

THE DIGITAL CONSUMER REPORT

50%

Boost in conversion rates enjoyed by Indian merchants that opted for AI-based visual search functionality

1.1 Billion

Number of listings through which image recognition technology helps online retail customers search

40%

Reduction in inventory achieved through AI-based inventory management systems



SAMSUNG

PAY REPORT



ACKNOWLEDGMENT

The Digital Consumer Report is powered by Samsung Pay, and PYMNTS is grateful for the company's support and insight. PYMNTS.com retains full editorial control over the findings presented, as well as the methodology and data analysis.

TABLE OF CONTENTS

03

Intro

06

Optimizing Business with Image Recognition Technology

08 Commercial applications of AI-based image recognition technology

10 How image recognition is driving eCommerce

14

How Trax Uses AI To Manage Inventory

16

Implementing AI-based Consumer Applications

18 Channeling AR to help shoppers avoid buyers' remorse

21 Humanizing the digital: Neiman Marcus' relationship-centric approach to e-retail

23 AI-based image recognition in brick-and-mortar retail

27

Conclusion

28 About



INTRODUCTION

The “deep learning revolution” is disrupting the retail industry.

Artificial intelligence (AI) has tiptoed its way from the depths of obscure science fiction paperbacks to the forefront of many consumers’ everyday lives. More than ever, retailers are seeking to streamline their shoppers’ experiences, both online and in stores, using algorithmic tools that make shopping easier and more enjoyable — and they’re now doing so with cutting-edge image recognition technology.

Innovative retailers like West Elm and IKEA are using image recognition to enable shoppers to run AI-based functions like “visual searches” and find exactly what they want — even if they know nothing about it other than its appearance in a painting or photograph. In doing so, they’re endeavoring to “hyper-personalize” their customers’ shopping experiences.¹

Smartphones’ surging ubiquity, especially among millennials and Gen Z, has supercharged this revolution. These digital-native age brackets spend as much as four hours per day searching the web, sending messages and sharing photos on their mobile devices. It is to these coming-of-age consumers to whom many retailers’ mobile-assisted visual searches, virtual reality (VR) and augmented reality (AR) features are designed to appeal.²

Younger generations are theoretically more likely to feel comfortable with mobile-based AR features, but such technologies transcend merchants focused on post-millennial customers. Companies with consumers of all ages have invested in deep learning and broader AI features to improve customer service, including Google, Target, ASOS, Pinterest and countless others.

Millennials and Gen Z may have provided the demand for advanced digital services, but they are far from the only beneficiaries. In fact, recent AI-based features’ sophistication even has the potential to render such



¹ Zaczekiewicz, Arthur. AI, Visual search and retail’s next big step. WWD. 2018. <http://wwd.com/business-news/technology/ai-clarifai-retail-brands-1202650318/>. Accessed September 2018.

² Biron, Bethany. Retailers continue to experiment with visual search. Digiday. 2017. <https://digiday.com/marketing/retailers-continue-experiment-visual-search/>. Accessed September 2018.

market segmentation obsolete. Some retailers now possess the computing power and storage capacity necessary to treat each customer as an individual, rather than part of a segment. In addition, visual recognition is emerging as yet another tool to cater to customers' specific needs and wants, regardless of whether they shop online or in store. As technological development continues to pave the way for a more omnichannel shopping experience, demand for payments solutions that can facilitate that experience increases, too.

This report intends to demonstrate how modern merchants use AI and deep learning to bridge the fabled gap between digital and brick-and-mortar commercial channels, creating an all-encompassing, omnichannel shopping experience. We hope to challenge the false dichotomy assumed between online and in-store shopping by exploring how retailers are incorporating AI-supported image recognition into their standard business practices. It's becoming increasingly apparent that digitization is not the enemy of brick and mortar, but rather its accomplice.



