Using AI to Identify and Expedite Environmental Goods at Customs

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Global Drivers and Operational Gaps

Global Frameworks for Green Trade

UN SDGs
Guide sustainable production, climate action, and international partnerships

Doha Declaration
Calls for lowering barriers and labeling to environmental goods

WCO Green Customs Action Plan
Greening Customs, enabling green trade, and fostering long-term innovation

ESCAP Framework
Four pillars: Digital procedures, environmental goods, green transport, NTMs

Operational Challenges at Customs

Classification Problem
Environmental and non-environmental goods have same HS codes.

Operational Inefficiency
Time-consuming and inconsistent manual identification processes

Policy Gap
60% of Customs do not have a trade facilitation policy for environmental goods
(WCO annual survey, 2022)

Technology Adoption
Only 10% of Customs use AI in operations
(WCO smart Customs survey,2024)

Objective and Scope of the Study

Objective

To develop and evaluate an AI-based model for the identification and risk assessment of environmental goods at Customs.

Scope

1. Uses Customs declaration data from Nepal.
2. Applied AI models for classification and fraud detection of EGs
3. Based on reference lists of EGs: APEC list of environmental goods and others
4. Addresses both policy relevance and operational feasibility in Customs

ACCTS: Agreement on Climate Change, Trade and Sustainability

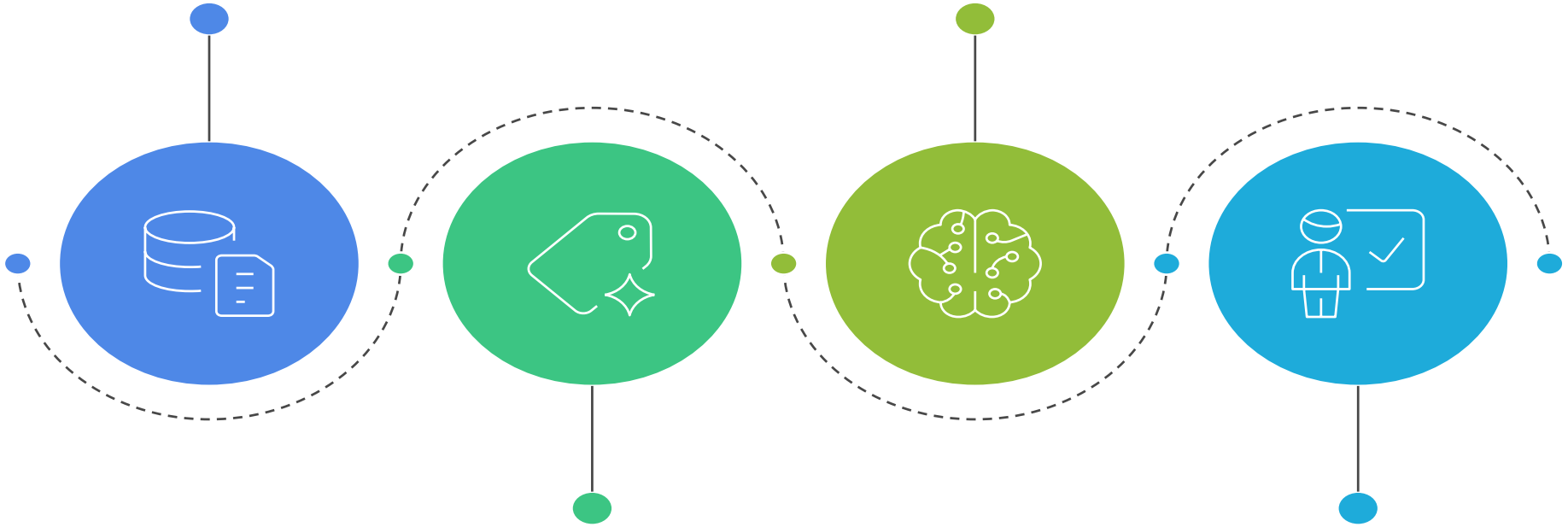
Methodology

Data Collection

Data from Nepal Customs

AI Models Development

Model for environmental goods classification
Model for fraud detection



Labeling and Pre-processing

- Environmental goods labeled using three references
- Fraud labels derived from existing seizure database
- Feature engineering

