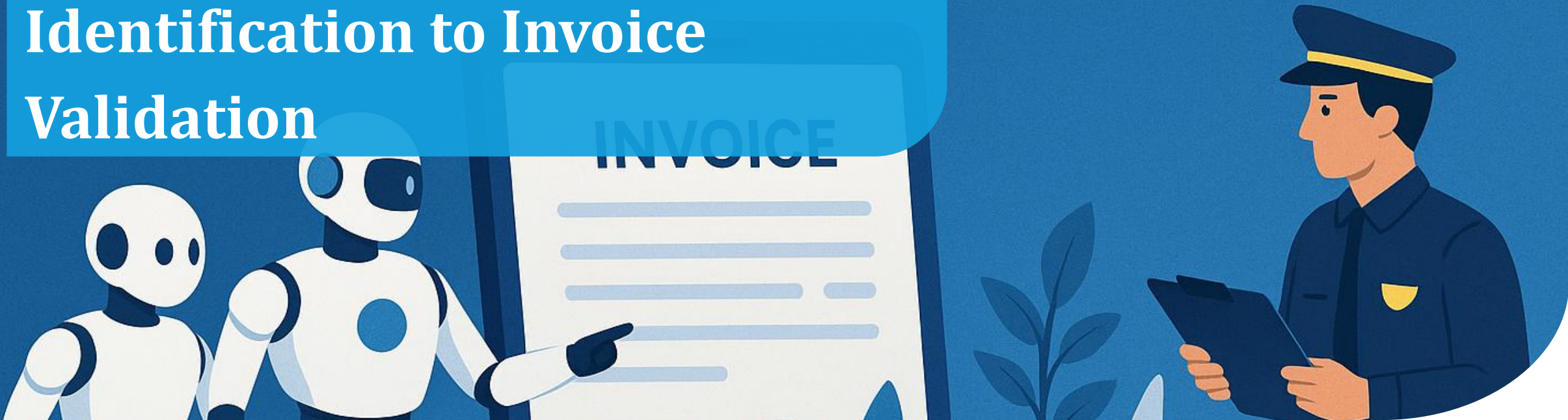


# AI Agents in Customs: From Environmental Goods Identification to Invoice Validation



**Mohan Kumar PUDASAINI**  
WCO Expert (Risk Management, Data Analytics)  
Data Analyst, Nepal Customs

**Webinar on AI Agents and Bots for  
Facilitating Paperless Trade  
Transactions**

26 June 2025

# AI Environmental Goods Classification

## Background



### Strong Policy Momentum

UN SDGs, WTO Doha Declaration, WCO Green Customs Plan, and ESCAP conceptual framework of Green Trade Facilitation



### Environmental Goods: A Classification Challenge

Many environmental and non-environmental goods fall under the same HS codes, making HS-based facilitation difficult. E.g: Steel towers (used for both telecoms and wind turbines)



### Policy Gap

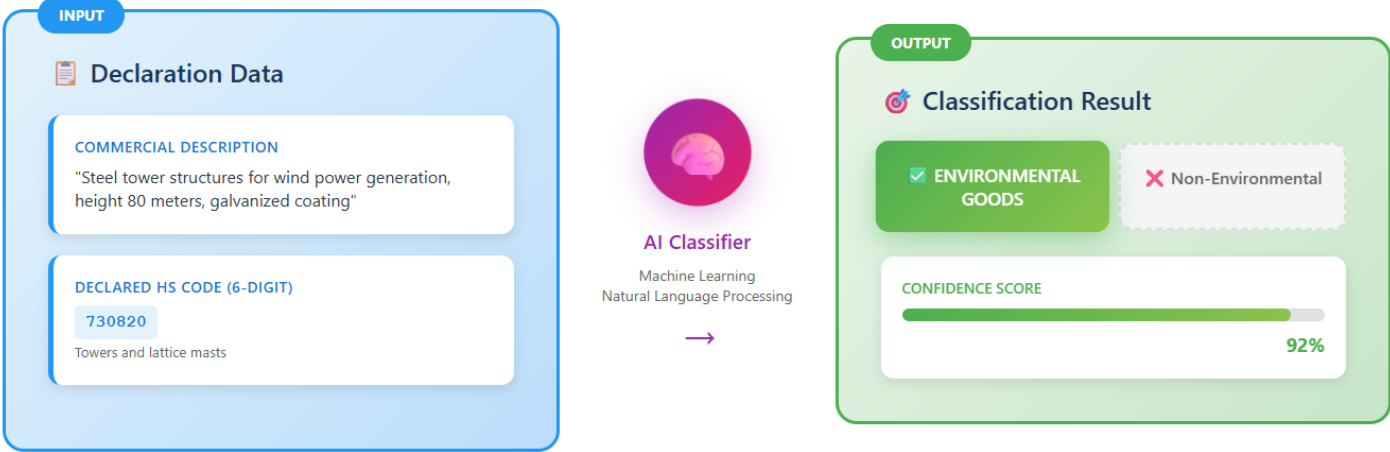
60% of Customs do not have a trade facilitation policy for environmental goods  
(WCO annual survey, 2022)