OPTIMIZING BUSINESS WITH IMAGE RECOGNITION TECHNOLOGY





COMMERCIAL APPLICATIONS

OF AI-BASED

IMAGE RECOGNITION TECHNOLOGY

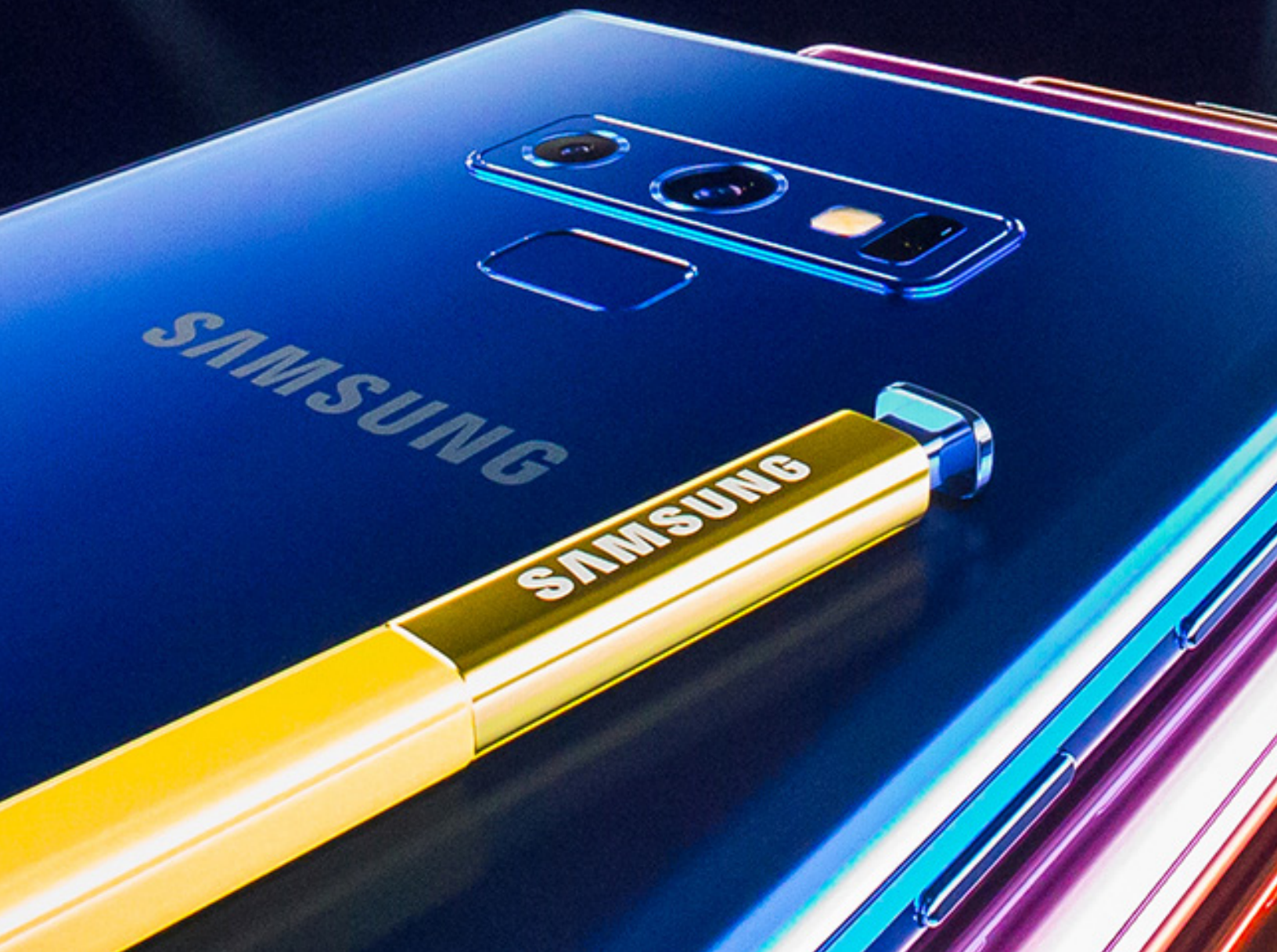


Image searches are one of the more popular uses of image recognition technology, but there are other applications. Programs that enable users to interact with digital images allow for several possible cutting-edge capabilities, including VR and AR.

As the name suggests, image searching is the act of browsing an online system or catalog using images rather than plain text. Think traditional search engines, except consumers upload a photo that resembles the item for which they are searching and an algorithm locates similar images in its database.

VR is quite different. Most people have encountered some sort of VR, likely in the form of a video game, but the technology can also be used for commercial purposes. It allows users to navigate and experience a computer-generated world without stepping a physical foot anywhere near it. Although VR technology is still in its infancy, there are already a few success stories: eBay-owned ticketing site StubHub, for example, which allows patrons to preview their stadium seats using a 360-degree view before purchasing.

AR is a subset of VR. It allows users to superimpose digital images onto each other, usually with a

smartphone, as popularized by social media platform Snapchat. Swedish furniture retailer IKEA boasts one of the technology's most famous commercial uses: an app feature enabling customers to see how furniture might look in their homes before committing to it.³

Image searches, VR and AR are not only streamlining the buying process, but also bridging the gap between online and brick-and-mortar shopping. The technology is fusing both options to form a cohesive, omnichannel consumer experience based in both worlds, something we will explore in the following sections.

³ Dawson, Chris. Tambay Position Paper: Search. Tambay. 2018. <https://tamebay.com/2018/05/tamebay-position-paper-search.html>. Accessed September 2018.

A man and a woman are shown from the chest down, standing close together. The man is wearing a dark blue denim jacket over a red and black plaid shirt and a white t-shirt. The woman is wearing a light blue denim jacket over a blue shirt and dark blue jeans. They are both wearing blue jeans. The background is a plain, light-colored surface.

HOW IMAGE **RECOGNITION** IS DRIVING ECOMMERCE

Since the dawn of eCommerce, online merchants' commercial viability has hinged on answering one question: How can we convert browsers into buyers?

This question has never applied to online merchants to the exclusion of brick-and-mortar retailers. Both business models require that merchants perform several key functions: notifying customers of their existence, drawing them to their stores, helping those customers find what they want and providing a quick, efficient and painless checkout.

Perpetual access to millions of online shops via personal computers and smartphones amplifies the difficulty of two of these tasks. Every online store is in constant competition with its rivals, and each risks being drowned out by the noise before a consumer ever has the chance to hear its name. Even when consumers find online stores with which they'd like to shop, locating the products they want can still be a hurdle. Online merchants must maintain an easily navigable website to assist shoppers in this process.

That process becomes a lot more cumbersome when consumers know what they want but are unsure of the providing brand. Traditional text-based searches require consumers to translate images into descriptive phrases, and that's after locating the online retailer selling the product in question. With billions upon billions of

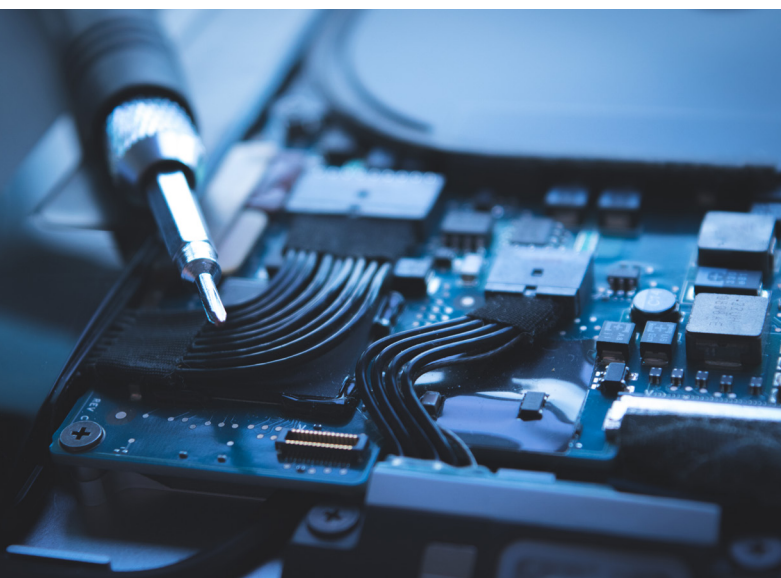
commercial items available online, finding anything – let alone one, very specific product – can be daunting.

