DESCARTES™

The Future of Global Trade Intelligence

Providing Insight and Improving Processes with Rule-based
Artificial Intelligence (AI) & Machine Learning (ML)

Introduction

Data has been called "the new oil" since it has become a resource for businesses to streamline processes. Data is useless when businesses can't make sense of it. Artificial Intelligence can help make sense of data by mining and processing large amounts of information. Not all AI is the same, however, and not all industries and applications are appropriate for AI. It is only by deploying the right AI technology that businesses can automate routine tasks, optimize decision-making, reduce errors, and pinpoint trends from vast amounts of information.

In regard to industry applications, sectors such as cross-border trade are ideal for AI due the substantial volume of information that flows through international commerce. For example, product classification, duty comparisons, and cross-border trend analysis all contain considerable quantities of information and involve repeated points of decision-making. Beyond this, these practices often include time-consuming manual processes and subjective analysis. As a result, global trade is an excellent sector that can benefit from the right application of AI if done well.

This white paper examines key pathways for the deployment of specific types of AI in cross-border trade. With Rule-based AI and the application of Machine Learning, businesses can achieve measurable gains in productivity, optimize select operational processes, drive-up accuracy, minimize costs, and realize better decision-making. It all starts with best-in-class technology.

Types of Artificial Intelligence

In general, the field distinguishes between two AI systems: (1) **Rule-based AI** and (2) **Machine Learning (ML)** (Source: Forbes). Simply stated, a rule-based system realizes AI through the application of pre-defined logic. In contrast, Machine Learning techniques realize AI by providing systems with access to data. Then, the ML systems evolve and learn independently. This white paper examines the practical application and benefits of both Rule-based AI and Machine Learning in global trade intelligence.

It is only by deploying the right AI technology that businesses can automate routine tasks, optimize decision-making, reduce errors, and pinpoint trends from vast amounts of information.

Rule-based Artificial Intelligence in HS Classification

One of the cornerstones of Artificial Intelligence is to build upon previously valid outcomes and apply the same logic to similar scenarios. The main tenet of a rule-based system is to capture and apply the sound knowledge and prior decisions of a human expert and then embody it within a computer system. In a sense, knowledge and "intelligence" are encoded as rules.

In cross-border trade, the Harmonized System (HS) is an international nomenclature to classify products. It allows participating countries to categorize goods on a common or harmonized basis for customs purposes and for duty collection. The duty collection aspect makes correct HS identification of particular importance since duties directly impact the bottom line.

