Competitive Landscape: Cloud Providers Artificial Intelligence Services

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Initiatives: Technology Market Essentials

Democratization of technologies is extending the cloud-based AI services competition approach from technology-centric to solution-oriented. Technology and service providers must support both professional developers and business users to compete in the AI services market.

Overview

Key Findings

- Hyperscale cloud providers — such as Alibaba Cloud, AWS, Baidu, Google, IBM, Microsoft and Tencent — compete on the speed of AI services adoption by lowering the level of expertise required through low-code/no-code development technologies and custom-made packages.
- Responsible and explainable AI are increasingly becoming important to gain customers' trust, with hyperscale cloud providers competing on these as their differentiated value.
- Hyperscale cloud providers are scaling their influence on cloud-based AI services by expanding their partner ecosystem and improving the access to diverse types of customers.

Recommendations

Technology and service providers competing in the cloud provider AI services market should:

- Optimize their AI services product portfolio and improve the speed of business value realization by partnering with specialists who provide industrial/business domain expertise, data and solution.

- Strengthen responsible AI by collaborating with vendors that not only provide safety and governance of AI services but also give visibility into how a model arrived at a particular decision.
- Select hyperscale vendors that have a strong developer community and partner ecosystem by assessing their openness and interoperability support with third-party solutions.

Analysis

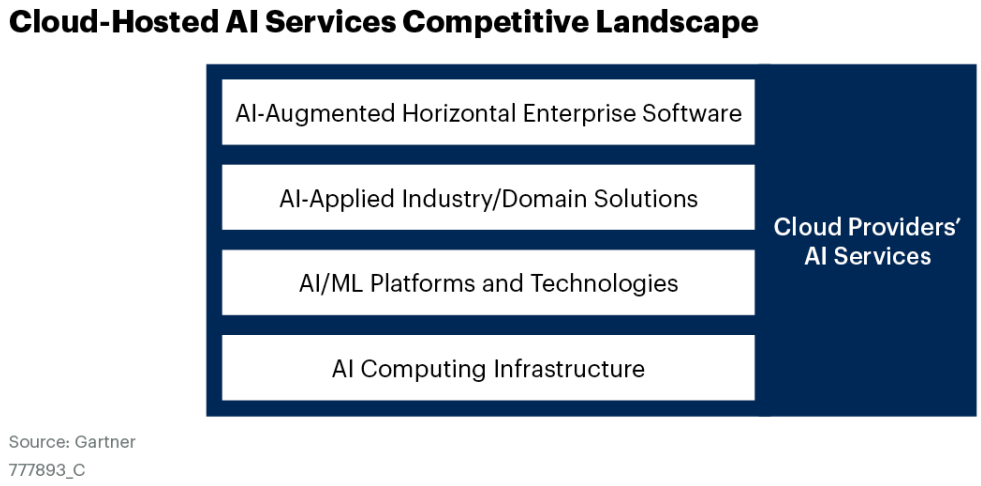
Cloud-Based AI Services Definition and Description

The total AI software market is expected to reach $134.8 billion in 2025, growing at a 29.2% CAGR from 2022 through 2025 (see Measuring the Opportunity in the AI Software Market). According to findings from the 2023 Gartner CIO and Technology Executive Survey, distributed cloud and artificial intelligence/machine learning remain the top technologies that enterprises plan to deploy within the next three years. [1]

Cloud-based AI services are cloud-hosted or containerized services that enable development teams and business users (who are not data scientists) to use AI models via APIs, software development kits (SDKs) or low-code and no-code applications. The cloud provider AI services market is dynamically evolving not only in terms of the technologies but also the broad spectrum of cloud-based AI services that serve different types of users and purposes.

Cloud-based AI service providers in the market are competing for faster democratization of AI capabilities through a wide range of products and services — from AI technologies, data science and machine learning (DSML) platforms, to AI-applied industry/domain solutions and AI-augmented horizontal software. All AI services are supported by purpose-built computing infrastructure for optimized performance (see Figure 1).

