



AI Brings Precision to Grocery Assortment Optimization

Put customer relevancy at the heart of your assortment curation

In the early days of grocery retailing, assortment management involved just a handful of factors: the economic health of local businesses, the number of newly married households, and the number of births. Stores were highly localized, as was the population. People had similar backgrounds and values, often spending their entire lives in one town. So local store owners knew pretty much what shoppers wanted.

Today, retailers operate national and international chains. Their customer bases are now ethnically and economically diverse, on the move, and constantly changing their channel affinities. Grocery retailers have therefore developed increasingly sophisticated ways to match products to people. They have become pioneers in collecting and applying consumer data to merchandise mixes.

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Retailers have excelled at creating meaningful services and experiences.

Now, the proliferation of cloud computing is enabling big data and artificial intelligence (AI) to give grocers the opportunity and power to make the assortment management and optimization process even more timely, precisely aligned to customer needs and behaviors and, ultimately, more profitable. These sophisticated solutions provide a deeper understanding of the what, why, and how behind consumer purchasing decisions. They support a retailer's understanding of how and when these factors change and what influences the many shifts in the market.

At its simplest level, AI-enabled solutions and systems imitate human behavior in intelligent ways that can improve productivity and optimize performance. AI allows retailers to gather shopper insights in an automated and predictive manner. This enables them to evaluate and predict consumers' next actions based on both previous purchasing patterns and future responses to market trends. It also uses predictive patterns to help retailers and suppliers better understand desires, motivations, and actions. This enhances many functions, including the ability to create shopper-focused, trend-right assortments in real time to best meet and anticipate customers' near-term and future needs across every category.

What should you expect from artificial intelligence?

In this whitepaper, we explore assortment optimization challenges currently faced by the grocery industry and how AI can help overcome these challenges and deliver greater efficiencies and profitability.

Traditional calendar-based assortment planning and optimization are not always cost-effective or timely relative to changing consumer needs. AI can:

1. Provide a timely, comprehensive, and deep understanding of consumer shopping patterns.
2. Continuously refine, update, and analyze data samples in real time and make product recommendations based on what works.



3. Curate micro assortments and determine accurate stock levels with relevant product and category adjacencies, effective pricing, and profitable promotions.

Traditional Assortment Optimization

Assortment optimization is a process that helps retailers decide how many and which products should be offered in a category. This allows them to meet the needs of their most-valued customers and potentially attract shoppers from competitors. In making assortment decisions, grocers compile data from POS systems, loyalty programs, and syndicated data sources. They use this information to evaluate:

- Which SKUs are driving category performance
- What criteria should be used for adding/deleting items
- If the retailer is missing opportunities by not offering particular items from the supplier base
- Which items offer true variety, not duplication
- Which products are not contributing to the category
- If there is a gap in the category that requires a new product development strategy

The tools currently used to answer these questions do not always yield fully accurate insights or deliver outcomes that deliver sustainable growth and profitability. Nor do they prescribe optimal actions to address them.

For example, category assortment reviews are often conducted once or twice per year on a strict calendar schedule. This can be disruptive and incur heavy operational costs. It does not factor in changes in consumer behavior that occur between reviews that can influence product choice or demand.

Traditional methods tell retailers/suppliers only about products they already know about.

If inaccurate forecasting information is applied, a retailer may not order enough of a popular product and needing to use open-to-buy (OTB) dollars to replenish. Dollars that are set aside to take advantage of opportunities or trends, and to satisfy short-term demand and generate incremental revenue. If OTB dollars are used to replenish depleted stock in a standard inline category, the incremental opportunity is lost.

Weeding Out Bad Apples

The goal of every retailer/supplier relationship is to recognize trends, unfulfilled consumer needs, and other opportunities as early as possible and act upon them. Just as important, they want to avoid (or have shallow stock in) products that have declined in popularity or are flash-in-the-pan fads. There may also be new items that appear on the surface to meet consumer needs. Then, of course, there are some epic failures.

There are also products for which shoppers appear to have an immediate need. Remember the doggie pooper scooper from the late 1970s? When strict pet cleanup laws were enacted, retailers began offering these cumbersome contraptions. While there was a clear need to keep streets clean, nobody wanted to carry a three-foot-long, double-hinged shovel during a dog walk. Most people found it far easier and cheaper to carry a lightweight, disposable plastic bag.

Grocers can also mistake a fad for a trend. This happened a few years ago with low-carb foods following the South Beach Diet craze. Retailers loaded shelves with hundreds of low-carb SKUs



“Every year 85% of CPG products fail upon product launch”

SOURCE: FORBES



in every category from ice cream to pasta. Many grocers and suppliers were burned. If data had been more comprehensive, they may have learned how many—and for how long—consumers really stick to particular diets and purchase the special foods required.