HS classification can also be subjective and labor-intensive. As businesses move to source and ship products to new locations, they often must re-classify goods which adds even more labor. If new but similar products are developed, such as a different product sizes or shapes, a reclassification may be in order. For example, a relatively minor difference in a clothing fabric could alter its HS code.
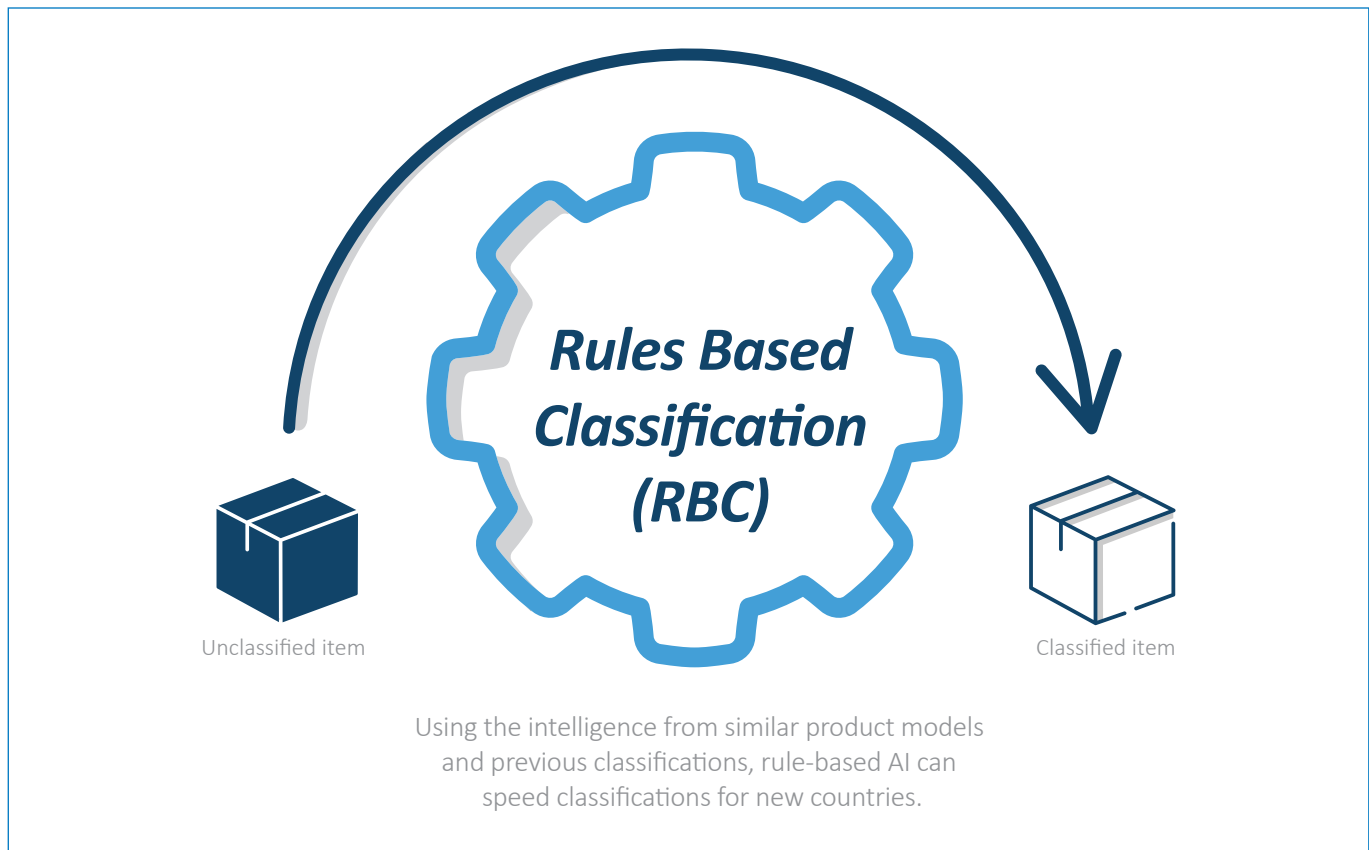
In addition, classification needs are ongoing. The volume and frequency of regulatory changes make the practice a time-consuming activity for trade compliance professionals. As businesses expand, manually classifying and reclassifying items can quickly become unmanageable. The task of manual classification, even when performed by an expert, is rife with potential errors that can result in penalties or manifest as shipment delays.

The Challenges of HS Classification

- Subjective classification
- Human error
- Limited scope / time constraint
- Ongoing new item creation

- Repetitive decision-making
- Multi-country classifications
- Lack of consistent decisions
- Lack of compliance control

For these reasons, HS classification is a perfect scenario for the application of rule-based AI. By utilizing rule-based AI to automate the repetitive, non-judgment dependent tasks of classification, compliance departments can work more efficiently, and businesses can more readily scale to new locations. For example, businesses can apply a previous HS determination to a new country.

Let's look at a practical example of how this works in the case of women's cotton pants. The creation of a "rule" requires two parts to be effective and more accurate. First, best-in-class technology should look at certain aspects of the data associated with an item. In the case of women's cotton pants, such attributes could be descriptors such as style, fabric, and woven vs. knit. However, this is not enough for a rule-based AI to operate effectively. Next, the right solution should look at previous human decisions that were applied. By marrying these two pieces of intelligence together, a rule-based AI system can be created that says that (1) an item with given attributes, and (2) had a set of classification decisions applied previously would likely result in a similar classification. In this case, a rule can be created to assign women's cotton pants the HS code of 6204.62. After applying the rule, future items fitting the description of women's cotton pants will be assigned the 6204.62 HS code automatically.

Rules Based Classification (RBC)

Unclassified item

Classified item

Using the intelligence from similar product models and previous classifications, rule-based AI can speed classifications for new countries.

By utilizing technology to streamline repetitive, non-judgement dependent tasks, compliance departments can work more efficiently and effectively. Automating these processes can also free time and resources to focus on other important business issues or more strategic areas.

