

Market Share

Worldwide Artificial Intelligence Software Platforms Market Shares, 2018: Steady Growth – Moving Toward Production

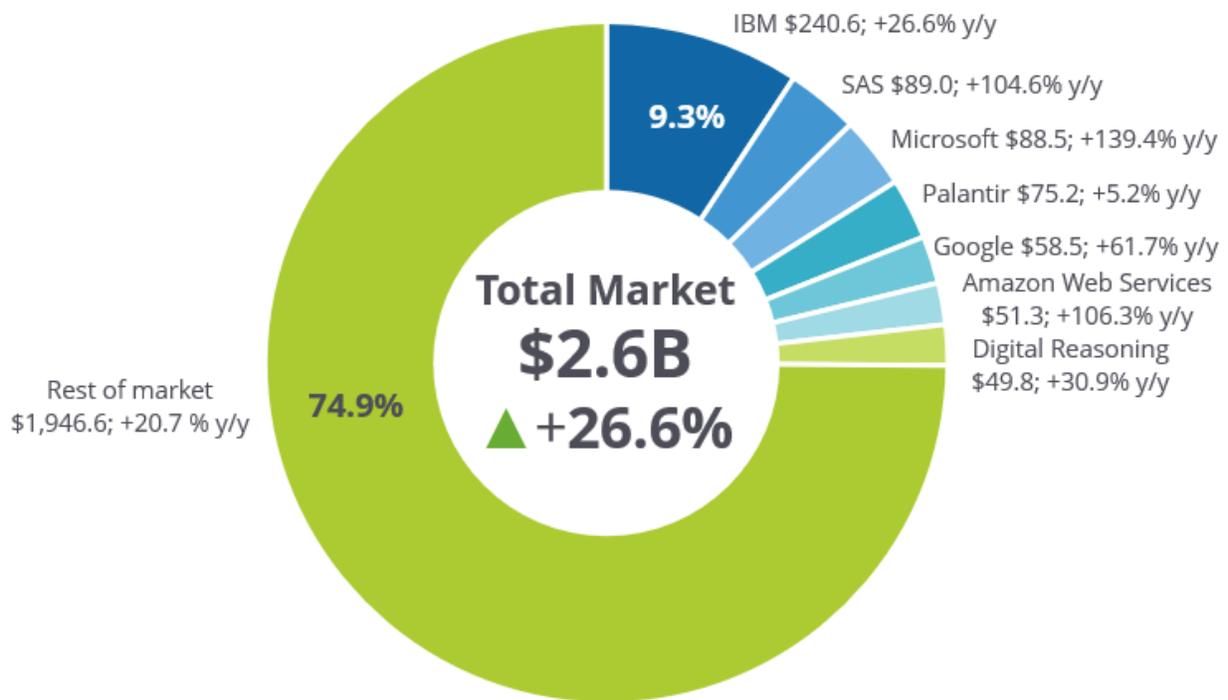
David Schubmehl

THIS IDC MARKET SHARE EXCERPT FEATURES IBM

IDC MARKET SHARE FIGURE

FIGURE 1

Worldwide AI Software Platforms 2018 Share Snapshot



Note: 2018 Share (%), Revenue (\$M), and Growth (%)

Source: IDC, 2019

IN THIS EXCERPT

The content for this excerpt was taken directly from IDC Market Share: Worldwide Artificial Intelligence Software Platforms Market Shares, 2018: Steady Growth – Moving Toward Production (Doc # US45262419). All or parts of the following sections are included in this excerpt: Executive Summary, Market Share, Who Shaped the Year, Market Context, Appendix and Learn More. Also included is Figure 1, 2, 3, 4, 5 and Table 1.

EXECUTIVE SUMMARY

The artificial intelligence (AI) software platforms market experienced steady growth in 2018, growing 26.6% to \$2.6 billion. Growth in this market continues to be driven by increases in general-purpose AI software platforms and conversational AI software platforms being used to develop predictive and prescriptive applications that offer advice and recommendations as well as digital assistants and conversational user interfaces. The artificial intelligence software platforms market is focused on tools and API frameworks for applications and technologies based on artificial intelligence and machine learning (ML) using both structured and unstructured data to drive these applications.