Image recognition technology provides an opportunity to alleviate these difficulties, rendering images of all kinds more easily monetizable. An image is worth a thousand words, after all, and image recognition programs can collect an abundance of information on any given product. A shopper isn't shopping for just any black shirt when using image searches, but for *that* black shirt. The specificity that accompanies visual informational input has the potential to drastically reduce the time online consumers spend shopping for their desired items.⁴ This eases merchants' job of ensuring shoppers know who they are, where to find them and how to locate their products.

Such is the business platform of free shopping app ScreenShop, which launched in 2017 and was popularized on Instagram. It allows users to upload photos, then uses them to locate similar items online, providing an immediate, direct link between social media and commercial sites.⁵

⁴ Franco, Helena. 6 benefit of visual recognition technology in fashion eCommerce. Catchoom. 2018. <https://catchoom.com/blog/visual-recognition-fashion-e-commerce/>. Accessed September 2018.

⁵ Devlin, Katie. Everyday consumers can monetize posts with visual shopping app. Psfk. 2018. <https://www.psfk.com/2018/05/screenshop-visual-search-shoppable-social-media.html>. Accessed September 2018.



The commercial appeal of search technology has also attracted the interest and monetary investment of global tech giant Google. It announced in early May that a new version of its Google Lens feature, built into the camera of several Android models, would allow users to search the web for items that are visually similar to those they snap with their phones. The feature also recognizes brand and style, and can provide a direct link to a site through which users can purchase said clothing item, book, piece of art or other product.⁶

ScreenShop goes one step further than basic visual search functionality, however, supporting a customer compensation program that allows users to monetize

their photos on its Discover page — like how YouTube allows users to monetize their videos based on follower interaction.⁷ It allows everyday consumers — not just celebrities and big-name companies — to participate on the supply side of the eCommerce industry, and enables merchants to essentially bypass one of the major eCommerce hurdles: how consumers might locate their sites or stores. In fact, the app helps customers find what they want with relative speed and ease.

eCommerce visual searches inevitably brings us to eBay. Its latest feature, Interests, seeks to help digital shoppers more easily navigate its products, many of which are not available on rival sites. The digital marketplace platform has also introduced an AI-based personal shopping concierge designed for Facebook Messenger.⁸ It had already applied the visual search option to its Motors app, but announced the launch of two new AI-based mobile features, Find It On eBay and Image Search, in late 2017. Both allowed shoppers to use photos found online or taken from their own cameras to search for anything among its reported 1.1 billion listings.⁹

This two-pronged approach to personalizing potential and returning customers' shopping experiences while simultaneously cementing its image of a niche, alternative retailer — a persona eBay's head of engagement calls a "heavy metal-loving yogi" — represents a particularly resourceful commercial usage of AI-based image recognition.¹⁰

⁶ Liao, Shannon. Google lens is moving into the camera app and gaining new features. The Verge. 2018. <https://www.theverge.com/2018/5/8/17320672/google-lens-update-new-camera-features-pixel-2-google-io-2018>. Accessed September 2018.

⁷ Devlin, Katie. Everyday consumers can monetize posts with visual shopping app. Psfk. 2018. <https://www.psfk.com/2018/05/screenshop-visual-search-shoppable-social-media.html>. Accessed September 2018.

⁸ Gagne, Yasmin. eBay's new feature finds the products you might actually buy. Fast Company. 2018. <https://www.fastcompany.com/40573863/eBays-new-feature-finds-the-products-you-might-actually-buy>. Accessed September 2018.

⁹ Robles, Patricio. Ebay becomes latest ecommerce brand to offer visual search. Econsultancy. 2017. <https://econsultancy.com/blog/69551-ebay-becomes-latest-ecommerce-brand-to-offer-visual-search>. Accessed September 2018.

¹⁰ Gagne, Yasmin. eBay's new feature finds the products you might actually buy. Fast Company. 2018. <https://www.fastcompany.com/40573863/eBays-new-feature-finds-the-products-you-might-actually-buy>. Accessed September 2018.

These visual search-enthused retailers share a common trait: They see image recognition as a means to improve customer service by eliminating the logistical difficulties associated with online shopping. Creating a quick, instantaneous digital link between products and their online locations renders the shopping experience less complicated and time consuming, thereby making it easier to convert browsing sessions into real-life purchases.

eBay's digital personal shopping concierge further represents a way in which such recognition technology can recreate an in-store experience online, though the company has always focused on the latter to the exclusion of other channels. It brings in-store customer service to its digital platform by providing an AI-fueled virtual sales associate, showing that technology can be used to bridge the gap between the cold, impersonal online experience and the warmth of the person-to-person interaction shoppers expect from brick-and-mortar stores.

THE ROLE OF MOBILE MANUFACTURERS IN ENABLING FRICTION-FREE PAYMENTS AND COMMERCE

As mobile technology integrates into consumers' everyday lives, merchants are seizing the opportunity to utilize it to engage with their customers in real time. In this sense, the mobile channel is the first digital outlet capable of delivering on-demand customer service both online and in stores, at all stages of the shopping experience.

Moreover, consumers are learning to expect a certain level of real-time customer service support from their mobile phones that has never been expected of a digital device. This dual supply- and demand-side expectation puts mounting pressure on mobile manufacturers to ensure their products are not only capable of interacting with merchants' applications, but also that consumers can use those applications to optimize their shopping experiences — regardless of how or where they choose to partake. Take the checkout process, for example. Mobile phone manufacturers have been leading the charge toward offering a more seamless payment experience, continuously working to reduce checkout friction and take that final step in transforming browsers to buyers.

