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ANALYTIC SERVICES

Briefing Paper

MACHINE LEARNING: THE NEXT GENERATION OF CUSTOMER EXPERIENCE

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We are at an important transition point with machine learning—a shift toward real solutions that apply to customers, not just companies. This new wave will create new opportunities for competitive advantage.

Every customer journey contains untapped potential that machine learning can help reveal, including new business models, products, and services and additional revenues. Typical corporate machine learning projects aren't driven by customer interactions but rather by automation needs. In contrast, with machine learning that focuses on customer-facing initiatives, companies big and small are starting to redefine and improve the customer experience. Improvements can be made immediately by creating and testing proactive experiences that reduce friction along the customer's journey and create key moments of delight.

What's especially exciting is that companies are beginning to do this inexpensively with only small or gradual improvements. Current technologies enable organizations to use machine learning without significant investment in infrastructure or a team of data scientists. However, not every business is prepared to use machine learning to create better customer experiences.

For over 20 years, CI&T has been a trusted digital solutions partner in complex engagements inside the world's biggest companies. We're experts at transforming the customer experience with the power of machine learning. As a Google Cloud Premier Partner, we accelerate the impact machine learning can bring to organizations and customers by reimagining their experience and validating the business impact within a short time frame. The following report illustrates how organizations can take steps to access the significant value machine learning has to offer and can seize the next generation of customer experience opportunity today.

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MACHINE LEARNING

The Next Generation of Customer Experience

Machine learning offers huge promise when it comes to improving the customer experience. But due to many factors, that promise is only now starting to be realized. According to the Harvard Business Review Analytic Services research report "Closing the Customer Experience Gap," nearly three-quarters of business leaders (73%) said that delivering a relevant and reliable customer experience is critical to their company's overall business performance today. However, the report continues, "very few companies have the necessary technology systems in place to support the organizational and process changes required to reorient the business to the customer."

By reorienting business to the customer and implementing machine learning technology in a way that focuses on customer-facing initiatives, companies of all sizes can start to redefine and improve the customer experience. And they can do it relatively inexpensively and even with only small or gradual improvements.

MACHINE LEARNING CAN HELP IMPROVE AND EVEN PERSONALIZE EVERY ASPECT OF A CUSTOMER'S EXPERIENCE

A True Focus on the Customer

To demonstrate the key shift in perspective that's needed, let's look at one large insurance company. The insurer wanted to improve its fraud detection capabilities when it came to reimbursing patients for medical expenses. It began using machine learning to identify the types of customers that were most likely to commit fraud. But a few leaders questioned how that was actually helping the large majority of their customers, who would usually wait weeks for reimbursements.

So, the question became "How can we become better at detecting what is *not* fraud in order to speed up reimbursements?" They used the same machine learning technology to identify the types of customers that were least likely to commit fraud. Using those lessons, the company was able to hasten medical reimbursements for a large segment of its seven million customers—what used to take weeks for the majority of its customers now took only days.

"You would be surprised how many times **you interact with a machine learning model** when you are on Airbnb.com," says Mihajlo Grbovic, senior machine learning scientist at Airbnb.

Machine learning can help improve and even personalize every aspect of a customer's experience—from successfully surfacing relevant products to offering key moments of delight along the way. Airbnb, for one, uses machine learning everywhere its business touches the customer, including Airbnb.com's search auto-complete, recommendations, pricing tips, marketing, fraud detection, payments, customer service, auto-categorization, and amenity predictions. The company has more than 100 machine learning models running on its website. "You would be surprised how many times you interact with a machine learning model when you are on Airbnb.com," says Mihajlo Grbovic, senior machine learning scientist at Airbnb. "Whenever you search for a home, those results are specifically tailored and personalized for you using our machine learning algorithms."