### No Universal Definition of Environmental Goods

This study adopts goods from:▪ APEC Environmental Goods List▪ Singapore–Australia Green Economy Agreement▪ ACCTS (Agreement on Climate Change, Trade and Sustainability)

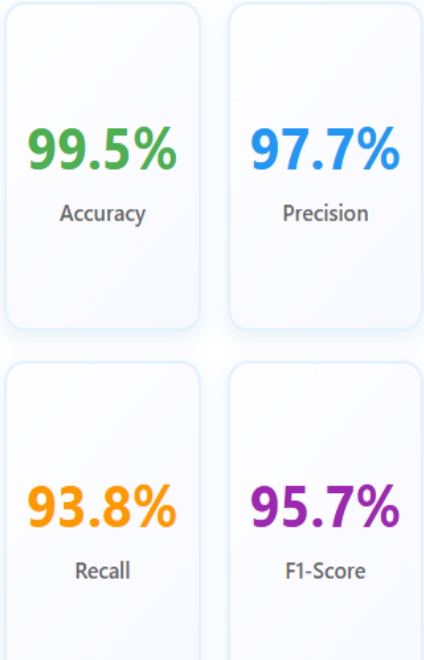
# AI Environmental Goods Classification



Classification Examples			
Solar panels, photovoltaic modules HS Code: 854140 Environmental 95%	Steel towers for telecommunication HS Code: 730820 Non-Environmental 88%	LED lighting fixtures, energy efficient HS Code: 940540 Environmental 91%	Water treatment filters, industrial HS Code: 842121 Environmental 89%