Product failure, inaccurate forecasting and assortment optimization are particularly problematic in fresh food. According to the U.S. Department of Agriculture, 10% of the food on US grocery shelves is wasted every year. The amount of food discarded by food retailers and other businesses combined totals \$940 billion annually.

The Need for Comprehensive Data and Machine Learning

Historically, assortment optimization has relied heavily on POS and syndicated data sources. This data has limitations since it does not always factor in demographic changes, preferences, social sentiment, and other factors that can provide a 360-degree view of shopper behavior.

Traditional data also looks at what customers have historically purchased and can be used as a basis for planning. But by nature, it is past tense and not validated in real time against tangible measures that reflect shifting trends.

Consumer lifestyles and behaviors are always changing. A community that was once home to many families with young children, for example, could now have more empty nesters. This would signify far less demand for children's snacks and lunch boxes and more demand for smaller portion food packages. But relying on historical data alone will limit a retailer's ability to quickly realize these changes.

Retailers generally accumulate large amounts of data. But they often face time and financial constraints when it comes to consolidating them in a comprehensible manner. According to a 2017 survey from EIQ Research ("Competing in the Age of Amazon"), 50% of retailers are grappling with data that are incomplete or inconsistent. And more than half lack the right skills to analyze data. With this shortage in available talent, retailers are searching for machine-first approaches that will enable them to do more with the same number of employees.

Most retailers also do not like to share data with suppliers, and vice versa, even though both parties may have mutually beneficial information. While experts extol the virtues of sharing, the debate over how to change this scenario has been raging for years.

Grocers tend to rely heavily on the knowledge and data provided by seasoned vendor executives with whom they have ongoing relationships. These vendors are undoubtedly experts in their categories. But their insights alone are not enough. However, when their data is combined with other consumer metrics and analyzed with the appropriate technology, the resulting suggestions can better meet both existing demand and future item attribute preferences of their shoppers.

The Advent of Machine Learning and NLP within Assortment Optimization

When applied to assortment management, AI uses an application called machine learning that algorithmically analyzes large amounts of data. Machine learning takes retailers' existing data and combines them with external events

AI applications fall under three key areas



Machine learning uses machines to automatically analyze large amounts of data and "learn" using rule-based algorithms that identify patterns and trends. For example, machine learning can effectively combine 100,000+ data points from 75 million customers regarding their shopping patterns and other habits



Natural language processing (NLP) is a machine's ability to understand, analyze, and generate human speech. A computer listens to a natural language spoken (or written) by a person, comprehends its meaning, and responds by generating natural language to communicate back (as opposed to a computer language like Java or SQL). With NLP, retailers can request detailed information about a specific store, product, shipping method, or other topic without touching a PC.



Robotics involves full-scale automation of tasks traditionally performed by humans. Warehouse picking and packing, for example, can be performed by robots.

related to factors such as weather, holidays, demographics, and other criteria. Outside influences such as TV chefs and the latest health craze ingredients are factored in as well. The machines then “learn” using rule-based algorithms that identify patterns and trends.

Machine learning first became a scientific discipline in the late 1990s. It was not until the 2000s that the advent of cloud computing and the ability to apply mathematical calculations to big data over and over and faster and faster prompted more companies to embrace it.

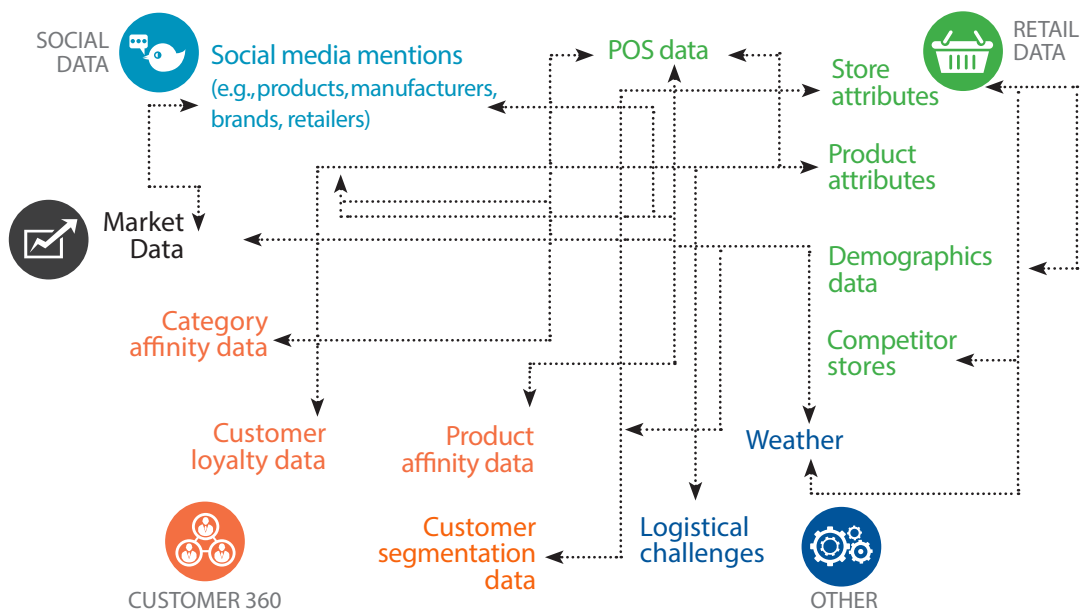
Natural Language Processing (NLP), another subset of AI, can also be used to gather valuable consumer insights. For example, NLP can compile information from social media by deciphering comments consumers write on retailers’ and suppliers’ social media pages. According to the Marketing 360 Survey, close to 80% of retailers regard social media as a highly effective communications channel.