In general, organizations that utilize automation can classify 7-times faster than those that use manual processes (Source: Descartes CustomsInfo™ research]. Along with expedition, automated classifications can improve overall compliance by reducing errors and inconsistencies within a product grouping.

With the right rule-based AI classification technology in place, businesses can:

- Increase productivity by reducing labor
- Minimize human error and increase accuracy
- Relieve repetitive decision-making
- More rapidly expand to other countries
- Help serve as part of record retention for audit purposes
- Reduce classification delays

Rule-based AI is an effective tool to enhance a company's compliance program by increasing the accuracy, consistency, and speed of operations.

Developing Machine Learning

To compete in today's global marketplace, companies need to keep a close watch on markets and stay alert to opportunities and risks as they emerge.

One of the challenges in identifying global import and export patterns is the lack of standardization within the data. Standardization is critical to find true trends and enable actionable decision-making. One example of non-standardization is the naming conventions in Bill of Lading (BoL) cargo descriptions.

One shipper may refer to products as "widgets" while another might describe the products on a BoL as "nuts and bolts". Since many BoLs do not have standardized product descriptions, accurately pinpointing patterns can be challenging. In order to discern trends in international trade, tracking codes to the 6-digit level is critical. It is only at the 6-digit level that products can be properly identified and an apples-to-apples analysis made.

Data Standards

In simple terms, data standards are agreed upon definitions for how information is captured and stored. Data standards are critical to speak the same language during information exchange, identify patterns, and make decisions. However, in cross-border BoL data, there is often a lack of consistent formats and vocabularies in fields such as the cargo description. As a result, deriving insight from this data can be challenging.

As mentioned previously, global trade is an ideal sector for the application of AI due the large amount of information involved in international commerce. Much like analysis in social media and spam detection where Machine Learning is applied to determine trends, similar analysis can be applied to data housed in cross-border global trade.

Given the volume of information contained on BoLs, data mining and natural language translation analysis might yield patterns on how products are described in maritime container cargo descriptions. Incorporating Machine Learning to properly assign accurate HS-6 codes against cargo descriptions would also be possible due to the volume of historical data contained in these records.

Why Import And Export Data Is A Good Case For The Use Of Machine Learning

- ✓ There is a large amount of data
- ✓ There are examples of properly defined inputs
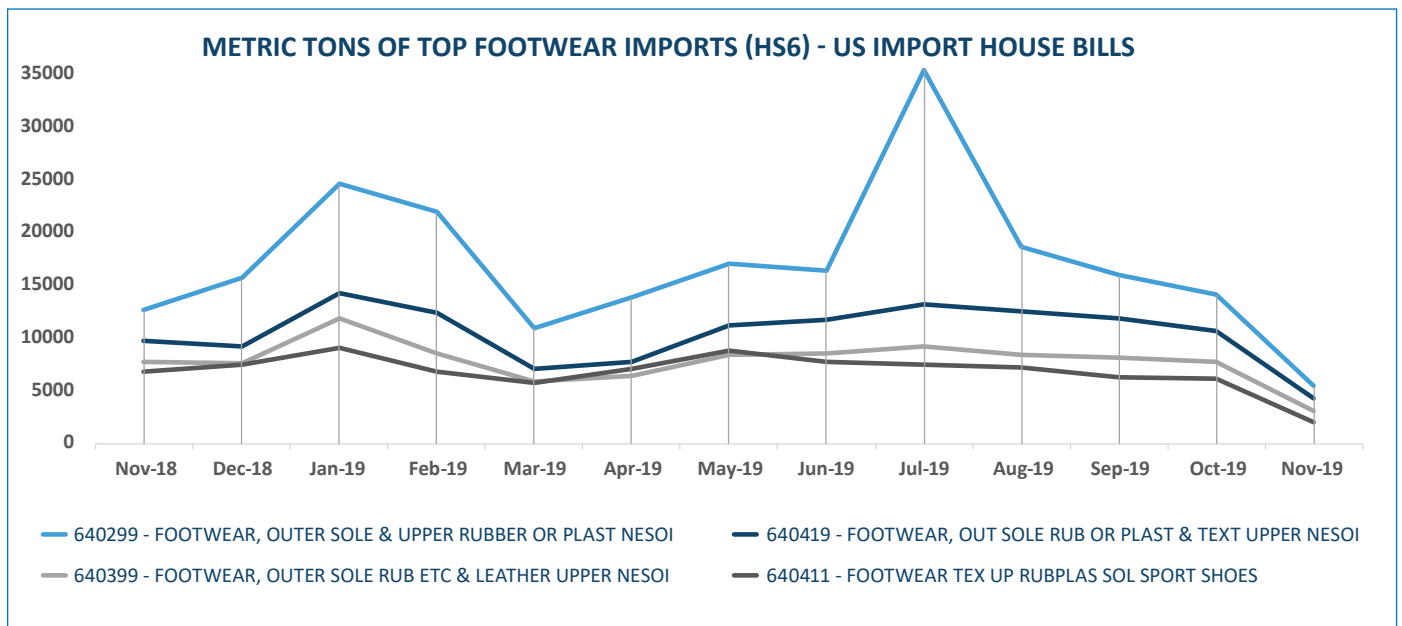- ✓ There are also specifically designated outputs

