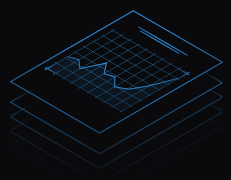
DataRobot AI-Driven Demand Forecasting for Retail

Improve forecasting accuracy with AI to transform retail operations and drive significantly higher profit.



Overview

Today's omnichannel retail environment requires a greater focus on solving supply and demand planning challenges. What merchandise is needed, in what sizes/colors, at what quantities, in which locations? When do we have to order it so that it arrives at the right locations and at the right times? How will seasonality and changes in customer preferences impact this plan? What are the right replenishment strategies to maximize profit without undermining the quality of the shopping experience?

Demand forecasting can help you answer these difficult questions. It's a critical component of every retailer's operations because of its impact on sales, profitability, and customer satisfaction. But the sheer number of variables that you have to take into account across millions of possible SKU and store combinations make demand forecasting and merchandise planning on a global scale highly complex.

Automated AI Applied to Demand Planning

Fortunately, machine learning and advanced analytics are available to greatly enhance your ability to predict what to have on your shelves and when to have it. By getting a much better handle on demand forecasting, you can improve the performance of your entire supply chain — saving significant time and money and increasing operating efficiency.

With traditional demand forecasting systems, data is fed into a computer that applies static, pre-determined sets of rules to analyze it and generate a result. With machine learning algorithms, however, the computer can automatically detect complex interactions and patterns in huge batches of data that would be impossible, or take too long, for humans to recognize. Automated AI systems take it a step further by updating retail demand forecasts dynamically in response to changes in collected data. This greatly improves demand planning accuracy for launches, promotions, and markdowns involving products that share similar characteristics. It also enables retailers to alleviate inconsistent purchasing practices, overstocks (and the resulting markdowns), out-of-stocks, and margin erosion.

Automated AI solutions can help retailers address one of their most complex tasks: time series forecasting. Time series is a set of data points indexed, listed, or graphed in time order, and time series forecasting is the use of models to predict future values based on previously observed values. Time series forecasting models use trends over time along with known future events, such as upcoming holidays, to extrapolate future behavior, making them very powerful for demand forecasting use cases.

Time series modeling is a complex and labor-intensive effort because of the number of historical events that impact the current predictions. This can make it difficult to find the most influential signals in the data. As conditions change, such as a new product introduction or a competitor opening a new store, the models need to be re-built. Retailers also face challenges with scaling time series modeling to support a large number of stores, each of which carries numerous products at any given time. Hundreds or thousands of individual models are often needed to generate predictions for each of these individual pieces.

Impact of Out-of-Stocks on Retail Operations[1]

$984 BILLION

Lost Sales from Out-of-Stocks, Worldwide

$144.9 BILLION

Lost Sales from Out-of-Stocks, North America

$24.2 BILLION

Additional Safety Stock to Reduce Out-of-Stocks, North America

Benefits of AI-Driven Demand Forecasting:

- More accurate sales and demand forecasts, by SKU
- Optimized inventory levels across the entire supply chain
- Fewer out-of-stock situations
- Decreased excess and safety stock
- Faster response to trends, seasonality, and competitors
- Increased customer satisfaction

[1] Source: IHL Group, Out of Stock, Out of Luck, June 2018

DataRobot has solved the challenge of scaling time series modeling by automating best practices to achieve the highest possible accuracy. **For example, a large retailer in Asia used DataRobot to improve their demand forecast accuracy by 9.5%, leading to an estimated $400 million increase in profit per year.**

DataRobot: AI with ROI for Retail

Retailers face critical decisions with regard to how they develop their demand forecasts. Few retailers can afford the armies of data scientists that are required to develop and continually update in-house solutions in response to market changes. With machine learning as the new standard for retail demand forecasting and data scientists in short supply, retailers are turning to DataRobot to help solve their most strategic supply chain challenges.

Some retailers choose to empower their existing supply chain managers with DataRobot software deployed on-premises or in the cloud so that they can use the power of AI to develop the sophisticated time series forecast models that easily slipstream into existing SP&O process and technology to improve demand forecasting accuracy. While other retailers prefer to take full advantage of DataRobot's unique combination of software plus partnership to develop and implement AI-augmentation across the entire product to consumer value-chain.