Model Evaluation

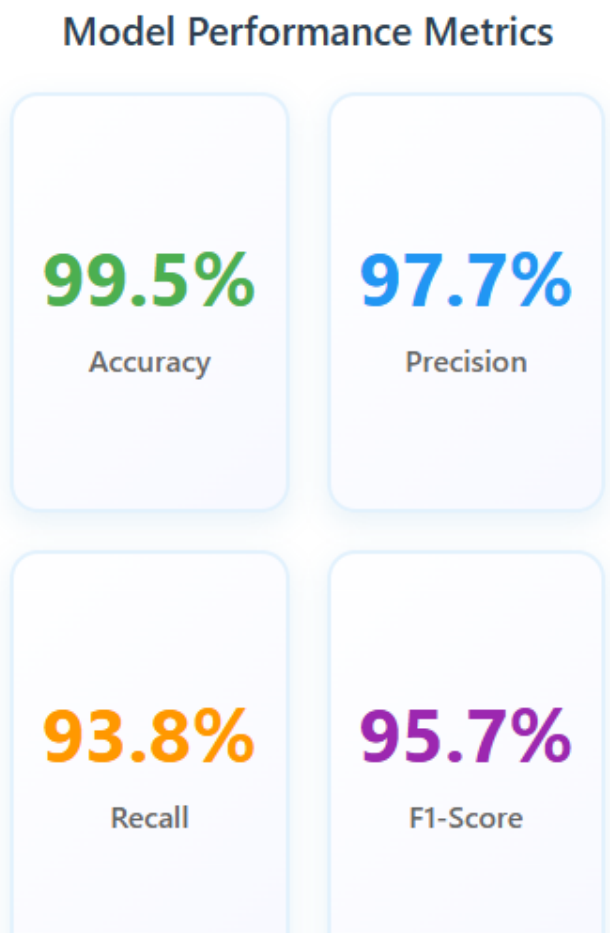
Accuracy, Precision, Recall and custom FDR@k metrics

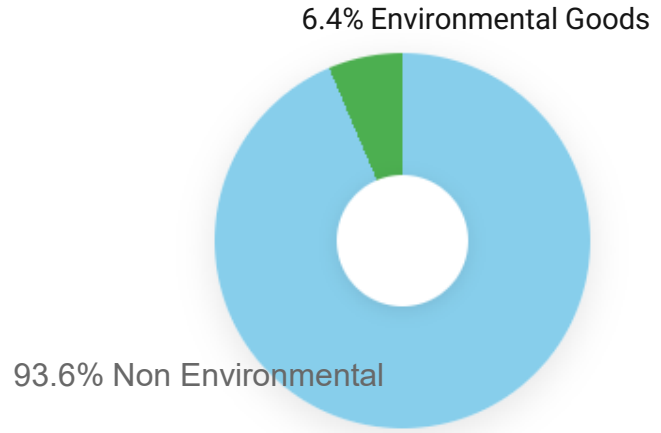
FDR@K: Fraud detection rate at certain inspection level thresholds

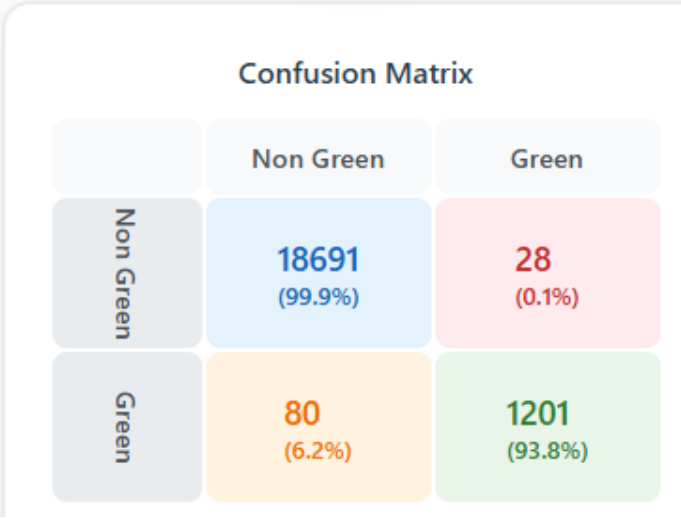
Key Findings

Environmental Goods Classification

- 6.4% of the dataset were environmental goods
- FastText outperformed all tested models
- Achieved 99.5% overall accuracy on test data
- Predicted 1,229 goods as green; 1,201 were correct → 97.7% precision
- Out of 1,281 actual green goods, 1,201 were correctly identified → 93.8% recall



