplicates, and outliers in the dataset.
  - Encode categorical variables (e.g., gender, scheme type) and scale numerical features. Perform feature selection and extraction to enhance model performance.
- **Machine Learning Algorithm:**
  - Implement classification algorithms such as Random Forest, Decision Tree, or XGBoost for multi-class classification.
  - Use cross-validation and hyperparameter tuning to optimize the model. Train the model to map applicant features to the correct NSAP scheme.
- **Deployment:**
  - Deploy the trained model using IBM Cloud Lite services, possibly via Watson Machine Learning or IBM Cloud Functions.
  - Create a simple web interface or API for government officers to input applicant data and receive scheme recommendations.
- **Evaluation:**
  - Evaluate model performance using metrics like Accuracy, Precision, Recall, F1-score, and Confusion Matrix..
  - Continuously monitor and retrain the model with new data to improve predictions..
  - Result: An AI-driven system that automatically and accurately classifies applicants into the most suitable NSAP scheme, enabling timely and fair distribution of financial aid.

SYSTEM APPROACH

This system aims to predict the eligible NSAP scheme for applicants using machine learning. The approach includes data preprocessing, model training, evaluation, and deployment on IBM Cloud Lite.

System Requirements:

- Hardware: Minimum 8GB RAM, i5 processor
- Software: Python 3.8+, Jupyter Notebook, IBM Cloud Lite account

Libraries Required:

- Pandas,numpy – Data Handling
- Matplotlib,Seaborn – Visulaization
- Scikitlearn,xgboost – ML models and preprocessing
- ibm-watson-machine-learning-Deployment on IBM Cloud

ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for predicting the nsap scheme. Here's an example structure for this section:
- Algorithm Selection:
  - We use a Random Forest Classifier for its high accuracy, ability to handle mixed data types, and suitability for multi-class classification. Other models like Decision Tree and XGBoost are also tested for comparison.
- Data Input:
  - Key input features include age, gender, marital status, disability, economic status (BPL), and location. The target is the NSAP scheme category.
- Training Process:
  - Data is split into training and test sets. Categorical variables are encoded, and hyperparameters are tuned using cross-validation and grid search to optimize performance.
- Prediction Process:
  - The model takes new applicant data, applies preprocessing, and predicts the eligible NSAP scheme. In deployment, predictions are made in real-time through an API and can be shown on a user-friendly interface for quick decisions.

RESULT

The model takes new application data, applies preprocessing, and predicts the eligible NSAP scheme. In deployment, predicitons are made in real-time through an API and can be shown n a user-friendly interface for quick decisions.

CONCLUSION

- This project demonstrates the effective use of machine learning to automate the eligibility prediction for NSAP schemes. By leveraging demographic and socio-economic data, the model improves accuracy, reduces manual workload, and speeds up decision-making. Deploying the solution on IBM Cloud Lite ensures scalability and accessibility for real-world government use.

FUTURE SCOPE

1. Model Enhancement: Incorporate additional features like health status, income proof, and family size to improve prediction accuracy.
2. Integration with Government Portals: Seamless integration with official application systems for real-time eligibility checks.
3. Multilingual Interface: Develop interfaces in regional languages for broader accessibility.
4. Continuous Learning: Enable the model to retrain periodically with new data to adapt to policy changes and trends.
5. Fraud Detection: Extend the system to identify anomalies or potential fraud in applications.

REFERENCES

- List and cite relevant sources, research papers, and articles that were instrumental in developing the proposed solution. This could include academic papers on NSAP scheme prediction, machine learning algorithms, and best practices in data preprocessing and model evaluation.

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