Figure 1: Cloud-Hosted AI Services



The market is served by five major types of providers that address either one or multiple types of services, based on their specialty and focus areas. These providers include:

- **Hyperscale cloud providers** cover the most comprehensive range of AI services and have the competitive advantages of hyperscale cloud computing infrastructure services specialized in supporting AI services for best performance. The major providers include Amazon Web Services (AWS), Google, IBM and Microsoft for the global market, and Alibaba Cloud, Baidu and Tencent primarily focused on China.
- **DSML platform providers** focus on end-to-end DSML platforms that support public, hybrid, private, on-premises or multicloud. Examples of vendors include Databricks, Dataiku, DataRobot, MathWorks, SAS Institute and H2O.ai.
- **AI technology vendors** focus on computer vision, natural language technologies or other core AI technologies, such as foundation models and generative AI. Examples include Cognigy, boost.ai, NVIDIA and OpenAI. This category of vendors is dominated by many AI startups, competing with expertise in a niche area or highly integrated solutions for one special domain.
- **Industry and domain platform providers** offer AI-applied domain solutions for a specific industry or business. Examples include GE Digital, Hitachi, PTC and Siemens.
- **Enterprise software vendors** focus on AI-augmented horizontal software and applications. Examples include Oracle, Salesforce and SAS.

In this research, however, we will focus on hyperscale cloud providers, as they have the most comprehensive cloud-based AI services product portfolio to help data scientists and business users expedite AI projects. This research is an update to Competitive Landscape: Cloud Providers Artificial Intelligence Services, Worldwide published in March 2021, and reflects the market dynamics and the impact of economic issues, scalability of AI solutions, multicloud support and the adoption of low-code/no-code platforms to support multiuser personas.

Competitive Situation and Trends

Hyperscale cloud providers compete in the market by leveraging their considerable resources, such as AI capabilities, geographic reach, data availability, R&D and capital investments. Each vendor offers different value propositions that help AI services users:

- Decrease engineering effort by using low-code/no-code development technologies.
- Realize business value faster by providing custom-made packed solutions as per user requirements.
- Support openness and interoperability with third-party solutions and services.
- Improve risk and fairness of AI tools by leveraging responsible AI to gain customers' trust.
- Build a partner ecosystem and developer community to access diverse types of customers.

Table 1 lists seven hyperscale vendors, their major AI services and geographic coverage.

Table 1: Top Hyperscale Cloud Providers for AI Services, Worldwide

(Enlarged table in Appendix)

Hyperscale Cloud Provider	Major Cloud AI Services	Geographic Coverage
Alibaba Cloud	▪ PAI platform for data science and machine learning ▪ DAMO Academy Tongyi foundation models ▪ AIRec and OpenSearch ▪ Vision AI, NLP, Intelligent Speech Interaction ▪ Digital Human, smart customer services	China Focus
Amazon Web Services	▪ Amazon SageMaker ML services ▪ AWS AI services such as Amazon Kendra ▪ Amazon CodeGuru, Amazon Polly, Amazon Rekognition, Amazon Monitron, Amazon Transcribe and Amazon Personalize	Worldwide
Baidu	▪ Cloud and intelligence integrated AI services ▪ Baidu Brain — a library of modularized custom solutions for industries ▪ EasyDL — AI PaaS for no-code development platform ▪ PaddlePaddle — open-source DL platform	China Focus
Google	▪ Vertex AI platform (includes notebooks, training, prediction, MLOps) ▪ BigQuery ML, Vertex AI pretrained models, Vertex AI Vision ▪ Contact Center AI, Document AI, Product Discovery, Healthcare Insights AI	Worldwide
IBM	▪ Watson AI services (such as Watson NLP, Watson NLU, Watson Text to Speech and Speech to Text, Watson Discovery, Watson Assistant and Watson Studio AutoAI) ▪ Maximo Visual Inspection, Cloud Paks	Worldwide
Microsoft	▪ Azure Applied AI Services such as Form Recognizer, Bot Service ▪ Azure Cognitive Services such as Vision, Speech, Language, and Open AI Services ▪ Azure Machine Learning ▪ AI Builder in Power Platform	Worldwide
Tencent	▪ Tencent Intelligence (TI) Platform (includes TI ONE, TI DataTruth, TI Matrix, TI Elastic Model Services)	China Focus

Source: Gartner (March 2023)

Realize Value in Speed and Scale With Democratization and Operationalization of AI

According to the 2023 Gartner CIO and Technology Executive Survey, “growth” and “cost optimization” will be the most common enterprise priorities through 2023. [1] To accelerate solution adoption and business value realization, hyperscale cloud providers compete on the speed of democratization of cloud AI technologies by lowering the requirements for level of expertise, increasing the level of integrations for the purpose of using and operationalizing AI.