The Samsung Pay mobile wallet utilizes near-field communication (NFC) and magnetic secure transmission (MST) technology,¹¹ enabling consumers to use their phones for contactless payments at any brick-and-mortar location with either a credit card PIN pad or card swipe machine.¹² Other NFC mobile wallets typically require merchants to acquire additional, specialized POS hardware and software.¹³ This is the case with both Apple Pay¹⁴ and Xiaomi Pay,¹⁵ which necessitate POS terminals enabled with contactless technology.

This example — one of many — showcases how mobile phone manufacturers are quickly learning that consumers' demand for a digital, one-stop-shop for customer service is making smartphones their first and primary customer service representative — from the doorway to the checkout line, and from the homepage to the buy button.

¹¹ Hager, Ryne. Chase Pay links up with Samsung Pay to leverage its Magnetic Secure Transmission tech. Android Police. 2018. <https://www.androidpolice.com/2018/07/28/chase-pay-links-samsung-pay-leverage-magnetic-secure-transmission-tech/>. Accessed September 2018.

¹² Moorhead, Patrick. Why I switched to the Samsung Galaxy S9+ as my primary phone. Forbes. 2018. <https://www.forbes.com/sites/patrickmoorhead/2018/06/25/why-i-switched-to-the-samsung-galaxy-s9-as-my-primary-phone/#68786e3e67d5>. Accessed September 2018.

¹³ Pandey, Susan. Mobile Payments Industry Workgroup leadership from 2010-2017: Adapting to a changing landscape. Federal Reserve Bank of Boston. 2017. <https://www.bostonfed.org/-/media/Documents/PaymentStrategies/mpiw-mobile-payments-8-years-later.pdf>. Accessed September 2018.

¹⁴ Author unknown. About Apple Pay for merchants. Apple. 2018. <https://support.apple.com/en-us/HT204274>. Accessed September 2018.

¹⁵ Author unknown. Xiaomi's Mi 6 receives support for Mi Pay via an update. Android Headlines. 2018. <https://www.androidheadlines.com/2017/06/xiaomis-mi-6-receives-support-mi-pay-via-update.html>. Accessed September 2018.

HOW TRAX USES AI TO MANAGE INVENTORY

As digital and brick-and-mortar shopping experiences continue to merge, image recognition technology solutions are finding their way into not only the hands of tech-savvy consumers, but also those of the retailers that serve them.

Many use cases have emerged in the last decade, including shelf management. These solutions can aid retailers — particularly brick-and-mortar businesses — in keeping an up-to-date and accurate account of products' shelf availability, helping them better serve their customers.

Adding this technology to a company's roster of solutions is often easier said than done, however. It typically involves a long process for those that have not already adopted, one marked by many opportunities for error. That potential for error can magnify exponentially for large retailers with equally large inventories.

Now, image recognition solution providers like [Trax Image Recognition](#) are beginning to emerge, working to help retailers adopt and integrate the technology into their operations. Based in Singapore, Trax provides AI- and machine learning-supported image recognition technology to retailers looking to streamline in-store

product management. The goal is to use that technology to track product availability and reduce the number of stock assessment inaccuracies due to human error.

In a recent interview with PYMNTS, David Gottlieb, Trax's general manager of global retail, discussed the company's vision for digitized brick-and-mortar retailers, including how image recognition and AI can be harnessed to streamline shelf management.

Shelf management could not be done frequently before solutions like those offered by Trax and others in the space, Gottlieb explained, largely because it required a manual and labor-intensive process.

"At some point during the day, you'd have an associate walk through the store looking for holes and then maybe scanning them with a scanner," he explained. This often ate up substantial chunks of time, particularly for retailers with large stores or a wide range of inventory.

Trax's system aims to cut down on the time required to perform shelf management tasks by using a camera for real-time shelf monitoring. It relies on AI-based image recognition to identify changes in stock, helping ensure that retailers obtain an accurate account of which products they have to sell or need to reorder.

Those images can be used for more than just shelf availability information, however. The pictures are also

stored to provide a large well of customer and product information, Gottlieb explained, which can then be used for analytical purposes.

"It is not just the image recognition technology we are offering," he said. "We are storing data on multiple levels — raw data generated from the images, the key performance indicator data, and then meta data, the master data."

With these use cases in place, image recognition technology can also enhance a brick-and-mortar retailer's ability to properly assess which customers are buying which products, thus gathering the information they need to determine their future focuses.

"If a retailer wants to maximize profits, we can stack or rank the items which have the highest value to the business, or the highest sales velocity," Gottlieb noted. "[We can provide information on] whatever the retailer is most interested in optimizing."

Trax's vision for the future of digitized retail is not entirely supply side-centric, though. The company also plans to offer AI-supported image recognition so customers can optimize their shopping experiences. One way to

accomplish this is to bring an element of digital into the brick-and-mortar store, allowing customers to "search and filter," as with a search bar, through items in a real-life retail location.

To that end, Trax is currently working on expanding its service to a mobile app customers could use to obtain real-time information on a desired product's availability. They could then "know where the items were [in the real store location], and they would know the content of the items," Gottlieb explained.

These mobile app development efforts are part of a larger vision, he added — one to build on the foundation of an AI- and machine learning-enhanced "digitized store."

This makes Trax yet another example of how companies are noting the importance of investing in digital capabilities and, in this case, image recognition technology. Retailers are hoping to capitalize on AI and machine learning to make the consumer experience more seamless and omnichannel-capable than ever, thereby offering consumers the connected and convenient shopping experiences they crave.





IMPLEMENTING AI-BASED CONSUMER APPLICATIONS



CHANNELING AR TO

HELP SHOPPERS

AVOID BUYERS' REMORSE

There are other commercial AI-based image recognition applications worth exploring, and they go beyond simple visual searches — AR, for example.

AR is not new, but it was not sophisticated enough to be considered viable for commercial use until recently. Many applications involve providing shoppers with virtual product trials through mobile phones or other smart devices. Without high-resolution and considerable computing power, though, AR-generated images would not be close enough to reality to be useful.