The company frequently hosts research sessions with Airbnb guests to learn where it can improve its platform, which is what it did with one of its newer offerings, Airbnb Experiences, a collection of activities designed and led by local hosts. Unlike when searching for homes, where guests typically enter a geographic location in the search bar, when searching for Airbnb Experiences, guests want to be able to search for specific activities (for example, "concerts" or "surfing") as well as to search for specific experience names (for example, "Wolf Encounter"). This customer need motivated the company to start a machine learning project aimed at enabling keyword search in the search bar. FIGURE 1

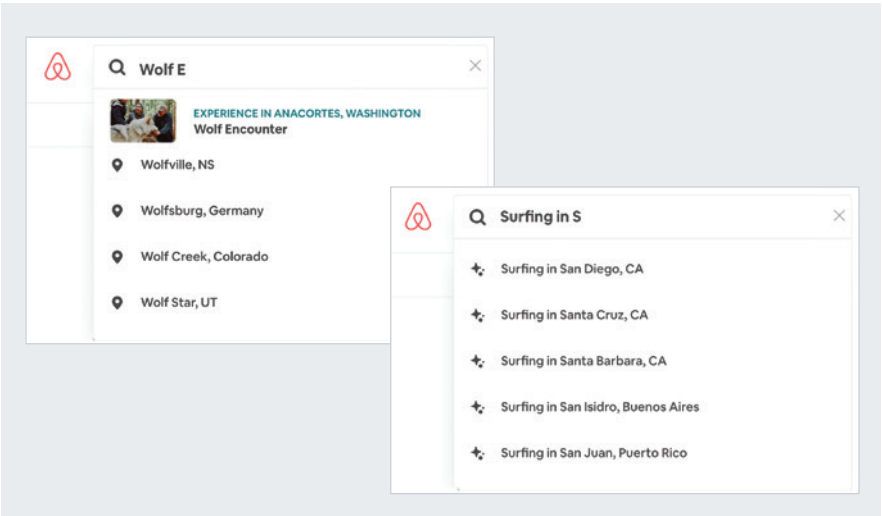
The machine learning model was even able to understand synonyms. For example, it learned that search queries like "live music," "bands in town," "upcoming concerts," "local bands," and "concert venues" all mean "concerts," so the model would navigate users to the concerts page. To help customers find experiences that matched their desires even better, Grbovic and his team launched a machine learning experiment that targeted possible popular new experiences. The experiment was such a success with customers that the company was able to increase Airbnb Experiences bookings by 17%.

Another organization that accurately pinpointed and sought to resolve customer difficulties with machine learning was a medical diagnostic company with $1 billion in revenue. The company was experiencing a high abandonment rate when patients

FIGURE 1

AIRBNB DELIVERS REAL-WORLD ADVENTURE TO CUSTOMERS THROUGH DATA

Airbnb's machine learning–driven keyword search



SOURCE: AIRBNB

tried to schedule lab tests using its website. After doing a little digging, the company realized that patients were starting the process online, but then, unable to decipher either their doctors' handwriting or the complicated test names, they'd stop and do everything over the phone with a live agent instead.

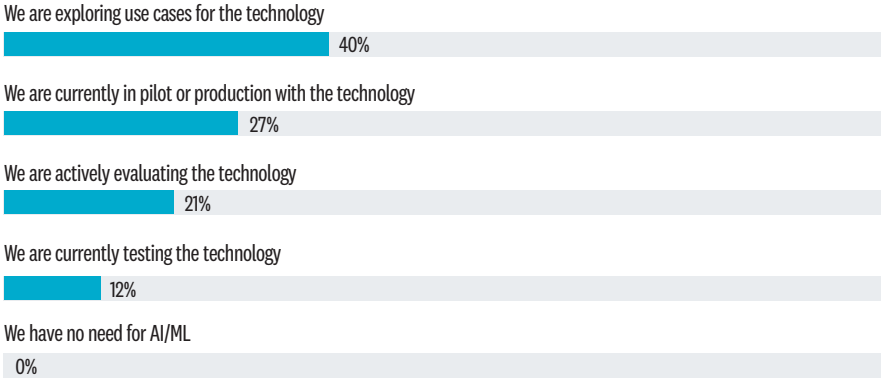
Using data from only the past two years, the company developed a machine learning model that discovered a high correlation between tests for certain conditions. It was then able to build an application that automatically suggests related tests as patients begin typing in their first test. As a result, the company increased online scheduling by 25%.