Decreasing Customers’ Engineering Efforts and Expertise Requirements by Using Low-Code/No-Code Development Technologies

Vendors in the AI services market are competing against each other by lowering the level of expertise requirements and supporting multiuser personas including data scientists, professional and citizen developers as well as business users. Hyperscale cloud vendors treat low-code/no-code technologies as key differentiators for compelling user experiences to gain target users' adoption. For example, IBM provides low-code and coded development assets to enable developers and subject matter experts to rapidly, and collaboratively, build solutions. Similarly, Google's AutoML and BigQuery ML allow developers to easily create custom models with a no-code/low-code experience. Microsoft's AI Builder, on the other hand, provides no-code experience within the Power Platform to business users to easily build custom models tailored to their needs, such as detecting products in an image or detecting sentiment in text-based data.

Realizing Value at Speed by Increasing Custom-Made Packaged Solutions

Hyperscale cloud vendors increase the level of integration with custom-made AI services and packaged solutions for specific industries/domains to support customers in realizing business value faster. For example, Google Cloud's Vertex AI provides a variety of prebuilt AI solutions targeting industry-specific use cases, such as Contact Center AI and Healthcare Insights AI. AWS also invests in specialized solutions in many areas such as Amazon Comprehend Medical and Amazon HealthLake for healthcare. Microsoft Azure Applied AI Services provide prebuilt and customizable AI models with specialized data ingestion and scenario-specific business logic to accelerate time to solutions. Alibaba Cloud's AI middleware includes customized algorithms, pretrained models and domain data for specific use cases. Tencent also offers custom AI solutions for industrial and business domains such as media AI, industrial inspection, education and government.

Improving the Operationalization of AI Solutions by Supporting Openness and Interoperability With Third-Party Solutions and Services

By the end of 2024, 75% of enterprises will shift from piloting to operationalizing AI, accelerating AI deployment. [2] The increasing complexity of operationalizing AI requires cloud providers' support for multicloud, open-source framework, integration with third-party solutions and operating in a services-based architecture. This is to not only operationalize AI solutions faster but also prevent the risk of being locked in adding cost for scalable growth. The competition for hyperscale cloud providers is around making it easy and flexible for developers to operationalize AI solutions, not only within the providers' own platform but to also support integration with third-party services. Some hyperscale cloud providers offer open DL platforms such as Google's TensorFlow and Baidu's PaddlePaddle.

Gain Customers' Trust With Responsible AI

Responsible AI is an effective demonstration of the commitment to consistent quality of service and risk mitigation for customers' investment. The awareness and success of responsible AI tools are rapidly increasing. Many organizations are already exploring certain responsible AI capabilities such as bias mitigation/fairness, explainability, trust/transparency and privacy/regulatory compliance.

Explainable AI is a critical component of responsible AI that gives visibility into how a model arrived at a particular decision. This helps in building trust, confidence and understanding in AI systems. In highly regulated sectors such as insurance or banking, regulations directly or indirectly mandate the need for model explainability to properly manage model risk.

Hyperscale cloud providers not only focus on AI explainability but also social ethics such as fairness, bias, privacy and security. For example, AWS's AI Service Cards for Amazon Rekognition, Amazon Textract and Amazon Transcribe centralize model detail to mitigate bias in data and enable developers to build responsibly. Google also has a series of responsible AI tools — such as ML-fairness-gym, Model Cards, Know Your Data and Fairness Indicators — for mitigating fairness and bias issues and improving models' transparency and explainability. IBM's responsible AI includes FactSheets to automatically document model lineage and metadata as well as industry algorithms to ensure fair, explainable and drift-free AI models. Microsoft's Fairlearn empowers AI developers to assess their systems' fairness and mitigate any negative impacts for groups of people, such as those defined in terms of race, gender, age or disability status. Chinese vendors are also increasing focus on ethical governance and explainable AI, such as Alibaba Cloud's AI governance and Tencent's age/audience content moderation.