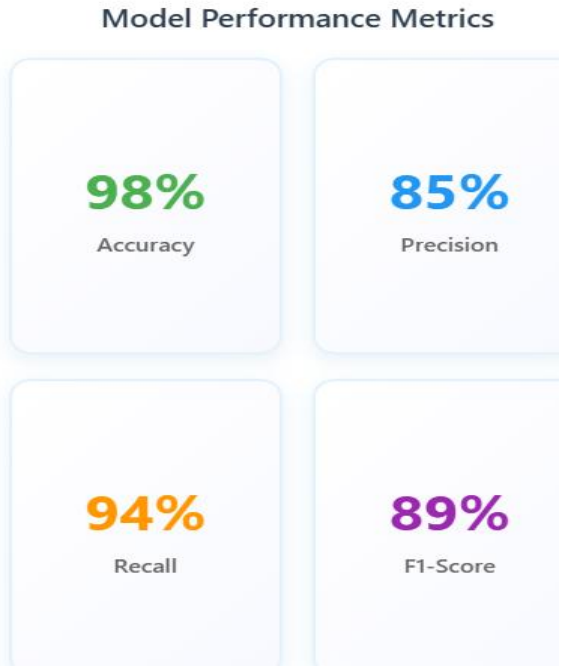


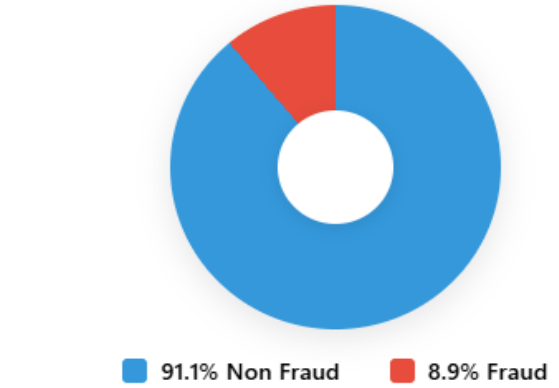


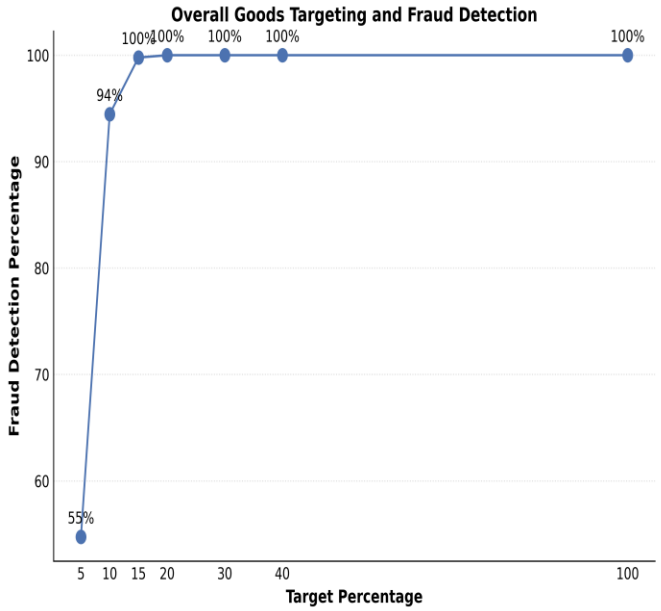
Key Findings

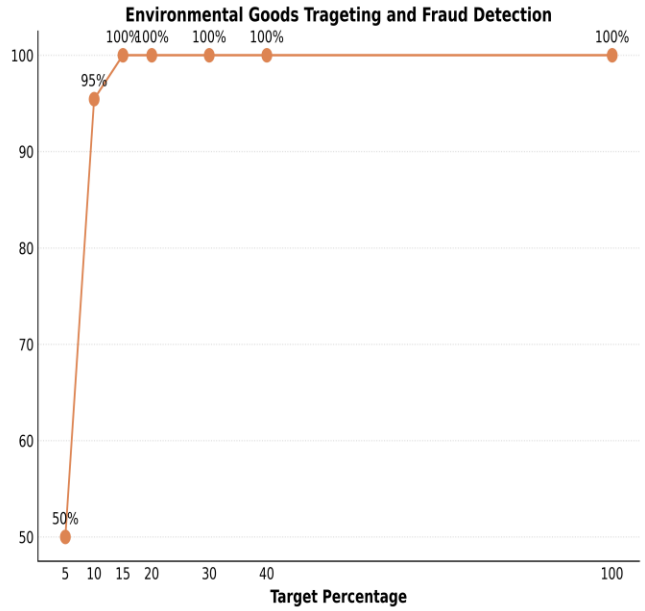
Fraud detection

- 8.9% of the transaction has some kind of fraud.
- CatBoost model outperformed all other tested
- Achieved 98% accuracy and 94% recall on test data
- Custom FDR@K metrics shows:
  - Targeting top 10% of risky consignments detects 94% of fraud
  - Targeting 15% detects nearly all fraud currently caught by Customs









Thank you

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