Key Benefits of AI in Assortment Optimization

When it comes to trends, quick fads, demographic changes, and other consumer nuances, AI can provide a current, comprehensive, and penetrative understanding of shoppers’ buying patterns. It can keep shelves stocked with the right merchandise mix and ensure that the supply chain is aligned to eliminate expensive out-of-stock or overstock scenarios. It can perform these tasks in an automated, predictive, and real-time manner. It can also determine when a category review is critically needed and when it is not. This makes the AI process far less cumbersome and disruptive than traditional, calendar-based reviews.

In making product recommendations, AI-influenced algorithms even analyze the assortments and pricing of competing grocers and relevant brands. Then those items are compared against the demographics and shopping history of the retailer’s customers.

Neural Network will combine multiple in-out sources of data



The combination of social media feedback and the myriad of other internal and external data resources that AI can mine and interpret creates a neural network that provides a far more accurate assortment forecast than traditional calendar review methods.

Needs-Driven vs. Calendar-Based Planning

AI uses data mining to continuously analyze data samples in real time. Recommendations are constantly being refined and updated based on what really works. It is not necessary to wait for the next calendar review to learn that an item has experienced a temporary dip or a serious drop. Only recommendations with proven outcomes are put forward.

With machine learning built into the data process, automated triggers identify predictable patterns, peaks, or troughs and send alerts to retailers and suppliers. Retailers and suppliers do not have to make a special effort to seek out this information.

AI software, which uses NLP for dialogs with people, can “understand” and process requests in spoken English. A category manager may ask, for example, “What is the effect on profitability if we carry two rather than three brands of a product?” AI’s ability to identify upcoming trends or attribute gaps before they significantly impact the market can allow grocers to drive a more effective and competitive private-label strategy. Retailers can then produce private-label items that will meet customer needs and support future category growth and profitability. And they can do so ahead of competitors.

Consumer Perception vs. Reality

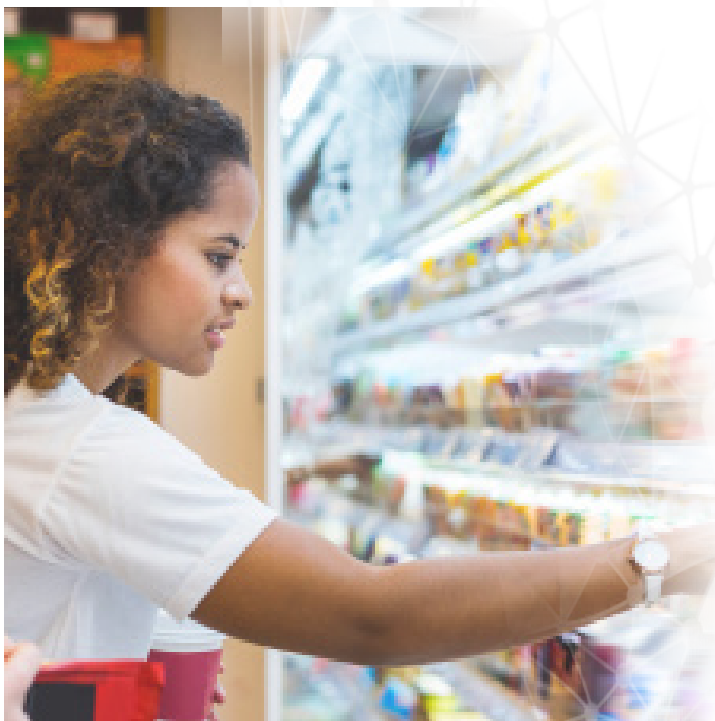
AI in assortment optimization allows grocers and suppliers to better differentiate between perception and reality when it comes to what consumers really want. In a survey or focus group, for example, consumers may say they will buy a particular item. But when visiting a store, price or other factors may dissuade them.