Build and Expand Partnership and Developer Community to Scale Competitiveness

Building partnership and developer community are two key go-to-market strategies for all AI technology and service providers, but particularly for hyperscale cloud providers who compete on influence through partner ecosystems and access to diverse types of customers. These partners are critical in supporting hyperscale providers deliver a wide range of specialized industrial and business domain AI services and solutions at speed. There are several partnership programs cloud providers compete through:

- **Partnership with technology and service providers for value-added solutions** — Such partnerships accelerate the process of solving complex or niche business problems for diverse use cases. These types of partners include enterprise application vendors, consulting service providers, systems integrators (SIs), independent software vendors (ISVs) or AI startups. For example, Microsoft's Azure Analytics and AI Accelerate Program (AAAP) helps partners bring AI solutions and capabilities to the market faster.
- **Partnership with growing developer community ecosystem** — Providers offer training, certification and specialist support to attract and influence developers, as developers are often the key stakeholders in vendor selection. For example, Microsoft offers free online Azure AI courses and free certification tests once developers complete the training courses. Tencent AI Cloud Community provides developers a platform for technical discussion and support.
- **Customer advocacy programs** — Building advocacy programs with end customers helps gather successful customer case references. For example, Lowe's uses Google's Vertex AI Forecast to create accurate hierarchical models that maintain balance between SKU and store-level forecast at more than 1,700 stores. [3]

Competitive Profiles

This research analyzes how vendors compete and is not intended to rate, score or rank vendors in a quantified way. The following seven cloud providers for AI services were selected as representative competitive profiles based on the complete spectrum of cloud-based AI services and geographic coverages. Of these seven vendors, four serve globally, while three primarily target China due to market uniqueness.

Alibaba Cloud

Product or Portfolio Overview

Alibaba Cloud's AI services comprise four stacks:

- **DSML platforms:** Supported by Alibaba Cloud's Big Data Platform and large-scale pretrained models such as AliceMind, which is Alibaba Cloud's large-scale pretrained language model
- **AI technologies:** Such as speech, conversational AI, NLP, computer vision, data mining and AutoML
- **AI-applied industrial/domain solutions:** Alibaba Cloud AI and Data Intelligence, an all-in-one cloud-native group of industrial AI solutions for industries such as finance, education, transportation and retail
- **Infrastructure capabilities:** Such as Graphics processing units (GPUs), field-programmable gate arrays (FPGAs) and custom application-specific integrated circuits (ASICs)

How Alibaba Cloud Competes

Competitive Differentiation:

- Large amounts of China-specific domain data across industries and business domains, through integration with its Big Data Platform
- E-commerce, intelligent recommendation algorithms on its Tmall homepage and Taobao mobile app
- Strong local language support for its second-largest market, Southeast Asia

Value Proposition:

- The large amount of data that serves to improve the quality of its AI models (for example, Alibaba Cloud's machine translation translates up to 1.2 trillion characters per day)
- Domain expertise and data backed up by the internal use of AI services for e-commerce and mobile finance business supporting more than 5,000 enterprise customers globally

AI Investment:

- Aggressively investing in its AI capabilities with a $15 billion investment in its DAMO Academy, a $1.4 billion investment in its AI system for smart speakers, as well as in research areas that focus on data intelligence, IoT, human-machine interaction and quantum computing
- Offers a free hosting platform, ModelScope, with hundreds of proprietary models developed by Alibaba Cloud DAMO Academy for developers from smaller companies and research institutes to develop their own AI models on Alibaba Cloud

Amazon Web Services

Product or Portfolio Overview

AWS's AI services comprise four stacks:

- **DSML platforms:** Such as Amazon SageMaker Canvas, SageMaker Studio Lab, SageMaker Studio and SageMaker MLOps to help business analysts, data scientists and developers build, train and deploy ML models at scale; ML frameworks include TensorFlow, PyTorch, Apache MXNet, AWS Deep Learning AMIs and containers
- **AI technologies:** Amazon Lookout for Vision, AWS Panorama, Amazon Textract, Amazon Augmented AI, Amazon CodeWhisperer, Amazon Comprehend, Amazon Forecast, Amazon Fraud Detector, Amazon HealthLake, Amazon Lex, Amazon Lookout for Equipment, Amazon Lookout for Metrics, Amazon Omics and Amazon Translate
- **AI-applied industrial/domain solutions:** Provide automated model building for industries such as healthcare, and domains such as business process, search, code and DevOps
- **Infrastructure capabilities:** Such as ML-enabled silicon, including AWS Trainium, AWS Inferentia, Habana Labs and FPGAs

How AWS Competes

Competitive Differentiation:

- Emphasis on reduced upfront cost with a free tier available and faster production time, with a comprehensive AI/ML solutions library