One of the more sophisticated AR applications comes in the form of shopping app FaceCake, and the idea behind it is simple: A shopper can use her phone to “try on” a wide assortment of earrings before purchasing them. She chooses an online earring option and an image is superimposed onto her face through her device’s screen, allowing her to use her phone as she would an in-store mirror. The visuals produced by the app even take complex factors like relative size and position into consideration, a difficult feat to achieve with such a program.

Virtual earring wearing may seem niche or insignificant, but FaceCake heralds the ever-more conceivable possibilities of applying such algorithms to other products — clothing, for example — though the

sophisticated coding required would be considerable. Its goal is to solve the problem of location, digitally bringing the product to the customer before he or she invests time and money.

Samsung has also made forays into the AR world, most recently with an app created in collaboration with cosmetic brands Sephora and CoverGirl. The offering allows shoppers to virtually “try on” makeup, helping them avoid potentially dirty in-store tester products and decide whether to purchase. Shoppers are able to use their devices’ selfie cameras and, via Samsung’s digital assistant, Bixby, virtually apply cosmetics to their faces. The products can be selected from an in-app list of Sephora items, allowing users to test them before committing to a purchase.¹⁶

IKEA’s approach to solving this problem also involves AR technology, something with which it has been experimenting since 2012. After five years of perfecting its capabilities, the company introduced an AR-based mobile app called IKEA Place in 2017. It uses sophisticated image recognition technology, allowing users to superimpose images of IKEA furniture onto

¹⁶ Winkelman, Steven. How to use Samsung’s Bixby assistant for all of your smartphone tasks. Digital Trends. 2018. <https://www.digitaltrends.com/mobile/samsung-bixby-how-to-use>. Accessed September 2018.

digital images of rooms in their homes. The app has 3-D capabilities, taking lighting, relative position and other specificities into consideration when generating the resultant AR-based previews.¹⁷

Like FaceCake, IKEA Place offers a viable solution to the geographical distance between online merchants and their customers, but it solves other problems associated with furniture purchases, too: time and monetary investment.

Furniture is not only expensive, but also difficult to transport. Shoppers who purchase these items are gambling with both the time and money it takes to transact and the effort it takes to move them from store to home. If they do all of that only to realize the items are not to their taste, customers are then forced to exert even more time and effort to remove the furniture pieces, return them and replace them with alternative options. IKEA Place helps reduce the temporal cost and emotional toll associated with investing in expensive furniture by allowing customers to preview how items might look in real life before purchasing them.

FaceCake and IKEA's uses of mobile technology serve to recreate in-store experiences, something many consumers might consider necessary to the buying process. Retailers are now using technology to improve customer satisfaction, streamlining an otherwise long and complex process and blurring the lines between online and brick-and-mortar channels.

As they increasingly turn to AR to improve customer experience, retailers' expectation that mobile technology will support VR features is also growing. It is no longer enough to have an internet-capable mobile device, but rather necessary to ensure those devices come equipped with the VR technology to support merchants' mobile-centric customer service applications.

JD.com's TWO-PRONGED APPROACH TO AR

In May 2018, Chinese eCommerce giant JD.com introduced three new AR products to offer its customers a more personalized online shopping experience. Those products included an AR-enhanced makeup mirror that uses AI to provide virtual previews of how an applied product might look before purchasing.

JD.com also recently announced the full automation of its completely robotic warehouse. The facility uses image recognition and machine learning to fill as many as 200,000 orders per day — the work equivalent of 300 warehouse employees. It currently only stocks smartphones, but the move is seen as a huge step toward what retailers are hoping will be the cost-effective, fully automated future of warehouse management.

¹⁷ Pardes, Arielle. Ikea's new app flaunts what you'll love most about AR. Wired. 2017. <https://www.wired.com/story/ikea-place-ar-kit-augmented-reality/>. Accessed September 2018.



HUMANIZING THE DIGITAL:

NEIMAN MARCUS'

RELATIONSHIP-CENTRIC APPROACH TO ECOMMERCE

Experts and analysts have long discussed the merits of eCommerce retail, often pointing to the convenience of being able to shop via smart devices and personal computers to access a world of products at their beck and call. Brick-and-mortar shops have always held one competitive edge over digital channels — real-time, person-to-person interaction with sales associates for shopping assistance — until recently, that is.

Browsing a retailer's website may be convenient, but it can also create a cold and impersonal consumer experience. Luxury retailer Neiman Marcus' mobile app is a poignant example of how companies are now seeking to recreate the warmth of brick and mortar within their digital channels. Omnichannel capabilities have long topped its customer engagement priority list, but Neiman Marcus cemented its exceptional reputation in this area with the April 2018 launch of its omni-capable mobile app.

Designed to feel personal and engaging, with options to connect with real sales associates — not chatbots — via email, text, FaceTime or an old-school phone call, Neiman Marcus' app applies tried-and-true, brick-and-mortar sales methods to eCommerce. Consumers have been responding to one-on-one, personalized consumer-merchant interactions for generations, after all. As an added entertainment element, it also offers a "dating app-style" feature that allows customers to swipe "yes" or "no" on an assortment of items available in Neiman

Marcus stores.¹⁸ The retailer attributes its two-quarter running growth period to this digital-first strategy.

Furthermore, the app uses image recognition technology to support visual search. Users upload digital images of any product, then the app searches Neiman Marcus' inventory for visually similar items and immediately provides its results to its users. This means it can not only check if a particular item is in stock, but also suggest less-expensive alternatives to budget-conscious consumers, thus providing a service previously only available in brick-and-mortar shops.

Neiman Marcus' omnichannel approach epitomizes effective integration of online and in-store shopping, allowing the company to take a unique stand as a retailer committed to digitization as more than just a cost-saving mechanism. If its innovations were only to reduce its overall budget, Neiman Marcus would likely have employed chatbots in place of sales associates on its omnichannel features.