The continued growth rate in 2018 was due to organizations moving from experimentation to production with digital and conversational assistance, recommendation systems, and prediction systems as well as increases in use cases ranging from predictive maintenance and digital twins to business process automation using deep learning and machine learning. These tools and platforms offer a range of capabilities from deep learning and other forms of machine learning to natural language processing and generation, image/video processing, and speech recognition as well as semantically enabled knowledge extraction technologies including knowledge graphs and reasoning systems. Factors that influenced market growth in 2018 include:

- Computer vision, speech recognition, and other user interaction technologies continue to mature.
- The number of applications using conversational AI technologies continued to increase, and the development of chatbots and other types of conversational interfaces continued to be one of the most popular forms of AI in production.
- Open source deep learning and machine learning APIs and toolsets continued to expand and proliferate throughout enterprises.
- Organizations continued to develop solutions and applications based on deep learning and machine learning capabilities that either improve existing applications or have been breaking new ground with completely new types of applications.

This IDC study presents a view of worldwide AI software platforms revenue broken down by vendor for the historical year 2018.

"The artificial intelligence software platforms market experienced steady growth in 2018, with revenue of \$2.6 billion and a growth rate of 26.6%," says David Schubmehl, research director, Cognitive/Artificial Intelligence Systems, IDC. "IDC is seeing that in 2018 organizations have been moving from experimentation to production with the use of AI applications within their business processes. The AI software platforms market is seeing growth in providing the tools and capabilities that organizations are using to develop these applications. IDC expects to see this trend to continue, even though open source platforms and technologies are also seeing growth in this market."

ADVICE FOR TECHNOLOGY SUPPLIERS

The market opportunity for AI software platform vendors continues to evolve. IDC is seeing that AI software platform vendors should continue to make their tools and platforms easy to develop, easy to use, and easy to scale. Over the past year, we have seen that vendors are addressing these needs by announcing/offering suites of tools and APIs, such as Google's AI Hub, Amazon's SageMaker, and Microsoft Azure Machine Learning Studio and MLOps, that help enterprise developers create AI-enabled applications more easily than ever before. These tools are providing the capabilities for enterprises to create applications that do product recommendation, pricing optimization, predictive maintenance, financial advice, and a whole host of other use cases. We're also seeing that vendors are beginning to offer a range of deployment options for both development and production. Cloud, hybrid, and container approaches to packaging and using these tools and platforms demonstrate that end users want flexibility for both development and production.

At the same time, concerns are growing in user communities about trust and ethics in AI applications. Organizations want to know that the recommendations and predictions being made by AI applications aren't biased and can be explained to end users and customers if they question the outcomes. Several vendors (including start-ups) are beginning to offer what IDC calls "explainable AI," where the rationale and reasons for why a particular outcome was suggested or predicted occurred. In addition, products like IBM's OpenScale help monitor AI/ML applications in production, letting IT know whether potentially biased results are being generated. Tools and capabilities like these will help organizations and end users feel more comfortable with the deployment and operation of AI applications.

Another trend that IDC is observing is the creation of AutoML and other low-code/no-code AI tools for jobs such as automatic translation, image recognition and classification, speech recognition, machine transcription, machine learning-based text analytics, and a host of other functions. These tools can be simply plugged into an application, providing the capabilities of an AI-enabled function without the need for extensive training or development. This trend is especially useful for organizations that have business analysts or traditional developers on staff but may not have many, if any, data scientists trained in developing advanced neural network models. In some sense, this is democratization of AI, making it available for an ever-wider group of developers and business users.

Vendors are also beginning to accommodate the inclusion of open source deep learning and machine learning frameworks that are proliferating in the market today (refer to Figure 2). Many organizations are using these tools and languages, such as Google's TensorFlow, Caffe, Python, and R, to develop their own deep learning/machine learning applications. However, these frameworks often need additional capabilities and technologies that aren't currently offered through open source means and we're seeing several commercial AI software platforms provide capabilities for including these open source technologies as part of their development options. As IDC has noted earlier, those vendors that can successfully mix and match open source with proprietary technologies and offer them at a reasonable cost will be the winners in this market in the long run.

MARKET SHARE

Table 1 displays 2016-2018 worldwide revenue and 2018 growth and market share for artificial intelligence software platforms.