- Strong online retail presence with AI services such as Amazon Kendra for intelligent search, Amazon Personalize for personalization and Amazon Fraud Detector for detecting online fraud, as well as solutions like the Predictive User Engagement and Maintaining Personalized Experiences with ML
- AI Use Case Explorer, which gives developers a highly targeted look at how others are building solutions for AI use cases to address similar issues or challenges
- AWS Marketplace, a one-stop shop for builders to find and implement reference architectures that meet standards for highly regulated industries

Value Proposition:

- Custom AI solutions for industries and business domains, such as for healthcare, manufacturing, retail, media and entertainment (M&E), DevOps and AdTech
- AI democratization with a full suite of AI services, such as Amazon SageMaker Canvas (helps ease onboarding and proliferate ML usage), Amazon SageMaker JumpStart (provides a centralized hub with built-in algorithms, foundation models, and prebuilt ML solutions that one can deploy with just a few clicks) and Amazon CodeWhisperer (helps create a low-code environment for novice developers to build ML-enabled applications)

AI Investment:

- Investing in enterprise business applications and productivity apps that use embedded AI capabilities such as AWS Supply Chain
- Invested in education efforts, including Machine Learning University, AWS DeepRacer and AWS Partner Training

Baidu

Product or Portfolio Overview

Baidu's AI service product strategy is to unite Baidu AI Cloud with integrated cloud intelligence from chips, frameworks, ML models and applications to industry solutions. Its AI services comprise four stacks:

- **DSML platforms:** Baidu's AI PaaS includes EasyDL (no-code development platform including voice, text, image, video, OCR and translation models), and AI full life cycle development platform BML (data management, model development and deployment); PaddlePaddle — Baidu's open-source platform for deep learning framework — includes model library, end-to-end development toolkits and AI Studio (courses and community)
- **AI technologies:** Services include speech (ASR, TTS), vision (face recognition, ORC, video, image), AR/VR, as well as language and knowledge (text analytics, content generation, machine translation, knowledge graphs)
- **AI-applied industrial/domain solutions:** Baidu Brain, a library of modularized custom solutions for specific industries such as government, manufacturing, smart cities and healthcare
- **Infrastructure capabilities:** GPUs, FPGAs and custom ASICs

How Baidu Competes

Competitive Differentiation:

- Core business competence, such as search engine, internet information platform and cloud services
- Breadth and depth of industries and business domain solutions, and integration with data analytics, data integration, security, edge/IoT and domain knowledge
- Its own AI accelerator, Baidu Kunlun, designed to optimize AI services' performance

Value Proposition:

- Baidu AI Cloud, with integrated cloud intelligence from chips, frameworks, ML models and applications to industry solutions

- Support of government AI initiatives, such as the autonomous driving bus operated by Baidu's Apollo system, driving brand awareness of its AI capabilities

AI Investment:

- Around 21% of revenue in 2021 invested in R&D for AI
- Over 13,000 employees focusing on the AI services portfolio, and over 2,000 employees from Baidu's AI Technology Group and AI Labs working on PaddlePaddle, AI chips, DuerOS and Baidu Apollo

Google

Product or Portfolio Overview

Google Cloud's AI services include Vertex AI and AI solutions for industry and business domain:

- **DSML platform:** Vertex AI — Google Cloud's unified development and deployment platform for building, training and deploying ML models throughout the ML life cycle in a single environment
- **AI technologies:** Vertex AI pretrained models for speech, vision, translation, language and structured data
- **AI-applied industrial/domain solutions:** AI agents, including Contact Center AI, Document AI, Discovery AI for Retail and Healthcare Insights AI
- **Infrastructure capabilities:** CPUs, GPUs, tensor processing units (TPUs)

How Google Competes

Competitive Differentiation:

- Unified data and AI platform to simplify and accelerate the journey from data to ML model development, with BigQuery, BigQuery ML, Spark and Vertex AI; for example, BigQuery ML for users to train models in structured query language (SQL) to manage, orchestrate and deploy directly to Vertex AI
- End-to-end MLOps to efficiently and responsibly manage, govern and explain ML projects throughout the entire development life cycle

- Research-based product pipeline, including TPUs, Speech to Text, Translation, AutoML, BigQueryML, TabNet, Vertex AI Matching Engine (a vector database) and Neural Architecture Search
- Open-source framework support, which includes TensorFlow, PyTorch, XGBoost, Scikit-Learn, Ray, MLflow, Spark, Apache Beam, Kubeflow and Apache Airflow