Global trade is an ideal sector for the application of AI due the large amount of information involved in international commerce.

DATA → REFERENCE MODELS & NATURAL LANGUAGE PARSERS → PROPERLY-DEFINED OUTPUT PREDICTIONS
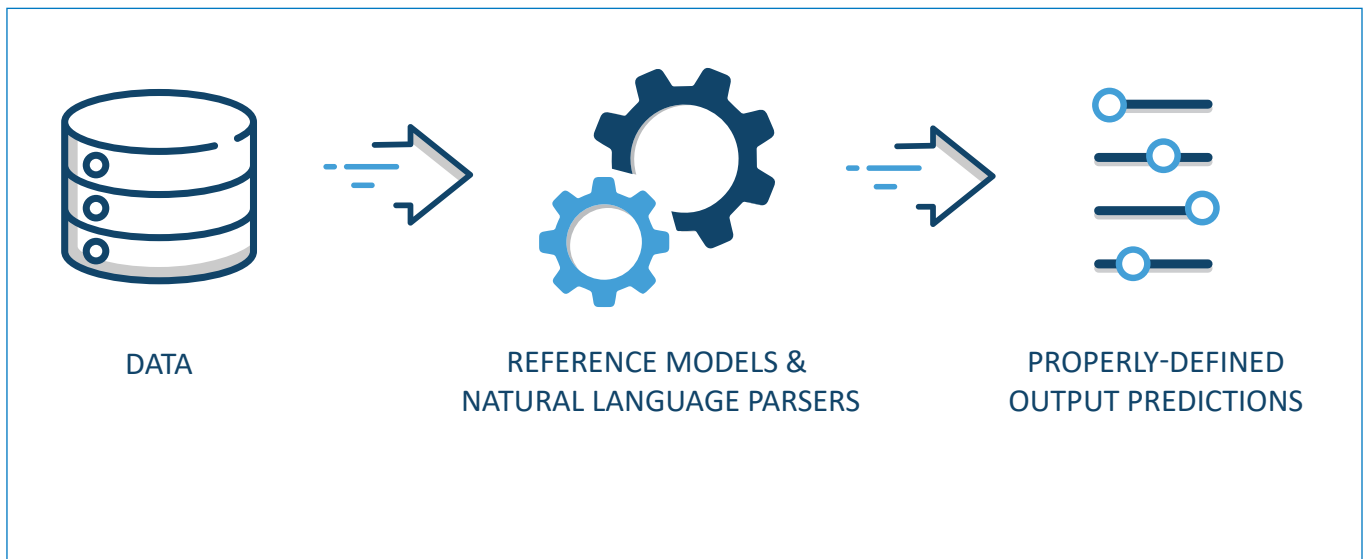
In the case of US maritime container cargo descriptions, all of the above is true. There is a large amount of data (i.e., BoL cargo descriptions). There are also reference models (i.e., from entries that were declared). Finally, there are defined output predictions (i.e., 6-digit HS codes) that can be made.