Like Airbnb and the medical diagnostic company, other companies are beginning to successfully harness machine learning's powers and see results in higher sales, more efficient service, and greater customer loyalty. And more organizations plan to put machine learning to work for their customers. According to a recent Harvard Business Review Analytic Services report, "Artificial Intelligence: The End of the Beginning," some 40% of the 283 executives surveyed said they are exploring use cases for machine learning. FIGURE 2

FIGURE 2

NO LONGER ON THE SIDELINES OF AI

Nearly one-third of respondents are using AI/ML in pilot or production mode.



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY. SEPTEMBER 2018

Engaging Customers in New Ways

Airbnb has taken machine learning a step beyond just knowing its customers. The company uses the technology to gain new insights as a way to surprise and delight customers to build greater loyalty. In 2018, it launched Airbnb Plus, a new selection of homes of the highest quality, with one-of-a-kind, beautiful interior designs and guaranteed amenities that essentially provide guests with a five-star experience. To identify homes with the potential to become Airbnb Plus homes, Airbnb trained a machine learning model to scan its inventory of millions of active homes and point to the ones with the highest potential. It then notified the chosen hosts. "The selected home hosts were delighted"—not just to find that they were now part of Airbnb Plus but also that "their homes qualified to receive interior design help and professional photography," Grbovic says.

And there are yet more novel ways machine learning can engage customers. Some companies have figured out how to elegantly use data to better identify and recommend the most appropriate content or products, inspiring customers to buy. Consumer products maker Procter & Gamble recognized that there are so many skin products on the market today that when customers are faced with having to make a decision, they either turn to user reviews, make a guess at what product might work, or, faced with an overload of choices, put off making a decision until later—or never. The company wanted customers to make well-informed and more immediate decisions when it came to its Oil of Olay skin brand, so it developed its machine-learning-based VizIDTM technology, which scanned more than 50,000 faces to build the Olay Skin Advisor. To make it easier for customers to determine which Oil of Olay skin products are right for their skin types, the tool analyzes selfies to tell potential customers how old their skin is. It then recommends the most appropriate Oil of Olay products to help reduce the apparent

COMPANIES ARE BEGINNING TO SUCCESSFULLY HARNESS MACHINE LEARNING'S POWERS AND SEE RESULTS IN HIGHER SALES, MORE EFFICIENT SERVICE, AND GREATER CUSTOMER LOYALTY.

ages of their complexions, inspiring immediate purchases.

Loyalty programs, too, are key. In the area of frequent flier programs, for example, it's been proven that frequent flier customers prefer to have numerous ways to collect points, which can then be redeemed for flights as well as other products and services. The goal of machine learning when applied to frequent-flier loyalty programs is to allow customers to collect and spend their points in predictive ways that line up exactly with their preferences. Australian airlines like Virgin Australia are at the forefront of using machine learning to improve customers' experiences. Virgin Australia's Velocity Frequent Fliers program uses machine learning to enhance customer experiences among members by offering more personalized and relevant redemption offers. As a result, the program's engagement has increased by 10%.

THE GOAL OF MACHINE LEARNING WHEN APPLIED TO FREQUENT-FLIER LOYALTY PROGRAMS IS TO ALLOW CUSTOMERS TO COLLECT AND SPEND THEIR POINTS IN PREDICTIVE WAYS THAT LINE UP EXACTLY WITH THEIR PREFERENCES.

Serving Customers Better

Ride-sharing company Uber employs extensive machine learning activities in customer service. Every day, Uber deals with hundreds of thousands of customer support tickets across more than 400 cities worldwide. To resolve them as quickly as possible, its Customer Obsession Ticket Assistant, or COTA, uses machine learning and natural language processing to help customer support representatives improve their speed and accuracy for better customer experiences.