Value Proposition:

- Focus on developers, with an integrated end-to-end stack, development platforms and pretrained models to accelerate time to value
- An MLOps-focused development and deployment experience, integrated with data tooling, and built on flexible and scalable AI infrastructure, along with responsible AI tooling for repeatable, trustable and governable ML systems

AI Investment:

- Investment through Google Research, Google Brain and DeepMind, in various areas of AI (including machine intelligence, NLP and responsible AI), and adjacent areas such as quantum computing and robotics
- 2,400+ researchers and 8,500+ publications to help drive a product pipeline across AI and machine learning

IBM

Product or Portfolio Overview

IBM AI services aim to provide cloud AI services for end-to-end management of the AI life cycle in organizations for multiple roles. It offers a variety of packaged services under the Watson brand. IBM offers Cloud Paks, a prepackaged set of AI-powered and containerized capabilities for application modernization. IBM's solutions and services can be grouped as the following:

- **DSML platform:** Watson Studio to enable the development, deployment and governance of models across the AI life cycle
- **AI technologies:** Covering language (NLP), speech, vision and data insights through Watson Text to Speech and Speech to Text, Watson Discovery, Watson Assistant, Watson Language Translator and Maximo Visual Inspection
- **AI-applied industrial and business domain solutions:** For specific verticals such as financial services, retail and manufacturing, as well as for functional domains such as customer management, risk management, knowledge management, HR, weather, security and operations
- **Infrastructure capabilities:** GPUs, FPGAs

How IBM Competes

Competitive Differentiation:

- Supports both public cloud and hybrid, multicloud environments, allowing customers to choose where they want to run their AI solutions
- An extensive catalog of modular and composable AI services that can be deployed at scale across hybrid, multicloud, edge and IoT environments, including a strong vertical focus
- Strength in vertical and business domains, provided through both modular components and supporting IT services
- A leading consulting arm that enhances its penetration in accounts

Value Proposition:

- Hybrid cloud, automation and AI solutions building through internal capabilities and acquisitions such as Red Hat
- Combined comprehensive capabilities within a unified experience to support the collaborative efforts of developers, data engineers, data scientists, business analysts and risk analysts across the AI life cycle

AI Investment:

- A $1 billion investment to develop the ecosystem and elevate the role of partners in delivering products
- Investments in research innovation/pipeline, such as modernizing AI R&D to innovate faster by bringing the benefits of hybrid cloud and to scale up cloud-native infrastructure to run on-premises as well as in one or more clouds

Microsoft

Product or Portfolio Overview

Microsoft's Azure AI services comprise four stacks:

- **DSML platforms:** Azure ML platforms to provide studio experiences (notebooks, automated ML and designer) with responsible ML tools, comprehensive MLOps (reproducibility, automation, deployment, retraining) with governance, and unified management access in cloud as well as on-premises (Azure, Edge and Hybrid)
- **AI technologies:** Azure Cognitive Services for vision, speech, language, decision and OpenAI, as well as Azure Applied AI Services such as Bot Service, Cognitive Search, Form Recognizer, Video Indexer, Metrics Advisor and Immersive Reader
- **AI-applied industrial/domain solutions:** Industry-specific apps that cover manufacturing, healthcare, financial services, retail and government, such as Nuance and FSI Fraud Protection, and horizontal enterprise applications such as AI Builder for Power BI, Power Apps, Power Automate and Power Virtual Agents
- **Infrastructure capabilities:** GPUs, FPGAs

How Microsoft Competes

Competitive Differentiation:

- Develops AI responsibly for fairness and expandability, uses AI solutions responsibly in deployment, and governs AI for transparency and accountability
- Provides developers responsible AI resources [4]
- Offers AutoML and MLOps to improve time to value with rapid innovation and integrated tools, operationalize at scale with MLOps, develop a secure, hybrid and compliant platform

Value Proposition:

- Integrated value of AI services with existing enterprise software support for security and privacy compliance (for example, integration with Microsoft 365, Dynamics 365 and any data providers)
- Its broad base of existing customers that use Microsoft enterprise products and its many partners in the Microsoft Partner Network (MPN) and Cloud Partner Program

AI Investment:

- Several billion dollars invested on R&D to support its cloud AI services (for example, the investment in OpenAI to bring large language models to Azure)
- Investing in the developer community, including providing certification and Microsoft Partner Network to support thousands of partners around the world