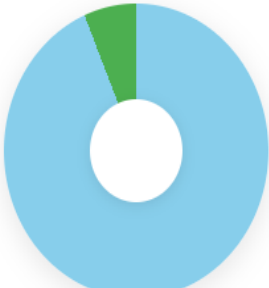
Classification process

## Model Performance Metrics



Model Performance

6.4% Environmental Goods



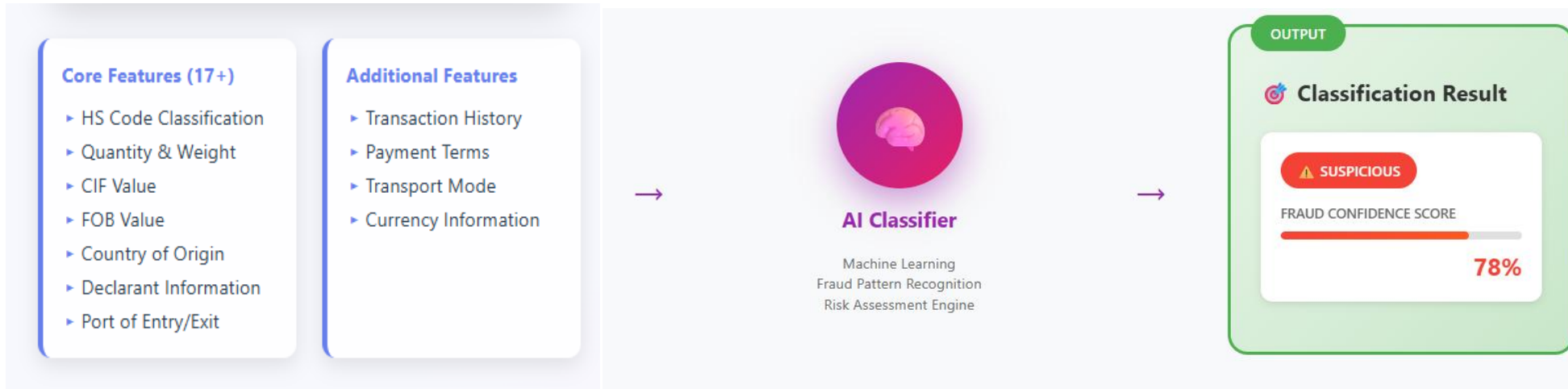
93.6% Non Environmental

## Confusion Matrix

	Non Green	Green
Non Green	18691 (99.9%)	28 (0.1%)
Green	80 (6.2%)	1201 (93.8%)

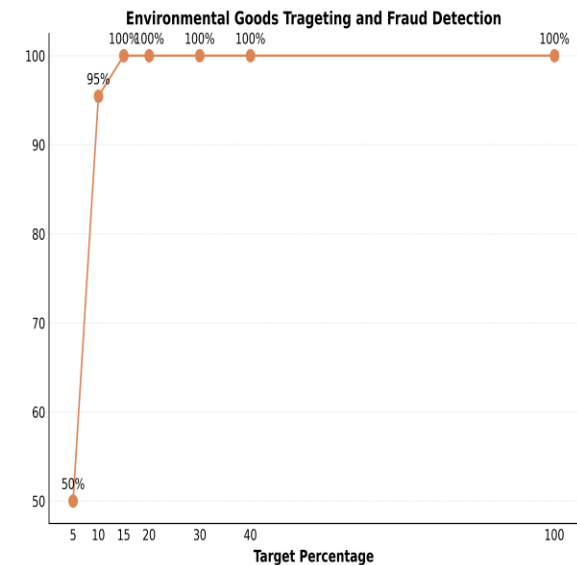
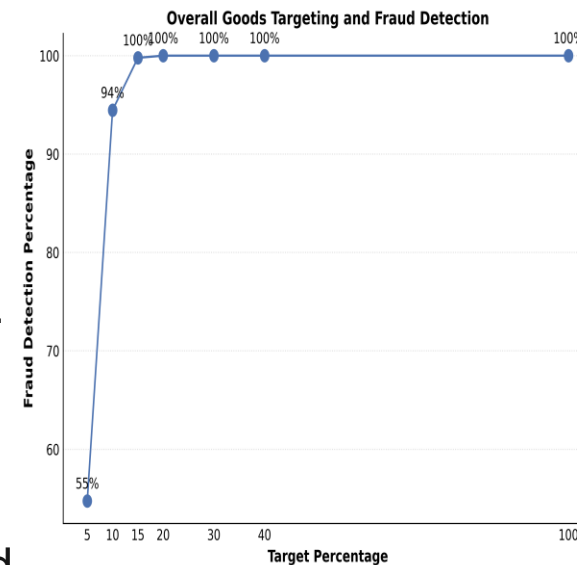
# AI for Fraud Detection

## Classification process



### Model Performance:

- ❑ 8.9% of the transaction has some kind of fraud.
- ❑ Currently, around 50% of consignments (physical + document verification) are targeted to detect such fraud.
- ❑ If we use AI, it can detect 94% of fraud by targeting just 10% of consignments.
- ❑ Targeting 15% detects nearly all fraud currently detected.



# AI for Classification

## ❑ AI-powered HS Code Recommendation

Automatically suggests appropriate HS codes based on product images using a large language model (LLM)-based agent.