TABLE 1**Worldwide AI Software Platforms Revenue by Vendor, 2016-2018 (\$M)**

	2016	2017	2018	2018 Share (%)	2017-2018 Growth (%)
IBM	161.0	190.0	240.6	9.3	26.6
SAS	10.0	43.5	89.0	3.4	104.6
Microsoft	12.7	36.9	88.5	3.4	139.4
Palantir	63.4	71.5	75.2	2.9	5.2
Google	25.8	36.2	58.5	2.3	61.7
Other	1,345.1	1,676.0	2,047.8	78.8	22.2
Total	1,618.0	2,054.1	2,599.4	100.0	26.6

Source: IDC's Worldwide Semiannual Software Tracker, April 2019

WHO SHAPED THE YEAR

This Excerpt was prepared for IBM but also included the following vendors: SAS, Microsoft, Palantir, Google, and others.

In 2018, the AI software platforms market was made up of several large vendors providing market offerings in the cloud and on-premises as well as numerous start-ups and other companies jumping into the AI software platforms market. These vendors include SAS, Palantir, IBM, Microsoft, Google, and Amazon as well as vendors such as Wipro, EdgeVerve, Nuance, SAP, and OpenText. In addition, several smaller vendors such as CognitiveScale, IPsoft, and Expert System have been continuing to grow and make their presence known in the market. There have also been several acquisitions by companies such as Verint and LogMeIn, adding AI software platforms to their portfolio of projects.

Several key themes were reinforced throughout the year, in the form of product announcements and initiatives, as well as acquisitions. Specific themes and a selection of vendor examples are:

- IBM's 2018 revenue grew 26.6% to \$240.6 million from \$190 million in 2017. In 2018, IBM released software tools that automatically detect bias and explains how AI makes decisions. In addition, IBM made available to the open source community the AI Fairness 360 toolkit – a library of novel algorithms, code, and tutorials that will give academics, researchers, and data scientists tools and knowledge to integrate bias detection as they build and deploy machine learning models. In 2018, IBM also introduced new Watson solutions and services pretrained for a variety of industries and professions including agriculture, customer service, human resources, supply chain, manufacturing, building management, automotive, marketing, and advertising.

MARKET CONTEXT

IDC is seeing several factors driving the growth of revenue in the AI software platforms market. These include:

- Machine learning/deep learning is a key component of most AI applications. Improvements in the variety, efficiency, and reliability of machine learning will make these systems more usable and stable and help increase their popularity. New types of learning, such as reinforcement learning and generative adversarial networks (GANs), are also creating opportunities to add AI in even more diverse settings than exists today.
- Digitization of everything and the increase in the number of data producers are driving greater demand in data capture, management, and analysis software. IoT, consumer behavior tracking, and risk management requirements are some of the biggest factors contributing to this market driver. The greater variety of data also means more sources of data are located on-premises and in the cloud, leading to additional silos of information.

However, on the downside, there are also inhibiting factors. These include:

- Open source AI software platforms and toolsets such as TensorFlow, Python, and R will continue to be broadly adopted. IDC expects that open source components will continue to represent the core of many AI-enabled applications. In turn, IDC believes that open source options will continue to push down prices of AI software platforms and tools. This trend is also likely to accelerate transition from on-premises to differentiated cloud solutions that compete on added value above the functionality of core components. Figure 2 shows a recent survey highlighting some of the most popular open source frameworks and tools.
- IT employment, now at more than 35 million, continues to grow by a factor of 1.3 worldwide. This is a constraint in an industry growing by a factor of 1.1 in terms of spending but by more than 2 by devices managed, 5 by information created, and 8 by networked interactions between customers. IDC views this as a long-term structural constraint that will inhibit growth to some degree, although a growing skilled workforce in emerging markets will help bridge the gap between supply and demand. The availability and skill level of talent have a direct impact on the AI software platforms market, especially the development of AI applications and solutions. The lack of data science talent as well as AI/ML developers will inhibit growth of the AI software platforms market and will also spur development of more AutoML technologies and other low-code/no-code alternatives.

Figure 3 shows AI software platform revenue by current and constant currency.