¹⁸ O'Brien, Mike. 4 takeaways from Neiman Marcus' awesome mobile app. ClickZ. 2018. <https://www.clickz.com/neiman-marcus-mobile-app/214155/>. Accessed September 2018.



AI-BASED IMAGE

RECOGNITION

IN BRICK-AND-MORTAR RETAIL

We have discussed at length how retailers use image recognition technology to improve online shopping experiences, but what can it offer brick-and-mortar shops? Popular theory may pit digitization against physical retail, but proper application of AI-based visual recognition technology can help boost any brick-and-mortar merchant's bottom line.

The first example relates back to delivery time, a fundamental problem with online shopping. eCommerce giants like Amazon lead the pack when delivering products quickly and on time, but can fall short when offering the instant gratification brick-and-mortar stores provide.

AI and image recognition technology can help physical retailers maximize this inherent competitive advantage, one they continue to enjoy over their online counterparts. It does this by better assisting shoppers in navigating merchants' inventories in real time, and ensuring they are provided the speedy service they expect from brick-and-mortar shops.

Inventory is difficult for many retailers, as humans are only capable of tracking so many products at a time. Even if they were able to memorize all the options, it is impossible to know exactly where any given product might be located in their shops. Customers regularly pick items up and drop them off elsewhere, and human error

inevitably leads some staff members to misplace others. This makes it difficult for merchants to track whether products are in stock, how many they have and where they are.

That's a problem Singapore-based tech startup Trax Image Recognition is working to resolve, developing an in-shelf inventory tracker which uses deep learning to keep real-time tabs on all products in a merchant's inventory. The company hopes to help brick-and-mortar retailers capitalize on their ability to provide a service with which eCommerce retailers struggle, "direct interaction with the customer," by keeping them up to date on their available supply.¹⁹

The Trax inventory tool uses data analytics to augment marketing tactics, and enhance the shopping experience by keeping consumers informed about brick-and-mortar retailers' product availability. Its use of image recognition is not the first of its kind, either, as India's leading eCommerce fashion retailer, Abof, has been providing

¹⁹ Rash, Wayne. IT can help brick-and-mortar retail compete using data analysis. PC. 2018. <https://www.pcmag.com/article/360484/it-can-help-brick-and-mortar-retail-compete-using-data-analy>. Accessed September 2018.

users the option to browse its extensive inventory through visual searches for years.

"For a category like fashion, visual search is extremely important — probably the second most-important aspect after 3-D trial," according to Prashant Gupta, Abof's CEO.

His is not the only company to have reaped benefits wrought by visual-based machine learning, though. Oliver Tan, CEO of AI-based visual search and image recognition solutions provider ViSenze, reports that a few of his India-based clients have "witnessed a rise of about 50 percent in conversion rates while using visual search technology compared to plain text search."²⁰

Some firms are going even further, coupling image recognition with cutting-edge technologies to render it more secure and reliable. The Optimal Shelf Availability Decentralization Platform (OSA DC), a digital marketplace built on smart-contract blockchain, includes an AI-powered digital assistant that uses consumer information and a built-in decentralized rating system to recommend products. It taps smart contracts as a security mechanism, aiming to render data gathered and stored on its system immune to both outside manipulation and human error.²¹

OSA DC seeks to solve an increasingly important concern: data security. With so much information available on how shoppers use online platforms, all of which is used to personalize and enhance their shopping

experiences, the data security issue is compounding. Blockchain is well-known for its security. Storing consumer information on an AI-supported, decentralized network that also includes visual information results in not only the benefits of machine learning, but also added security. This is just one more way AI is being used to meet real-world consumer demands.

Visual search technology is still young, of course, but it shows tremendous promise. Some skeptics postulate that it will be a while before customers and merchants clamor for visual-search functionality, however.²²

Nevertheless, the success several companies have enjoyed from implementing this technology has prompted others to invest in it. AI-driven image-recognition is evolving at a rapid pace, with merchants from the retail and fast-moving consumer goods (FMCG) segments developing innovative ways to enhance its functionality and render it viable to reduce supply chain costs.²³

One example is beverage giant Coca-Cola's recent adoption of image recognition shelving technology. After testing in three of its 70 North American bottling locations, the company replaced its manual audit shelving program with a machine learning- and image recognition-focused shelving system in 2017. The new system provides a more reliable, cost-effective alternative to sending human employees to manually track stock changes, thereby saving Coca-Cola a great

²⁰ Khera, Sanchit. Why artificial intelligence and visual search are the future if tech for major brands. The News Minute. 2018. <https://www.thenewsminute.com/article/why-artificial-intelligence-and-visual-search-are-future-tech-major-brands-81055>. Accessed September 2018.

²¹ Wang, Brian. AI-powered, big data manages critical retail efficiency in real-time. Next Big Future. 2018. <https://www.nextbigfuture.com/2018/05/ai-powered-big-data-manages-critical-retail-efficiency-in-real-time.html>. Accessed September 2018.

²² Khera, Sanchit. Why artificial intelligence and visual search are the future of tech for major brands. The News Minute. 2018. <https://www.thenewsminute.com/article/why-artificial-intelligence-and-visual-search-are-future-tech-major-brands-81055>. Accessed September 2018.

