**1️⃣ Features Used in the Model**

These features are calculated from your dataset and used to classify the importers.

**📌 A. Importer-Based Features**

| **Feature Name** | **Description** |
| --- | --- |
| **Total\_Import\_Value** | The total value of imports for an importer. |
| **Agent\_Loyalty** | Loyalty percentage based on the number of agents used and the percentage of imports cleared by a single agent. |
| **Marketing\_Risk** | Risk score based on the number of agents used and the concentration of imports with a single agent. |

**📌 B. Clearing Agent-Based Features**

| **Feature Name** | **Description** |
| --- | --- |
| **Clearing\_Agent\_Details** | Dictionary containing clearing agents, their GD details, and import values. |
| **No\_of\_GDs** | The number of GDs filed by a clearing agent for an importer. |
| **Unique\_GD\_Count** | The number of unique GDs filed by a clearing agent. |
| **Average\_Import\_Value** | The average import value per shipment for a clearing agent. |
| **Total\_Import\_Value** | The total import value handled by a clearing agent. |

**📌 C. Shipment Frequency & Import Growth Features**

| **Feature Name** | **Description** |
| --- | --- |
| **Classification Based on Shipment Frequency** | Identifies if the importer has frequent or rare shipments. |
| **Classification Based on Import Growth** | Checks if the importer’s import value is increasing, stable, or declining. |

**2️⃣ Importer Classifications**

The model assigns **multiple classifications** to each importer based on different aspects of their behavior.

**📌 A. Primary Importer Classification**

| **Classification Name** | **Description** |
| --- | --- |
| **Trust-Oriented** | Works with a single or limited number of agents, indicating agent preference. |
| **Highly-Diversified** | Works with many agents, frequently switching between them. |
| **Self-Clearing** | Handles its own clearance instead of using external agents. |

**📌 B. Classification Based on Shipment Frequency**

| **Classification Name** | **Description** |
| --- | --- |
| **High-Frequency Importer** | Files a large number of GDs, indicating frequent imports. |
| **Low-Frequency Importer** | Files a small number of GDs, indicating occasional imports. |

**📌 C. Classification Based on Import Value**

| **Classification Name** | **Description** |
| --- | --- |
| **High-Value Importer** | Imports a high volume of goods, indicating strong business activity. |
| **Low-Value Importer** | Imports small volumes, indicating limited transactions. |

**📌 D. Classification Based on Import Growth**

| **Classification Name** | **Description** |
| --- | --- |
| **Rapid Growth Importer** | The import value is increasing significantly over time. |
| **Stable Importer** | The import value remains relatively steady. |
| **Declining Importer** | The import value is decreasing over time. |

**📌 E. Classification Based on Clearing Agent Behavior**

| **Classification Name** | **Description** |
| --- | --- |
| **Single-Agent Importer** | Works with only one clearing agent. |
| **Moderately Diversified Importer** | Works with 2-5 agents, balancing risk and loyalty. |
| **Highly Diversified Importer** | Works with many clearing agents, frequently switching. |

**📌 F. Classification Based on Shipment Pattern (Volatility)**

| **Classification Name** | **Description** |
| --- | --- |
| **Stable Importer** | Regular, consistent import patterns. |
| **Irregular Importer** | Inconsistent shipment patterns. |
| **Batch Importer** | Imports goods in bulk with long gaps in between. |

**📌 G. Classification Based on Anomalies & Risk**

| **Classification Name** | **Description** |
| --- | --- |
| **Low-Risk Importer** | Has a stable import pattern and works with a few trusted agents. |
| **High-Risk Importer** | Frequently changes agents, has unpredictable import behavior. |

**3️⃣ Agent Loyalty & Marketing Risk**

The **Agent Loyalty** and **Marketing Risk** scores are calculated based on clearing agent usage and import distribution.

**📌 A. Agent Loyalty Score**

**Formula:**

vbnet

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Loyalty = 100 - (Clearing Agents Used × 10) + (If a single agent handles 70%+ imports, add 20)

**Loyalty Score Explanation:**

| **Loyalty Score (%)** | **Explanation** |
| --- | --- |
| **90-100%** | Importer is **highly loyal** to a single agent. |
| **60-89%** | Importer prefers a limited number of agents. |
| **30-59%** | Importer **frequently changes agents**, showing low loyalty. |
| **0-29%** | Importer works with **many agents**, showing no loyalty. |

**Example:**

* If **1 agent handles 80% of imports**, **Loyalty = 90%**
* If **5 agents are used equally**, **Loyalty = 50%**

**📌 B. Marketing Risk Score**

**Formula:**

vbnet

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Risk = (Clearing Agents Used × 15) - (If a single agent handles 70%+ imports, subtract 20)

**Marketing Risk Explanation:**

| **Risk Score (%)** | **Explanation** |
| --- | --- |
| **80-100%** | Importer is **high-risk**, frequently switching agents. |
| **50-79%** | Importer **sometimes** changes agents, moderate risk. |
| **20-49%** | Importer is **relatively stable**, prefers some agents. |
| **0-19%** | Importer is **low-risk**, always works with the same agent. |

**Example:**

* If **1 agent handles 90% of imports**, **Risk = 10% (Very Low)**
* If **5 agents are used equally**, **Risk = 75% (High)**