



NUCLEUS
RESEARCH

THE STATE OF THE ANALYTICS MARKET: 2019

ANALYST

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THE BOTTOM LINE

Driven by the cloud, 2018 was the year where artificial intelligence (AI) engulfed the analytics market. By now, all leading vendors in the space are investing heavily in AI and customers have realized legitimate ROI from task automation and predictive insights. Looking ahead at the next one to five years, Nucleus expects some disruption in the space. Customers will become better-educated about the real capabilities and limitations of AI. Calls for an ethical use policy around consumer data will change the industry, and new technology like AI-capable edge devices and cloud networks will enable new applications and business models like data science as-a-service. Above all, AI is here to stay, as we estimate that by 2024, 80 to 90 percent of new applications and consumer devices will come with intelligence built-in.

OVERVIEW

This year, the cloud drove adoption and innovation with analytics technology. Customers gave autonomous tools unprecedented levels of operational control and access to data and realized dramatic benefits from time savings and increased user productivity. By hosting on the cloud, customers were able to synthesize data from across the various departments of their businesses to perform more sophisticated multivariate analytics. In this vein, customers adopted a more proactive approach to analytics, enabled by predictive insights to allow decision-makers to anticipate and address issues before they arise.

Moving forward, cloud networks will evolve to leverage connected edge devices, expanding the reach and power of the overall network and allowing for faster surfacing of insights and improved compute performance. For customers not willing to invest in a proprietary analytics system, we expect data science as-a-service to emerge as another viable strategy for small businesses. With all the data being collected and shared to power AI systems, customers will demand an ethical use policy to protect their data, similar to 2016's GDPR in Europe, and customers will begin to separate the hype from reality regarding intelligent technologies.

In the more distant future, we expect researchers to solve the data problem in machine learning. Progress in machine learning on synthetic, sparse, and continuous datasets will enable new applications in a variety of fields including medicine and finance. Workflow automation tools will be replaced by legitimate robotic process automation systems, allowing for more flexible and user-friendly digital assistants. Altogether, AI will become table stakes for all applications and consumer devices, with 80 to 90 percent of new technology incorporating intelligence by 2024.

WHAT WAS INTERESTING IN 2018

AUTOMATION WAS EMBRACED

Automation has long been touted as one of the most prominent benefits from artificial intelligence technology, with the intelligent computer trained to perform repeatable tasks to free up human operators for more complex value-add work. For years, vendors have invested significantly in developing automated capabilities, however customers were at first reticent to entrusting computers with that much operational control. As the quality of these autonomous systems has continued to increase along with awareness of the capabilities and limitations of the technology, this year the enterprise user base bought into automation all the way. With automated data preparation, insight surfacing, report generation, and other automated processes, nontechnical users can now perform advanced data manipulation and analysis that was previously reserved for highly trained data scientists. Nucleus estimates

that companies which take advantage of process automation in a fully mature and connected ecosystem can experience overall productivity gains up to 65 percent.

PREDICTIVE ANALYTICS TECHNOLOGY PROLIFERATED

Across industries and verticals, companies are revamping their data strategy from a reactive model centered around problem resolution to a more proactive approach that uses historical data to predict, identify, and resolve issues before they happen. It makes perfect sense to stop problems before they arise to keep the business running smoothly, and with advances in statistics, machine learning, and computing infrastructure, business leaders this year were finally equipped with the full complement of tools to support this predictive approach. The applications for this technology are diverse and can be both internal and consumer-facing. For example, the products Amazon recommends to users based on their browsing and purchasing history leverages predictive AI to deliver a more intelligent experience to customers. Internally, by tracking sales data by month, a predictive AI can be trained to optimize inventory-on-hand by minimizing storage costs while still ensuring there are always enough units on hand to avoid disrupting the supply chain. As the amount of available data continues to balloon at a staggering rate, predictive AI technology will continue to see rising adoption.

ANALYTICS MET THE CLOUD

In a survey Nucleus carried out this year, we found that over 60 percent of new analytics deployments are hosted on the cloud with that figure projected to increase in later years. Customers are finding that the pre-start costs of hosting their data and performing analytics in the cloud as opposed to using dedicated on-site hardware are dramatically lower. As another benefit of cloud deployments, the technology is managed off-site by the cloud provider, reducing the demand for internal IT support. With the building momentum for real-time analytics and edge computing, cloud networks allow for analytics over the internet without needing to upload the data to a dedicated server. This improves overall time-to-insight and is critical to latency-sensitive applications such as those in manufacturing and medicine. As analytics technology is increasingly embedded in other enterprise applications and customers continue the movement toward suite-based application ecosystems, Nucleus expects cloud hosting for analytics to become a standard practice in industries that prioritize speed and cost over additional data security.

WHAT TO LOOK FOR IN 2019

INTELLIGENT EDGE DEVICES

The era of widespread cloud adoption has ushered in new network structures and computation models, such as edge computing. In that type of environment, the bulk of the network's computation is carried out on distributed nodes (the internet-connected edge devices) instead of in a centralized cloud environment. This year, hardware companies like NVIDIA and Intel, along with digital media giants like Facebook and Amazon, have all announced new computer chips optimized for AI operations. Previously the most advanced machine learning algorithms were generally run on graphical processing units (GPUs), but with infrastructure now purpose-built for AI, the "smart" capabilities of edge devices are certain to improve rapidly. With optimized microchips, processing speeds will be reduced, enabling more complex analytics at the edge. We anticipate the early adopters for this technology will be primarily in the manufacturing sector.