Tencent

Product or Portfolio Overview

Tencent's AI services comprise four stacks:

- **DSML platforms:** Tencent Intelligence (TI) platform, including TI ONE as autoML model training platform, TI DataTruth for data preparation, TI Matrix as application platform, TI Elastic Model Service for model deployment, prediction and monitoring, and TI Industrial Insight with built-in, general-purpose and industrial algorithms
- **AI technologies:** Including computer vision, OCR, automated speech recognition (ASR), TTS, NLP and digital human. The ASR supports more than 20 Chinese dialects and is switchable between Mandarin, Sichuan, Henan and northern Mandarin through a single model
- **AI-applied industrial/domain solutions:** Over 300 AI technology capabilities and solutions for more than 30 industries and 100 subindustries (for example, ASR for intelligent outbound calls, recording quality inspection and court hearing audio quality inspection)
- **Infrastructure capabilities:** GPUs, FPGAs, custom ASICs

How Tencent Competes

Competitive Differentiation:

- Conversational AI platform supporting text or speech developed based on WeChat AI, Xiaowei, YouTu Lab and AI Lab to support B2B and B2C conversational scenarios
- Security capabilities such as Tencent's trusted face security technology to prevent physical media attacks, digital content synthesis attacks and adversarial attacks

Value Proposition:

- AI-services-integrated industrial solutions with their core business in games, social networking (WeChat) and mobile payment (WeChat Pay). For example, WeChat mini program with face-scanning services for security and optimized user experience
- Self-developed AI technology capabilities over WeChat for national census, health code (for pandemic) and Guangdong-Hong Kong-Macao mini programs

AI Investment:

- More than 5,600 AI patents in China and authorized more than 1,200
- Investing in Tencent AI Experience Center Mini Program in WeChat, and Tencent AI Cloud Community to provide a platform for technical discussion and support for developers

References and Methodology

This research is based on existing Gartner research, complemented by secondary research and primary questionnaire-based research surveys conducted with the profiled vendors. Factual information for vendors' competitive profiles was reviewed by the relevant companies. For this study, we also analyzed publicly available information, such as vendor-related announcements, product developments, key transactions, financial reports and market research reports. Our conclusions about competitive positioning consider these inputs but ultimately reflect our judgment based on our overall perspective on the market.

Evidence

[1] **2023 Gartner CIO and Technology Executive Survey:** This survey was conducted to help CIOs and technology executives overcome digital execution gaps by empowering and enabling an ecosystem of internal and external digital technology producers. It was conducted online from 2 May through 25 June 2022 among Gartner Executive Programs members and other CIOs. Qualified respondents were each the most senior IT leader (e.g., CIO) for their overall organizations or some part of their organization (for example, a business unit or region). The total sample was 2,203 respondents, with representation from all geographies and industry sectors (public and private). Disclaimer: Results of this survey do not represent global findings or the market as a whole, but reflect the sentiments of the respondents and companies surveyed.

[2] SPA from Streaming Analytics in the Cloud: A Comparative Analysis of Amazon, Microsoft and Google.

[3] How Can Demand Forecasting Approach Real Time Responsiveness? Vertex AI Makes It Possible, Google Cloud blog.

[4] Responsible AI Resources, Microsoft.

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Tool: Vendor Identification for Data Science and Machine Learning Platforms

Hype Cycle for Data Science and Machine Learning, 2022

Measuring the Opportunity in the AI Software Market

Market Guide for Artificial Intelligence Startups, Greater China

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Baidu	■ Cloud and intelligence integrated AI services ■ Baidu Brain — a library of modularized custom solutions for industries ■ EasyDL — AI PaaS for no-code development platform	China Focus

	■ PaddlePaddle — open-source DL platform	
Google	■ Vertex AI platform (includes notebooks, training, prediction, MLOps) ■ BigQuery ML, Vertex AI pretrained models, Vertex AI Vision ■ Contact Center AI, Document AI, Product Discovery, Healthcare Insights AI	Worldwide
IBM	■ Watson AI services (such as Watson NLP, Watson NLU, Watson Text to Speech and Speech to Text, Watson Discovery, Watson Assistant and Watson Studio AutoAI) ■ Maximo Visual Inspection, Cloud Paks	Worldwide
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Source: Gartner (March 2023)