"We want to make it as frictionless as possible for the customer," says Fran Bell, director of data science in the product software team at Uber. As one of Uber's largest and most successful machine learning projects, COTA is involved in helping resolve more than 90% of all tickets and has so far been able to speed up issue-resolution times by 9%.

While Uber's COTA effort is at a massive scale, companies can better serve customers through machine learning at a smaller scale, too. Outdoor apparel company The North Face, for example, used machine learning to quickly create a new live chat function to serve its customers. The company programmed into the function tactics including adaptive canned messages, proactive chat, dual monitors, and layered chat. Live chat agents could quickly answer questions about order status, return status, shipping status, the loyalty program, basic warranty information, and gift cards. If, for example, a customer lost a gift card, he or she would be delighted to discover very quickly via chat that the card could be replaced by emailing a picture of the receipt. As a result of its new live chat function, The North Face's chat customer satisfaction score hit 94%, which is 24% higher than the industry average for apparel companies and 18% higher than the industry average for internet retailers.

Achieving Business Buy-In Across the Organization

Creating an effective machine learning strategy aimed at enhancing the customer experience starts with having a customer-centric culture. Ideally, customer initiatives should have a companywide focus and machine learning should be an integrated element across business segments rather than operating in a silo. "Improving customer journeys is a holistic, enterprise-wide-reaching objective as it involves multiple departments across your organization," Gartner analysts Bill Delrieu and Soyeb Barot write in "Using Machine Learning to Analyze and Optimize Customer Journeys."[1] "This can't be done without

AS TECHNOLOGY ADVANCES, SO DO THE NUMBER OF TOUCHPOINTS AND THE AMOUNT OF DATA.

a global view of how customers are interacting with your company."

In some successful companies, organizational structures and collective thinking are, if not already built for the customer experience and machine learning, then at least open to implementing and working collaboratively on them. Even though virtually every industry is transforming core processes and business models to take advantage of machine learning, "the bottleneck now is in management, implementation, and business imagination," writes Erik Brynjolfsson and Andrew McAfee in the *Harvard Business Review* article "Artificial Intelligence, For Real."

A stubborn company culture and department silos may block machine learning transformation. "Machine learning lets you generate lots of models, but the fraction of those models that actually get implemented within companies is substantially below 100%. For most companies, it's probably less than 50%," says Thomas Davenport, the President's Distinguished Professor of Information Technology and Management at Babson College and a research fellow at the MIT Initiative on the Digital Economy, who has written two books on artificial intelligence. "Maybe the company is still too company-centric in its outlook, the decision maker never really bought into the idea, or the marketing manager found the technology threatening," he says.

Fortunately, newer companies like Uber are often founded with a customer-centric, technology-focused culture. After all, Uber's customer service division is called Customer Obsession Ticket Assistant. "Leadership from the very beginning was a huge supporter of machine learning at Uber. One of the first employees at Uber was a data scientist," Bell says. With strong executive and organizational support, Uber was able to invest significant time and resources into building its own machine learning platform, Michelangelo.

Beyond having a technology- and customer-centric culture, if a company needs a place to start to gain machine learning buy-in, it could begin implementing an education program. That's something Uber also has some experience with. The company is a strong supporter of continuing educational investment, offering a seminar series for advanced machine learning topics as well as introductory courses for using machine learning tools that are available to everyone at the company.

Getting the Right Data

Going hand in hand with having deep interest in and knowledge of customers is possessing accurate data. "With no data, there's no machine learning," says Valentine Fontama, global lead for the machine learning practice at Google Professional Services. "It's a prerequisite for a successful machine learning strategy." By examining data derived from tracking when customers interact with a company and a brand, machine learning helps successful organizations go far beyond where human analysis can go in knowing customers. It helps them develop deep insight into customer feelings, behaviors, needs, and desires.