CALLS FOR AN ETHICAL USE POLICY CONCERNING USER DATA AND AI

In the wake of high-profile data breaches and scandals such as the Facebook-Cambridge Analytica affair, consumers are beginning to get wise to how technology companies are collecting and profiting from user data. Data is the fuel that drives the accelerating AI revolution, as modern machine learning algorithms require massive amounts of data to be trained to complete their programmed tasks. Additionally, controversy is building around what jobs an artificially intelligent system can ethically be entrusted with. With regard to regulating what AI can be made to do – the genie is out of the bottle. The prevalence of professionally designed open source software libraries and ease of access to educational materials ensure that the possibilities -- benevolent, neutral, and malevolent -- to a determined developer are virtually endless. However, there is growing momentum for new regulations around data collection and privacy. In the European Union such regulations already exist with the General Data Protection Regulation (GDPR), and in the US, California has followed suit with its California Consumer Privacy Act. These regulations seek to limit the types of data that companies can collect as well as the circumstances under which they can collect them. This year, we expect customers to demand more control of their personal data with GDPR-style legislation likely coming to the United States sooner rather than later. Vendors would do well to get out ahead of this impending legislation and leverage a customer data privacy policy as an avenue for differentiation.

DATA SCIENCE AS-A-SERVICE

Still for some companies, the barriers to entry for advanced analytics are too great due to the high cost of building and supporting the systems or a lack of necessary technical expertise. In years past, these companies – often smaller with limited budgets and fewer (or

no) highly-skilled data science resources – would be left at a massive competitive disadvantage to their competitors that could afford to invest in data science. Now, enabled by advances to cloud networks and AI, some disruptive companies are offering data science as-a-service via the internet. Customers will share their data with these vendors who build models and analyze the data, then returning fitted models and insights to the customer. Often these vendors serve as a partner to customers, with the two groups strategizing and executing a data-driven operating strategy. As this type of business model proliferates, the playing field will be leveled for the smaller businesses operating on leaner budgets. In 2019, as the barriers to entry are lowered for deriving actionable business intelligence from data, companies who don't act to keep pace with the rest of the market will suffer.

AI BECOMES THE NEXT SHINY OBJECT

2018 was the year AI went mainstream riding a wave of public optimism, venture capital dollars, and unbridled marketing hype. In 2019, the market will see a correction as the public becomes more aware of the capabilities and limitations of current AI systems. In light of recent high-profile data breaches and widely publicized failures of autonomous systems like the many accidents involving self-driving cars, customers will realize this year that “smart” technology is still not very smart. As a result, they will have less tolerance for vendors who haphazardly claim to include AI in their products yet fail to deliver real-world value. While there are certainly numerous high-value applications for AI across all industries and verticals and the state of the art continues to rapidly advance with contributions from industry and academia, this year expect the solutions who deliver value to thrive while the pretenders simply looking to cash in on the AI hype will be exposed.

LOOKING AHEAD TO 2024

MACHINE LEARNING ON SUBOPTIMAL DATASETS

At present, the most sophisticated machine learning algorithms require vast stores of data to train models accurately. Naturally then, one of the main obstacles to overcome in the field of machine learning and AI is aggregating, standardizing, and labeling the necessary data. With the rules governing data collection set to tighten, vendors know that to reach the same quality analysis they will need to develop new algorithms to address these challenges. One promising approach employs AI to generate synthetic datasets which can then be combined with limited real data to be analyzed.

Computers are discrete machines that can only approximate continuous time phenomena such as medical records and the price of a financial instrument. Thus, current machine learning approaches to continuous-time problems are intrinsically imperfect. One new approach uses ordinary differential equations to parametrize the neural network layers which

allows for scalable and accurate (to arbitrary numerical precision) model performance on continuous data. With continued research and innovation, by 2024 we expect substantial progress to be made in the area of machine learning with suboptimal data, opening the door for many new applications in medicine, finance, chemistry, and economics, among others.

ROBOTIC PROCESS AUTOMATION

Robotic process automation (RPA) systems will be commonplace. Workflow automation tools have been around for years, but advances in digital image recognition, computing performance, and human-machine confidence will allow RPA systems to achieve widespread adoption. Workflow automation tools require the programmer to build a list of actions and interface to the backend system through an application programming interface (API) to execute them. With RPA, the application watches the user perform actions through the graphical user interface (GUI) and then learns to repeat those tasks via the GUI. These systems are more flexible and can adapt over time to become better-suited at the tasks the user performs most often. It is likely that RPA systems will merge with voice-powered digital assistant technology into one digital robotic assistant. By 2024, people will be so comfortable with computerized automation and so accustomed to AI technology that we anticipate widespread adoption due to the massive potential time savings and convenience benefits.

INTELLIGENCE NEAR-UNIVERSAL IN NEW APPLICATIONS AND TECHNOLOGY

We anticipate that by 2024, 80 to 90 percent of new applications and consumer technology will come with built-in AI capabilities. Already, “smart” appliances like connected thermostats and refrigerators are becoming viable options and adding intelligence to applications to deliver more customized and engaging user experiences is “all the rage” among vendors. With advances to AI-capable hardware and further improvements to AI software, this trend doesn’t look to be slowing any time soon. Vendors who can demonstrate superiority handling private user data will be at an advantage as companies race to create the next hit “smart” app or product.