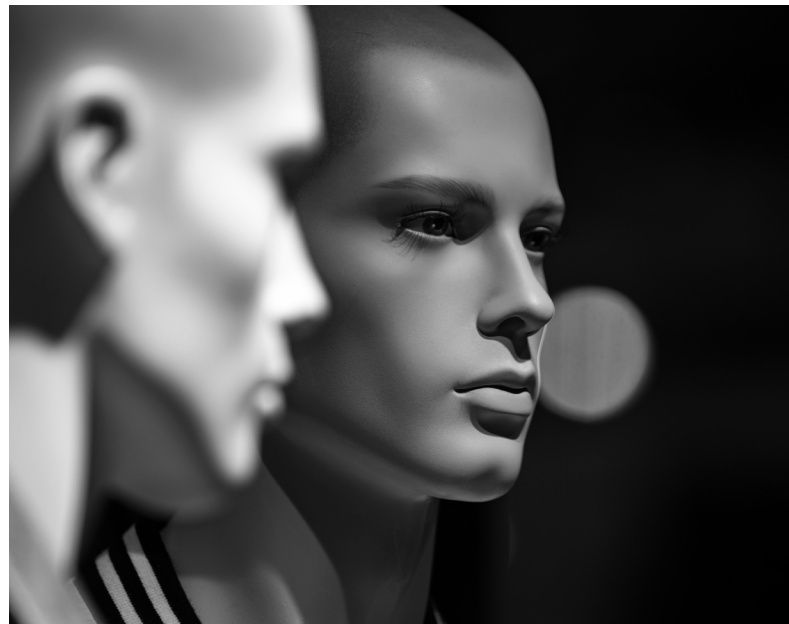
²³ Cheng, Andria. CPG brands are leveling the playing field by bringing this digital tool into brick-and-mortar retail. Forbes. 2017. <https://www.forbes.com/sites/andriacheng/2018/05/31/one-new-area-cpg-brands-are-leveling-the-playing-field-against-online-retailers/#1da37a1f3abb>. Accessed September 2018.

deal of manual labor-related monetary and temporal costs.

Deep learning's ability to streamline supply chain dynamics has enticed non-tech companies to try their hands at the AI game, too. Tools like Coca-Cola's machine learning image recognition system are arising from many firms in the commerce industry, including at big-name clothing retailer H&M. The company is testing image recognition to catch onto fashion trends as they spring to life, with data collected from social media and blogs being gathered, analyzed and used to design collections.

Its incorporation of AI into its inventory management extends beyond the moment a customer purchases an item, too, encompassing those bought and returned in each of its stores and theoretically allowing H&M to determine which trends resonate best with local customers. The technology is currently being tested at a Stockholm, Sweden, location. It has so far "advised" the retailer to alter its inventory through cutting the number of items it holds by about 40 percent, and by replacing basic items with more expensive options.²⁴

The results of this experiment demonstrate one very real possible outcome of allowing AI to determine in-store inventory: Such a process could lead to "personalized"



inventory selections, much the same way that Twitter feeds are personalized.

This offers yet another example of how widespread AI in omnichannel strategies is making the digital and brick-and-mortar shopping experiences less mutually distinguishable. The question is, how might allowing algorithms to select our clothing alter the future of the apparel and accessory retail industry? More fundamentally, how will digitizing shelves change consumers' relationships with the products they buy?

²⁴ Amato-McCoy, Deena M. H&M reportedly taps technology to solve inventory problem. Chain Store Age. 2018. <https://www.chainstoreage.com/technology/hm-reportedly-taps-technology-to-solve-inventory-problem/>. Accessed September 2018.

HOW AI IS TRANSFORMING ECOMMERCE IN 2018

Image recognition has the potential to unlock myriad commercial and logistical possibilities. It has already opened numerous doors, so it should come as no surprise that organizations — from commercial retailers to international nonprofit institutions — expect more merchants to convert to the digital business way as the technology continues to develop.

A 2017 World Economic Forum Report predicts that the Internet of Things (IoT), AI and robotic technologies will only gain importance in the retail industry by 2026,²⁵ and that there are a few pertinent areas in which three technologies — multichannel marketing (email, SMS and push notifications), visual search and influencer ROI — are expected to make an impact.

According to Joshua Neckes, co-founder of customer data platform Simon Data, these three tools will become more central to marketers' engagement strategies in 2018 than ever before, finally entering center stage.²⁶ In terms of visual search, Alex Vaidya, CEO and co-founder of social media newswire StoryStream, recent told Forbes that the "visual search for products will grow, particularly via mobile and the monetization of



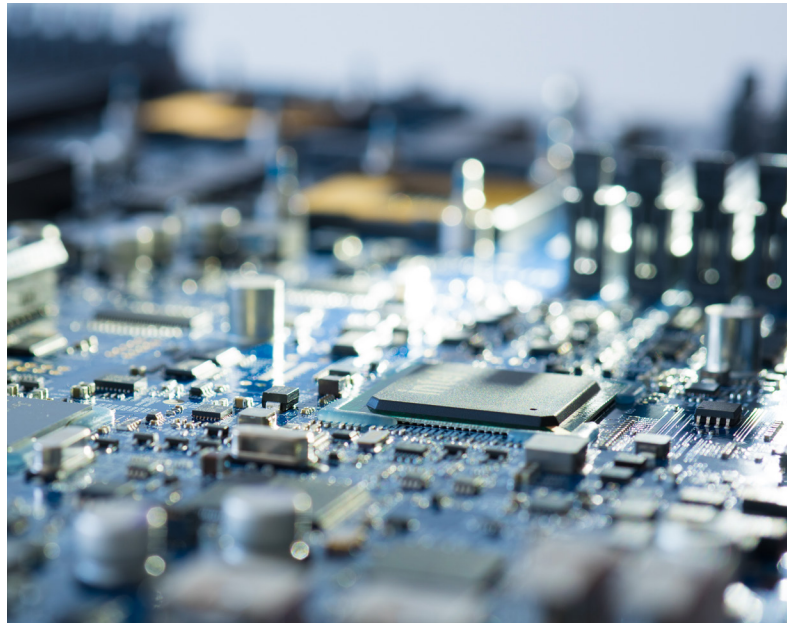
²⁵ Author unknown. Shaping the future of retail for consumer industries. World Economic Forum. 2017. http://www3.weforum.org/docs/IP/2016/CO/WEF_AM17_FutureofRetailInsightReport.pdf. Accessed September 2018.