## ❑ Support Tool for Classification Officers

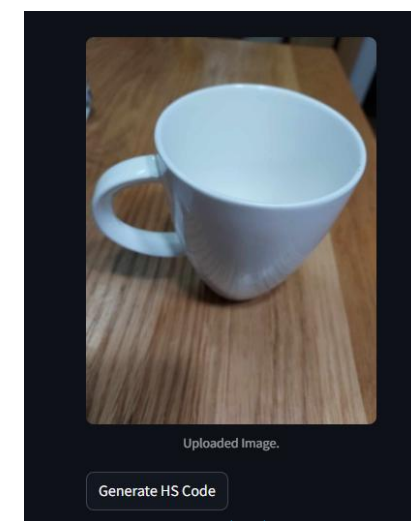
Acts as a smart assistant to help classification officers make quicker, more consistent decisions.

## ❑ Faster Customs Clearance

Speeds up the classification process, contributing to faster processing and reduced delays at Customs.

## ❑ Training Aid for New Officials

Serves as an effective learning tool by showing how image-based classification is mapped to HS codes .



### The Response is:

Here are the HS code recommendations and rationale:

**Recommended HS:** 69111000

**Rationale:** This HS code specifically covers tableware and kitchenware made of porcelain or china, which is the most likely material for the cup shown in the image. The cup is clearly intended for use as tableware.

**Description:** The image shows a white, empty cup with a handle resting on a wooden surface. It appears to be made of ceramic or porcelain. The cup is a typical shape for drinking beverages such as coffee or tea.

**Other possible HS:**

HS Code	Rationale
69120000	If the cup is made of other ceramic materials (e.g., earthenware, stoneware) instead of porcelain or china, this HS code would be applicable.
73239390	If the cup is made of Stainless Steel, this HS code would be applicable
70134900	If the cup is made of Glass, this HS code would be applicable

# AI for Invoice Validation

## ❑ AI-powered Invoice Validator

Built on Large Language Models (LLMs), this agent extracts key information from scanned invoices during goods declaration.

## ❑ Automatic Comparison with Declarations

Compares invoice details (e.g., description, quantity, value) with declared information in the Customs system.

## ❑ Discrepancy Detection

Flags mismatches or anomalies for further review, helping identify potential fraud or misdeclaration.

## ❑ Enhances Risk Management

Improves targeting by identifying high-risk consignments based on document inconsistencies.

## ❑ Time-Saving for Officers

Reduces manual document checks and improves workflow efficiency in Customs operations.

Commercial Invoice				
Seller Contoso Entertainment System USA 567 Blue Trail Redmond, WA 98052 USA	Invoice No. CEN001-000003		Date 10-18-2022	
	Customer reference no.			
	Name of bank FCB		Bill of lading/AVB	
	Terms of payment Net 30 days			
	Country of destination (ISO)			
Ship to (if different than sold to)				
Qty	Description	Unit of Measure	Unit Price	Total Price
35.00	A0001 - HDMI 6' Cables	Pcs	18.00	630
25.00	A0002 - HDMI 12' Cables	Pcs	30.00	750
Package marks				Total Commercial Value 1,380
Basic charges, packing, insurance, etc.				0
Total Invoice Value				1,380
Certifications		Verify that the stated export prices and description of goods are true and accurate		
		(signed) _____		
		Date _____		

## Validation Result

There are inconsistencies between the invoice and the declared information:

- **Unit Price:**
  - Invoice: A0001 - HDMI 6' Cables unit price is 18.00
  - Declared info: A0001 - HDMI 6' Cables unit price is 10
- **Total Price:**
  - Invoice: A0001 - HDMI 6' Cables total price is 630.00
  - Declared info: A0001 - HDMI 6' Cables total price is 350

Here is the declared information in tabular form:

Exporter	Consignee	Product	Unit	Quantity	Rate	Total amount	Country of Origin
Contoso Entertainment System USA	Birch Company	A0001 - HDMI 6' Cables	Pcs	35	10	350	USA
Contoso Entertainment System USA	Birch Company	A0002 - HDMI 12' Cables	Pcs	25	30	750	USA





Thank you

**Mohan PUDASAINI**

<https://pudasainimohan.com.np/>