METRIC TONS OF TOP FOOTWEAR IMPORTS (HS6) - US IMPORT HOUSE BILLS

Legend:
- 640299 - FOOTWEAR, OUTER SOLE & UPPER RUBBER OR PLAST NESOI
- 640419 - FOOTWEAR, OUT SOLE RUB OR PLAST & TEXT UPPER NESOI
- 640399 - FOOTWEAR, OUTER SOLE RUB ETC & LEATHER UPPER NESOI
- 640411 - FOOTWEAR TEX UP RUBPLAS SOL SPORT SHOES

Armed with this information, businesses can then drill down to recent BOL data to identify opportunities or points of risk. For example, as shown above, those in the footwear industry would see that in a given month, there was a substantial spike in a particular HS-6. From there, further action could be taken such as comparing the spike to the same month in previous years as well as:

- Examining competitors' cross-border activities
- Tracing suppliers
- Exploring the countries of origin
- Reviewing one's own performance
- Gauging supply and demand for the products
- And more

It all starts with Machine Learning to drive better-decision making.

Conclusion

AI makes it possible for machines to "learn" from experience, follow rules, and perform human-like tasks. With AI, computers can be trained to accomplish specific duties by processing large amounts of data and recognizing patterns.

High-value business use cases for the application of AI are appearing in industries and practices such as cross-border global trade. Cross-border trade is perfect for the use of AI since the technology calls for large amounts of quality data input to train its learning models. The more data you can "feed" an AI-driven system, the more accurate the AI becomes. In global trade intelligence, for example, best-in-class solutions have the broadest range of input which serves as a standard for AI to work. Market leading solutions should be able to capture, parse, and validate vast amounts of information as a comparative set to power further insight.

In compliance management for example, rule-based Artificial Intelligence can offer a more hands-off approach to HS classification. In cross-border import and export analysis, Machine Learning allows for faster and more accurate data-driven trend assessment.

Artificial Intelligence is poised to have a transformative impact on international trade. These advanced technologies can enable more proactive supply chains and improve business decisions. Market leaders are seeking out best-in-best solutions powered by AI to better compete and expand in today's competitive marketplace.

About Descartes Datamyne™

With a comprehensive database of accurate, up-to-date import-export information, Descartes Datamyne delivers actionable intelligence for market research, sales insight, supply chain management, enhanced security and competitive strategy. Descartes Datamyne features world-class AI-driven insight as part of its framework. The solution is powered by the world's largest searchable trade database, covering the global commerce of 230 markets across 5 continents.

Manufacturers, shippers, wholesalers, transport and logistics service providers, management consultants, legal practitioners, industry analysts and more use our exceptionally accurate and granular data to initiate growth strategies, explore new markets, benchmark performance, monitor commodity volumes and values, simplify trade data research, discover buyer-seller relationships and refine sourcing strategies.

Learn more about Descartes Datamyne or Request an Online Demo

About Descartes CustomsInfo™

With a vast database of data relating to regulations, rulings, duties and more, Descartes CustomsInfo™ helps clients minimize trade barriers. The solution features AI-driven options to better classify goods as companies expand to new locations. Some of the world's largest international ecommerce sites also leverage our powerful data resources to provide customers with more accurate landed cost information, improve the online shopping experience, add to overall compliance and reduce operating costs. Multi-national shippers, customs brokers, third-party logistics providers (3PLs), freight forwarders, multimodal carriers, compliance professionals and others use Descartes CustomsInfo to help build and maintain complex classification databases for their global operation

Learn more about Descartes CustomsInfo or Register for a Free Trial

About Descartes Systems Group

Descartes (Nasdaq:DSGX) (TSX:DSG) is the global leader in providing on-demand, software-as-a-service solutions focused on improving the productivity, performance and security of logistics-intensive businesses. Customers use our modular, software-as-a-service solutions to route, schedule, track and measure delivery resources; plan, allocate and execute shipments; rate, audit and pay transportation invoices; access global trade data; file customs and security documents for imports and exports; and complete numerous other logistics processes by participating in the world's largest, collaborative multimodal logistics community. Our headquarters are in Waterloo, Ontario, Canada and we have offices and partners around the world.

Learn more at www.descartes.com and connect with us on LinkedIn and Twitter.

Network. Applications. Content. Community.

Uniting the People & Technology
That Move the World.