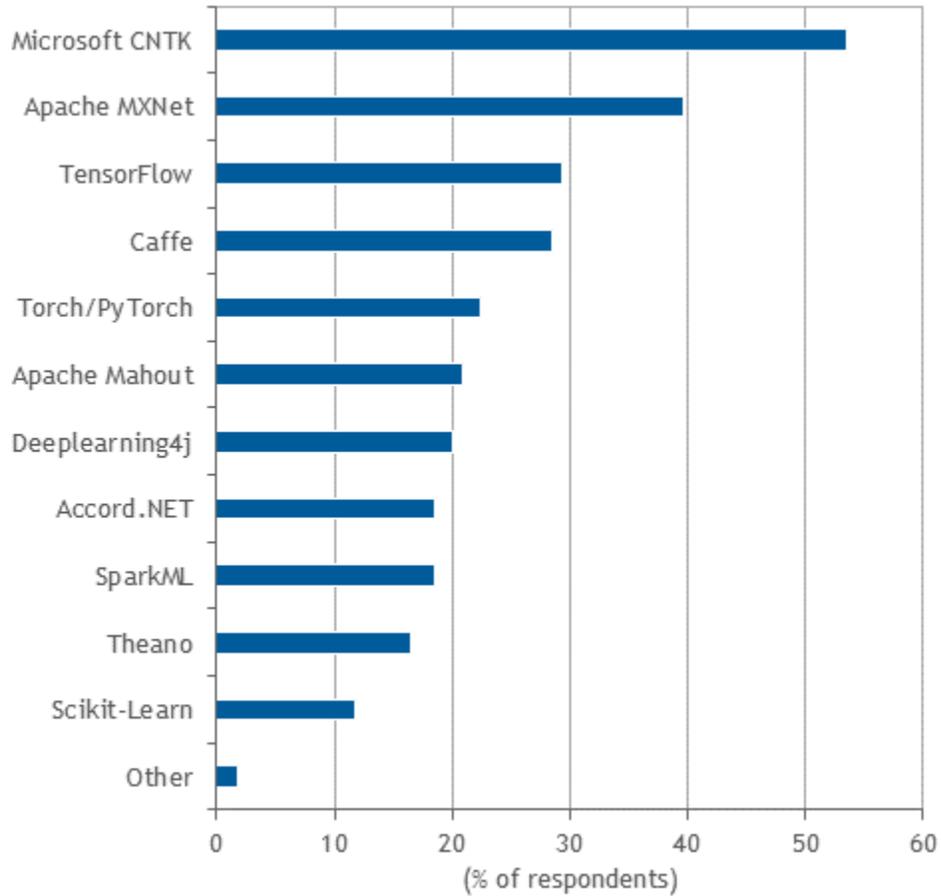
Figure 4 shows AI software platform revenue by region.

Figure 5 shows AI software platform revenue by deployment type.

FIGURE 2

Types of Machine Learning Frameworks Organizations Are Actively Working With

Q. Which of the following types of machine learning frameworks are you actively working with?



n = 340

Base = respondents are actively working with machine learning frameworks

Notes:

Managed by IDC's quantitative research group.

Data is not weighted.

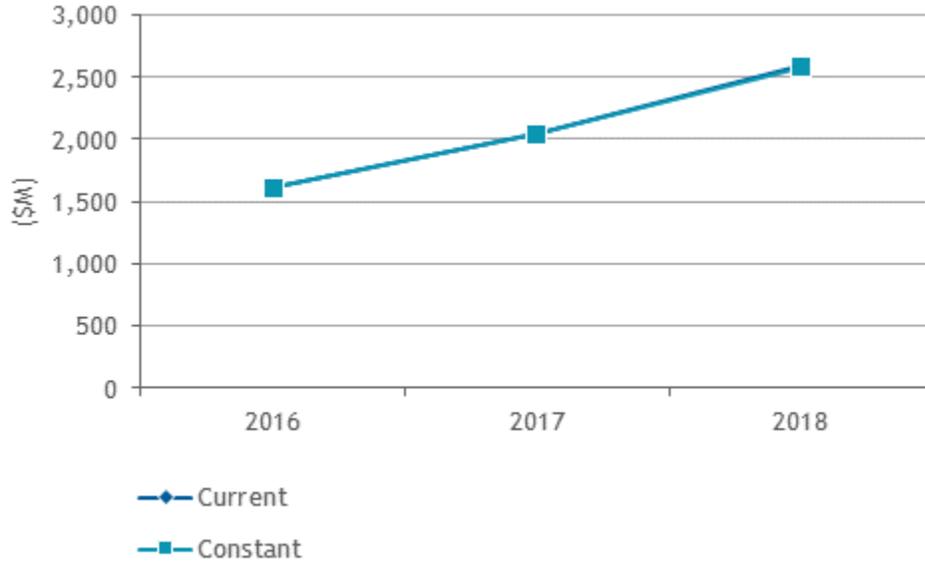
Use caution when interpreting small sample sizes.