DataRobot AI-Driven Forecasting for Retail

DataRobot can help you bridge the gap from mountains of raw data to detailed demand forecasts. We'll also help you integrate the results into your existing business processes and applications so you can have the right product, in the right place, at the right time.

STEP 1: CREATE A STRONG FOUNDATION BUILT ON DATA

You've spent a small fortune collecting data about every interaction that a customer has with you – online and in-store. We'll work with you to assess the data you have, no matter where it lives or when it was collected. Data on in-store transactions, online activities (including add-to-carts, clicks, and views), inventory levels, shrinkage, logistics, and more can provide significant insight. We'll help you separate demand signal from the noise.

Our experts will also help you document past promotions, seasonal changes, holidays, and external influences such as weather, store openings, competitor activities, and even social media. These events have impacted your historical data, and when combined with forecasts for future events, become valuable inputs into the demand forecasting process.

STEP 2: PREPARE YOUR DATA FOR MODELING

When used correctly, data can provide a significant competitive advantage, and drive powerful demand forecasts. Unfortunately, not all data is useful, and an unknown portion may be incorrect, inconsistent, or missing. Bad data always leads to bad forecasts, no matter what forecasting method you use.

Our powerful automated machine learning algorithms can analyze all of your data, including data that rarely or never receives human attention, to correct the problems that frequently cause inaccurate forecasts and unlock significant business value. We'll also help you combine data from disparate sources to create a unified dataset that's optimal for machine learning.

STEP 3: CREATE HIGHLY ACCURATE MACHINE LEARNING MODELS

This is where the power of automated AI really begins to shine. DataRobot uses its library of hundreds of the most powerful open source machine learning algorithms to create advanced time series models in parallel. The resulting competition between models quickly identifies the best one to drive the forecast required for just-in-time operations.

Forecasts aren't limited to SKUs that have a long history of demand data. You'll get forecasts for net-new products in a cold start situation using information such as store size, location, demographics, product description, price point and historical performance of similar products. For new products in a warm start where initial sales data is becoming available, we'll help you create the forecasts to quickly make run, chase, push, and cancel decisions.

This may sound highly complicated, and it is. But since transparency into the process has been a design requirement since our inception, the resulting models come with all the requisite insight so you can understand the data that's most influential on the forecast, see exactly why a specific SKU is being forecasted at the quantity it is, and much more. You can visualize insights over time and be armed with all the data you need to trust every aspect of the forecast and communicate the impact to others in your organization.

STEP 4: CONNECT DEMAND FORECASTS TO REPLENISHMENT AND ORDERING

Armed with detailed AI-driven demand forecasts and sales projections at the individual SKU level, it would be great if you could simply order exactly what you need. Unfortunately, bundling rules and minimum order quantities complicate the replenishment process. We'll work with your internal teams to help you connect the output of DataRobot models to the inputs your rules-based planning systems need for efficient ordering and on-time delivery.

STEP 5: UPDATE AI-DRIVEN FORECASTS AS NEEDED

Even the most accurate demand forecasting models need to be monitored, updated, and replaced regularly in order to account for environmental changes such as a competitor opening a nearby store, a change in consumer preferences, or a downturn in the economy. Our retail experts will teach you how to utilize embedded model management capabilities inside DataRobot to identify changes in model accuracy or data drift that can be symptomatic of models in need of replacing. Or, we can provide that service for you to help keep your AI-driven demand forecast models in optimal condition.

Conclusion

Accurately forecasting the demands of consumers has taken on greater urgency because of the array of competitive options that are readily available. Not having the right inventory in stock prevents a sale, and may also result in lost future business from decreased confidence and loyalty.

You already have the data resources to improve your ability to predict future demand. You just need to apply the right technology to this data. We're here to help. DataRobot can help you move from antiquated forecasting tools to a modern AI-augmented approach that makes advanced time series forecasting accessible, so everyone on your team can achieve the highest possible forecasting accuracy.

DataRobot Impact on the Bottom Line

With DataRobot, one leading grocer saw demand forecasting error rates drop from 20% to just over 5%

75% improvement

Another retailer calculated that more accurate demand forecasting is worth over

$400M per year

The world's largest retailers are using DataRobot to improve forecast accuracy and drive over $100M more in profit per year

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