Sophisticated modeling and prediction tools yield higher levels of probability. AI can help

ensure faster product success by predicting SKU-level customer preferences and affinity based on demand patterns and buyer propensity modeling, that can lead to higher sales and margin uplift along with better retailer and supplier collaboration during the first year or two that a product is offered. It can allow CPGs to better justify asking retailers to lower slotting fees. The result is a more judicious playing field ruled by products with tangible benefits that are linked to real customer needs.

50%
of retailers are grappling with data that is incomplete or inconsistent. And more than half lack the right skills to analyze data.

Source: *EIQ Research, “Competing in the Age of Amazon”*





Lowering or even eliminating slotting fees can open the door for smaller vendors with potentially successful products that may have been excluded from the mix due to financial constraints. According to Obeserva.com ("Know Your Slotting Fees," January 29, 2018), the total market for slotting fees is estimated at around \$9 billion annually and continues to grow.

Stock Levels, Adjacencies, and Curation

AI-powered recommendations have highly predictable outcomes, leading to more accurate forecasting and inventory alignment. AI can help identify what quantities should be ordered based on an item's historic sell-through. This can eliminate understocking or overstocking, both of which can cause revenue loss and, in the case of fresh food, spoilage.

Complex mathematics inherent to AI also allow it to make accurate recommendations regarding complementary products, intricate cross-item relationships, adjacencies, and section sizes. With traditional assortment optimization, each SKU is considered independently of others, ignoring complex interdependency factors.

Another benefit of AI is its ability to curate assortments to suit the needs of individual stores and customer groups at a granular level. Curation helps consumers find what they want quickly without overwhelming them with too many choices of items, brands, and package sizes. It also maximizes shelf space.

Traditional curation (sometimes called micro-merchandising) focuses mainly on margins, volume, store size, location, and what customers purchased within a particular zip code. These are important criteria. But they lack AI's algorithmic capabilities to cross-reference a wide range of data points across a myriad of consumer indices.

By applying AI, retailers can learn, for example, if shoppers are swayed by brand over price or if they decide on a price before choosing a package size. In processing this information, AI factors in demand transference data. This data tells a retailer what a shopper will accept as a substitute in a certain category or range. It's vital for grocers looking to curate narrower, more pinpointed assortments.

An AI-enabled curation can even identify items that are overall poor performers but are regularly purchased by a chain's highest-volume shoppers. Since traditional curation focuses largely on gross margin or volume, grocers can miss opportunities to help retain valuable consumers.

Conclusion

When it comes to grocers' practices and procedures, changing existing thinking can be like turning around an ocean liner. But since AI recommendations are prioritized and have highly predictable outcomes, they are a more reliable indicator of financial returns. This allows retailers and suppliers to continually improve category optimization and challenge the traditional approaches currently employed.

When applied to assortment planning and optimization, AI can provide a deep, comprehensive understanding of consumer purchasing patterns in real time. Through machine learning, AI automatically analyzes huge amounts of data. This includes the retailer's own data along with outside information related to everything from weather and holidays to demographics and social media feedback. The result is a neural network that provides a far more accurate assortment forecast than traditional calendar review processes.

AI's job does not end there. On an ongoing basis, AI uses data mining to analyze multiple data sources. It does not matter if the information is publicly available or purchased by the retailer. Recommendations are constantly being fine-tuned and updated according to what really works. Category managers do not have to wait for the next calendar review to find out if a product's performance has met expectations. And only recommendations with proven track records are presented.

AI in assortment optimization focuses on what consumers want and need by compiling shopper sentiments in meaningful and useful ways. In addition to identifying new items, AI helps companies quickly differentiate between a developing and potentially lucrative trend versus a flashy but financially risky one. The retailer can then jump on the promising new trend and avoid or limit offerings in the faddish one. AI also helps retailers and vendors better differentiate between what consumers really want versus what they say they do.

In light of AI's benefits, a grocer's practice of staging set, calendar-directed category reviews should be evaluated to find out if they have enough value to outweigh the disruption and operational costs they incur. AI can even be tested against traditional methods in categories that are coming up for review to see which method delivers the most net value.

The results may be surprising. By using AI in assortment planning and optimization, grocery chains could rapidly identify new items and trends before their competitors do. At the same time, they can eliminate merchandise that is no longer relevant and prepare more effectively to sell through on those lines. This would differentiate their stores, make them a destination, and give them a sharp and profitable competitive edge. It would also keep them in sync with the ever-changing needs and desires of today's demanding consumers by staying ahead of them and curating assortments that will be future proof of category performance and market competitiveness.



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