Multiple responses were allowed.

Source: IDC's *AI Software Platform Adoption Survey*, February 2019

FIGURE 3

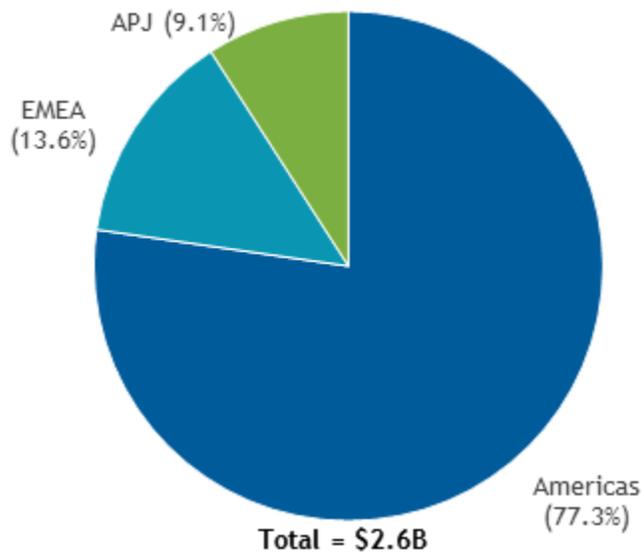
Worldwide AI Software Platforms Revenue in Current and Constant Currency, 2016-2018



Source: IDC's Worldwide Semiannual Software Tracker, April 2019

FIGURE 4

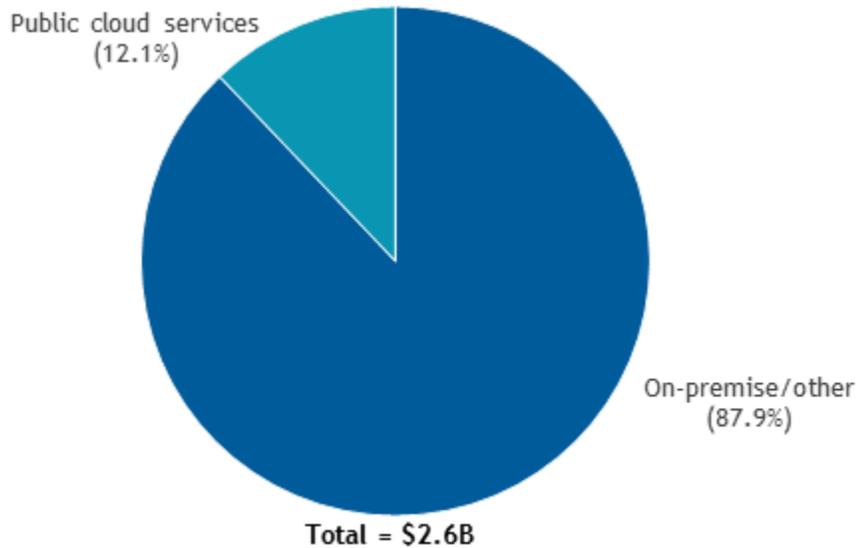
Worldwide AI Software Platforms by Region, 2018



Source: IDC's Worldwide Semiannual Software Tracker, April 2019

FIGURE 5

Worldwide AI Software Platforms by Deployment Type, 2018



Source: IDC's Worldwide Semiannual Software Tracker, April 2019

Significant Market Developments

Over the past year, several trends have begun to exert pressures and changes on the market for AI software platforms. These overall trends include the following:

- **AI in production and AI at the edge:** In most forms of AI applications, there is a training stage for machine learning and deep learning models and an inferencing stage. First, a model is trained to a certain level of perfection, and then it is being used to draw conclusions on incoming data. This training and inferencing back and forth is spreading from workstations to on-premises servers to cloud servers to endpoint devices and systems.

Endpoint devices and systems include any devices with some amount of compute that are stationary or mobile (handheld terminals, cell phones, wearables, switches, drones, TVs, planes, surveillance cameras, self-driving vehicles, smart buildings, etc.). Increasingly, these devices run AI algorithms to deliver more intelligent insights for their own operation or for impacting other connected devices, and they do so using ever-larger data volumes. In other words, while the AI algorithms may have been developed and trained on workstations or servers, the endpoint devices are running them to perform inferencing, increasingly in real time. IDC predicts that by 2022, 25% of all endpoint devices and systems will run AI algorithms.