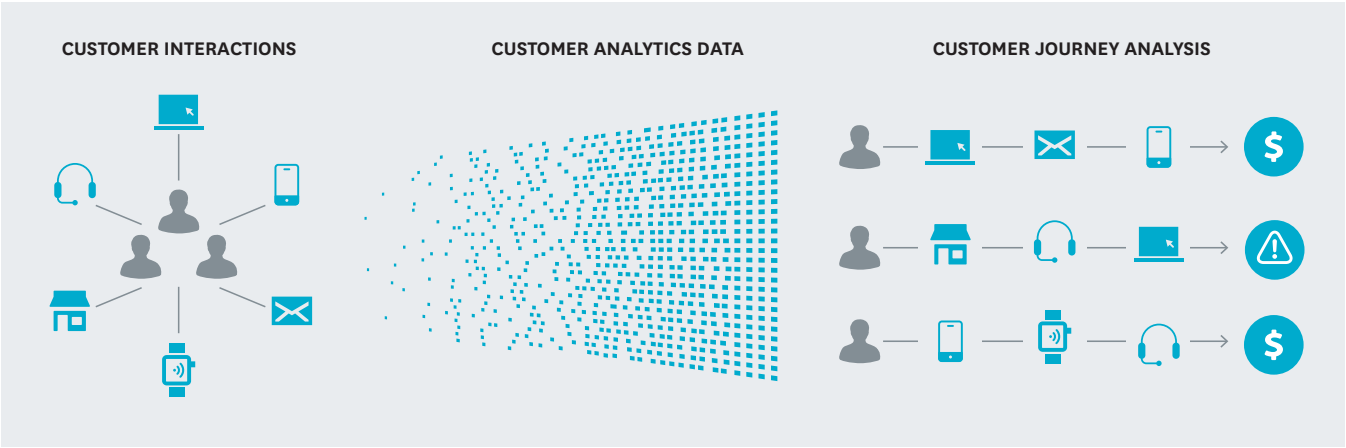
As technology advances, so do the number of touchpoints and the amount of data. Customer experiences once involved a more limited number of not-easily tracked touchpoints, including magazine and television ads, store visits, purchases at cash registers, and communications received by mail, such as bills or claims responses. Today's touchpoints—and data sources—have multiplied exponentially to include mobile apps, call centers, kiosks, all kinds of social media, and pretty much anytime anyone ever interacts with a screen. Wearable devices and the internet of things are set to become the next major elements of the customer journey, providing monumental amounts of new data.

Because today's customer experiences are not nearly as predictable as they once were, successful companies know that they may not conform to their intentions or expectations. Enter machine learning. "One of the most valuable outputs of journey

FIGURE 3

FOLLOWING THE CUSTOMER DATA PATH

Functional diagram of the customer analytics journey



SOURCE: GARTNER, "USING MACHINE LEARNING TO ANALYZE AND OPTIMIZE CUSTOMER JOURNEYS," NOVEMBER 19, 2018

discovery is the fact that the data shows what customers actually do and not what a business assumes they do. Optimizing customer experiences means understanding all the possible combinations of sequential interactions that a customer can take and identifying opportunities for improvement," write Gartner's Delrieu and Barot. "With more and more customer-centric data available across multiple, disparate data sources, machine learning has become essential to analyzing these large data sets and providing insights and recommendations." FIGURE 3

Companies like Airbnb that have successfully used machine learning to enhance customer experiences do deep data-centered user research to understand and define the best possible outcomes. To get a concise view, Airbnb splits up the customer journey into pieces that can be easily controlled or influenced and then outlines objectives and organizes the data for each, making sure to have good data on all the possible factors for a large number of customers—from what they booked to what they didn't and everything in between.

Fortunately, companies don't always need vast amounts of data but rather sufficient data. Buying packaged applications like Google's Cloud AutoML is one inexpensive way to start a machine learning project. Its image recognition technology–based AutoML Vision requires as little as a few dozen photographic samples to start. A company can simply input its data and get quickly up and running, training machine learning models for just $20 an hour.