²⁶ Dayton, Adrian. 3 retail marketing predictions to watch in 2018. JD Supra. 2018. <https://www.jdsupra.com/legalnews/3-retail-marketing-predictions-to-watch-33052/>. Accessed September 2018.

eCommerce imagery, via automated product tagging [which] will bring new revenue streams in 2018.”²⁷ When it comes to influencer ROI, Eric Sheinkop, co-founder and CEO of shopping platform DesireList, predicts that it will become increasingly crucial for companies to demonstrate connections between their technological investments and increased sales.²⁸

We are already witnessing the benefits so many retailers, especially in the fashion space, are enjoying because of their AI and image recognition investments. Both technologies will likely see an increasingly prominent role in modern online and in-store retail as they continue to advance.

The physical and digital commercial channels are no longer indistinguishable. Merchants are adjusting their outlooks accordingly, making use of the latest technological breakthroughs to enhance customer experience and satisfaction. Backed by machines, it appears the retail sector has the paradoxical potential to become ever-more personal and personalized.



²⁷ Ganatra, Rupa. 28 retail marketing predictions to watch in 2018. Forbes. 2018. <https://www.forbes.com/sites/rganatra/2018/01/18/e-commerce-marketing-predictions-for-2018/#6f4d9e0e49b6>. Accessed September 2018.

²⁸ Dayton, Adrian. 3 retail marketing predictions to watch in 2018. JD Supra. 2018. <https://www.jdsupra.com/legalnews/3-retail-marketing-predictions-to-watch-33052/>. Accessed September 2018.

about

PYMNTS.com

[PYMNTS.com](https://pymnts.com) is where the best minds and the best content meet on the web to learn about “What’s Next” in payments and commerce. Our interactive platform is reinventing the way in which companies in payments share relevant information about the initiatives that shape the future of this dynamic sector and make news. Our data and analytics team includes economists, data scientists and industry analysts who work with companies to measure and quantify the innovation that is at the cutting edge of this new world.



Samsung Pay, a mobile payment service from Samsung Electronics, is simple, safe and available almost anywhere you can swipe or tap your card. Combining near field communication (NFC) with Samsung's proprietary magnetic secure transmission (MST) technologies, Samsung Pay provides consumers a way to pay almost anywhere you can swipe or tap a card at millions of merchant locations. Samsung continues to strategically expand its partnership ecosystem for Samsung Pay to provide greater flexibility, access and choice for customers while enabling an easy and safe payment experience. Samsung Pay is compatible with select cards and Samsung devices, as well as leading wireless providers. Please visit www.samsung.com/pay to learn more.

We are interested in your feedback on this report. If you have questions, comments or would like to subscribe to future editions of the Digital Consumer Report, please email us at digitalconsumer@pymnts.com

disclaimer

The Digital Consumer Report may be updated periodically. While reasonable efforts are made to keep the content accurate and up-to-date, PYMNTS.COM: MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, REGARDING THE CORRECTNESS, ACCURACY, COMPLETENESS, ADEQUACY, OR RELIABILITY OF OR THE USE OF OR RESULTS THAT MAY BE GENERATED FROM THE USE OF THE INFORMATION OR THAT THE CONTENT WILL SATISFY YOUR REQUIREMENTS OR EXPECTATIONS. THE CONTENT IS PROVIDED "AS IS" AND ON AN "AS AVAILABLE" BASIS. YOU EXPRESSLY AGREE THAT YOUR USE OF THE CONTENT IS AT YOUR SOLE RISK. PYMNTS.COM SHALL HAVE NO LIABILITY FOR ANY INTERRUPTIONS IN THE CONTENT THAT IS PROVIDED AND DISCLAIMS ALL WARRANTIES WITH REGARD TO THE CONTENT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT AND TITLE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF CERTAIN WARRANTIES, AND, IN SUCH CASES, THE STATED EXCLUSIONS DO NOT APPLY. PYMNTS.COM RESERVES THE RIGHT AND SHOULD NOT BE LIABLE SHOULD IT EXERCISE ITS RIGHT TO MODIFY, INTERRUPT, OR DISCONTINUE THE AVAILABILITY OF THE CONTENT OR ANY COMPONENT OF IT WITH OR WITHOUT NOTICE.

PYMNTS.COM SHALL NOT BE LIABLE FOR ANY DAMAGES WHATSOEVER, AND, IN PARTICULAR, SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, OR DAMAGES FOR LOST PROFITS, LOSS OF REVENUE, OR LOSS OF USE, ARISING OUT OF OR RELATED TO THE CONTENT, WHETHER SUCH DAMAGES ARISE IN CONTRACT, NEGLIGENCE, TORT, UNDER STATUTE, IN EQUITY, AT LAW, OR OTHERWISE, EVEN IF PYMNTS.COM HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

SOME JURISDICTIONS DO NOT ALLOW FOR THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, AND IN SUCH CASES SOME OF THE ABOVE LIMITATIONS DO NOT APPLY. THE ABOVE DISCLAIMERS AND LIMITATIONS ARE PROVIDED BY PYMNTS.COM AND ITS PARENTS, AFFILIATED AND RELATED COMPANIES, CONTRACTORS, AND SPONSORS, AND EACH OF ITS RESPECTIVE DIRECTORS, OFFICERS, MEMBERS, EMPLOYEES, AGENTS, CONTENT COMPONENT PROVIDERS, LICENSORS, AND ADVISERS.

Components of the content original to and the compilation produced by PYMNTS.COM is the property of PYMNTS.COM and cannot be reproduced without its prior written permission.

You agree to indemnify and hold harmless, PYMNTS.COM, its parents, affiliated and related companies, contractors and sponsors, and each of its respective directors, officers, members, employees, agents, content component providers, licensors, and advisers, from and against any and all claims, actions, demands, liabilities, costs, and expenses, including, without limitation, reasonable attorneys' fees, resulting from your breach of any provision of this Agreement, your access to or use of the content provided to you, the PYMNTS.COM services, or any third party's rights, including, but not limited to, copyright, patent, other proprietary rights, and defamation law. You agree to cooperate fully with PYMNTS.COM in developing and asserting any available defenses in connection with a claim subject to indemnification by you under this Agreement.