- **The emergence of conversational interfaces and digital assistance and automation:** The market for intelligent conversational assistance is growing rapidly, fueled by the use and acceptance of consumer tools such as Google Assistant, Apple Siri, Microsoft Cortana, and Amazon Alexa as well as new products from other IT vendors. At the same time, IDC is seeing that process automation based on robotic process automation (RPA) technology is being utilized more frequently to streamline and replace repetitive manual tasks. Furthermore, advances in incorporation of AI capabilities into RPA software are driving the emergence of a

new generation of intelligent process automation (IPA) solutions that rely less on human-generated rules and more on self-learning AI models.

As the availability of voice, tactile, and gestural interfaces for consumer and enterprise use increases, the need for traditional screen-based interfaces will continue to decrease. At the same time, as AI-based process automation proliferates, the current automation of individual tasks will expand to the automation of activities composed of multiple tasks and from there to the automation of end-to-end processes composed of multiple activities. This evolution of AI-based automation will eliminate the need for whole series of current screen-based interfaces by eliminating the need for human eyes and figures to interact with the associated application.

- **Data shortages and the emergence of synthetic data:** One of the largest challenges that face builders of machine learning and deep learning models is where to get enough quantities of good, unbiased, and high-quality data to train their models. Where do you get this specialized training data, especially if you're a small to medium-sized organization with only a limited amount of first-party data. But this issue also affects large enterprises.

Several companies have addressed this problem by using AI to help AI – they have created AI-based simulation environments. The synthetic data created by these simulated environments is being used to train more models and provide a broad range of situations that the model would be unlikely to see in the real world. IDC expects that these types of simulation environments will create more data over time, and this data will become available as part of commercial data sets in data marketplaces. Video game manufacturers are already using this technique to create smarter and more effective computer-generated players in major role-playing games. Companies involved in developing autonomous vehicles are doing the same, and other examples continue to emerge.

Effects on AI Software Platform Providers

The aforementioned three macro trends that began to show themselves in 2017 and 2018 will spawn new capabilities among the AI software platform providers in 2019. IDC expects to see more capabilities for operating deep learning and machine learning models at the edge; more emphasis on reinforcement learning, which requires less data; more focus on capabilities for building conversational interfaces and digital assistance tools; and more simulation capabilities for generating synthetic data. These capabilities will expand and extend the use of AI and deep learning further across enterprises.

MARKET DEFINITION

Artificial intelligence software platforms provide the functionality to analyze, organize, access, and provide advisory services based on a range of structured and unstructured information. These platforms facilitate the development of intelligent, advisory, and AI-enabled applications, including intelligent assistants that may mimic human cognitive abilities. The technology components of AI software platforms include text analytics, rich media analytics (such as audio, video, and image), tagging, searching, machine learning, categorization, clustering, hypothesis generation, question answering, visualization, filtering, alerting, and navigation.

These platforms typically include knowledge representation tools such as knowledge graphs, triple stores, or other types of NoSQL data stores. These platforms also provide for knowledge curation and continuous automatic learning based on tracking past experiences. When these individual technology components are sold standalone, they are accounted for in other software functional markets such as content analytics and search, advanced and predictive analytics, and nonrelational database management systems (NDBMSs).

RELATED RESEARCH

- *Worldwide Artificial Intelligence Software Platforms Forecast, 2019-2023* (IDC #US44170119, June 2019)
- *Worldwide Semiannual Software Tracker Methodology, 2H18* (IDC #US44834819, April 2019)
- *IDC's Forecast Scenario Assumptions for the ICT Markets and Historical Market Values and Exchange Rates, 4Q18* (IDC #US43652019, April 2019)
- *IDC's Worldwide Artificial Intelligence Taxonomy, 2019* (IDC #US45013419, April 2019)
- *IDC's Worldwide Software Taxonomy, 2018: Update* (IDC #US44835319, February 2019)
- *IDC Market Glance: Artificial Intelligence, 1Q19* (IDC #US44808719, February 2019)
- *IDC FutureScape: Worldwide Analytics and Artificial Intelligence 2019 Predictions* (IDC #US44389418, October 2018)
- *Market Analysis Perspective: Worldwide AI Software Platforms and Components, 2018* (IDC #US43583418, September 2018)
- *Worldwide Cognitive/AI Software Platforms Market Shares, 2017: Significant Growth Continues* (IDC #US44013718, June 2018)

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