Short Experimentation Cycles

One key for success in using machine learning to improve the customer experience is to conduct short-term experiments while in production and test models constantly with real interactions. Online streaming company Netflix subscribes to the test-and-learn way of doing things to improve the customer experience with machine learning. For its recommendation system, Netflix designs randomized, controlled experiments, or A/B tests, to compare medium-term member engagement with cancellation rates across various recommendation algorithms. Tests typically last for two to six months, at the end of which the company evaluates member engagement and puts successful algorithms into production. It then starts the process

PREPARATIONS FOR THE CUSTOMER JOURNEY

Machine learning transformation targeting the customer experience should involve these steps.

1. Create organizational learning to improve literacy in machine learning and the customer experience and gain business buy-in.
2. Know the current customer journey, and either understand how to make it better or resolve to find out.
3. Pull in relevant people from across business segments for insight.
4. Define goals and questions.
5. Bring together only the needed data to answer those questions.
6. If lacking data, define strategies for how to acquire that data, such as incentivizing customers to provide it.
7. Apply machine learning models with a data scientist or via available premade machine learning models.
8. Deploy and iterate often to measure results, identify shortcomings and accuracy, and identify the need to improve models or adapt the customer journey.
9. Focus on a 30-to-60-day proof of concept to determine whether there is a market for the offerings being considered.

again, continually enhancing its recommendation system. "A/B test results are our most important source of information for making product decisions," write Netflix's Carlos A. Gomez-Uribe and Neil Hunt in the article "The Netflix Recommender System: Algorithms, Business Value, and Innovation" in the January 2016 issue of *ACM Transactions on Management Information Systems*.

The Right People in the Right Places

Much has been made of the need for data scientists to run successful machine learning strategies. While it's true that a barrier to successful machine learning implementation can be lack of talent due to a shortage of data scientists in the marketplace, there's an opportunity for using existing employees in new ways. Due to the wider availability of resources and technology, like Google AutoML, that make machine learning easier and don't require data scientists, "the barrier to entry to machine learning has become much lower," Uber's Bell says.

Many experts agree that turning existing employees across organizations into machine learning specialists can help advance machine learning accomplishments in a practical business context. Such employees serve as a conduit between those who create the models and the domain experts who can help identify opportunities for improving the customer journey.

Other companies are able to launch successful machine learning initiatives by hiring consultants to fill gaps or even freelance data scientists to build their first few machine learning models. Hiring recent data science graduates also works toward building business knowledge of the latest machine learning tools and techniques.

And if an organization does have its own data scientists, they shouldn't be siloed in the IT department. Each business function should have them working alongside domain experts—in marketing, sales, human resources, and anywhere else—because domain experts will understand the customer journey and can engage with data science at every stage of the cycle.

Tomorrow's Possibilities

While machine learning has been used in labs and academia for several decades, it's still in its infancy, and companies are only now able to find the real applications in areas like customer experience. "Business is only now starting to adopt machine learning for real," Google's Fontama says. "We're starting to cross the chasm from early adopters to more mainstream adoption. Businesses are getting serious about machine learning as a transformative technology that can offer a real competitive edge."

Technology for collecting, cleaning, and organizing data and then applying it to models will only get better—as will the practices around processing it. "People think of machine learning as a continuous process, but it's not unless you bring in new data and run a new set of models," Babson's Davenport says. "It requires human intervention and new data. In the future, we will have these continuous learning tools, but we don't have them yet."

That doesn't mean organizations should sit on the sidelines as technologies continue to improve customer experience with machine learning. "I heavily encourage companies that already have built the foundations around the customer journey to invest in this space because it's becoming more and more important," Bell says.

"As humans, we get used to certain technologies very fast," Grbovic says. "Just like we get used to asking questions and getting answers from a speaker—in the customer journey, we also get used to certain features, like personalization powered by machine learning. Users will be expecting to have those features on every website they visit. Companies with websites that are not able to provide those types of machine learning–powered features will fall behind."

ENDNOTES

1 Gartner, "Using Machine Learning to Analyze and Optimize Customer Journeys," Bill Delrieu, Soyeb Barot, November 19, 2018

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