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2022 China AI Development Platform Market Report

AI development platform/AI Model/AutoML/Low-Code AI Development

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Frost & Sullivan (China)
LeadLeo

Instruction

Frost & Sullivan and LeadLeo publish *2022 China AI Development Platform Market Report*. This report aims to analyze the definition, application, technology trends and development trends of AI development products in the AI Development market in China and identify the competitive landscape of AI development platform market, reflecting the differentiated competitive advantages of the leading brands in this market segment.

Frost & Sullivan and LeadLeo conducted a downstream user experience survey of the AI development platform market. Respondents came from a variety of enterprises of different sizes and in different industries.

The analysis of AI development platform market trends provided in this market report also reflects the overall movement of the industry. The final judgment of the market ranking and leadership is only applicable to this year's China AI development platform development cycle.

All figures, tables and text in this report are derived from Frost & Sullivan Consulting (China) and LeadLeo Research Institute surveys, and data are rounded off to one decimal place.

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Framework

- ◆ AI Development Platform Structure ----- 05
- ◆ AI Development Platform Business Model ----- 17
- ◆ AI Development Platform Market Size ----- 19
- ◆ AI Development Platform Competitive Elements ----- 21
- ◆ AI Development Platform Comprehensive Performance ----- 26
- ◆ AI Development Platform Scoring Dimensions ----- 28
- ◆ AI Development Platform Leading Company Cases
 - AWS ----- 31
 - Baidu AI Cloud ----- 33
- ◆ Terms ----- 36
- ◆ Methodology ----- 37
- ◆ Legal Disclaimer ----- 38



Chapter I AI Platform Structure

Frost & Sullivan focuses on the structure of AI development platform in this chapter, starting from following dimensions: infrastructure, framework and training platform.

1.1 AI Infrastructure

- ◆ The AI development platform is a platform that integrates AI algorithms, computing power and development tools, and opens up the development architecture for machine learning, deep learning, training models, etc. It also provides the computing power support required for development, and enables developers to efficiently use the AI capabilities in the platform for AI product development or AI empowerment through interface calls.
- ◆ The AI Open Platform provides developers with many development tools and frameworks that help reduce development costs, such as AI datasets, AI models and computing power. Developers can use the platform's datasets to train their own models, or use the platform's algorithmic framework to customize their own functions.
- ◆ The AI development platform architecture can be divided into four layers: infrastructure, framework, training platform, and technical services from bottom to top.

1. AI Infrastructure: Self-developed AI chips are the core competitiveness of enterprises, and self-developed chips show the trend of architectural innovation, morphological evolution, software and hardware integration.

1.1 Underlying hardware

The mainstream AI processor is essentially a system-on-chip (SoC), which can be used in scenarios related to image, video, voice, and word processing. The main architectural components of the AI processor include a specially designed computing unit, a large-capacity storage unit, and a corresponding control unit. By self-researching AI chips, companies can adapt the chip line architecture to their own algorithms to maximize computing efficiency, and self-researching AI chips will gradually become one of the core competencies of AI development platform companies.

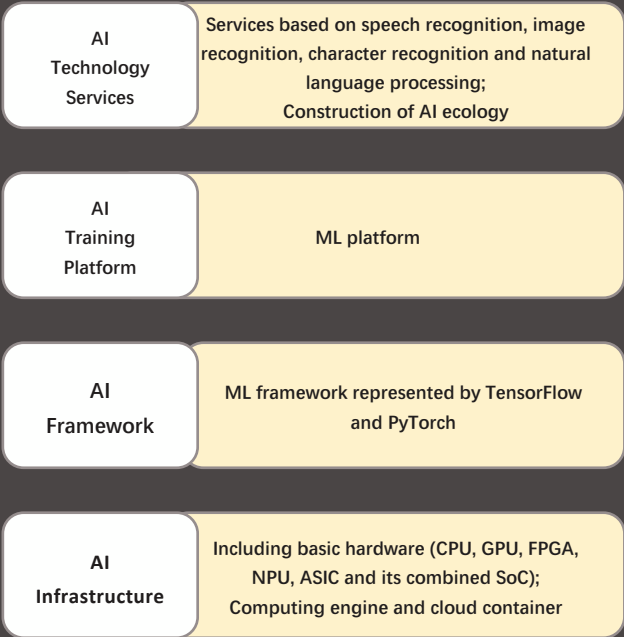
1.1.1 AI chip architecture innovation

The cloud AI chip is mainly used for AI training scenarios, and computing power is one of its core metrics. In order to adapt to the applications and algorithms that need to be used in AI training, suppliers need to develop domain specific architecture (DSA) chips to carry out architecture innovation to realize performance optimization. As one of its three major components (calculation, storage and control), the computing unit can perform scalar, vector and matrix operations. Huawei has deeply optimized the matrix operations in the da Vinci architecture and customized the corresponding matrix computing units to support high throughput matrix processing, so that it can use one instruction to complete the multiplication of two 16 * 16 matrices.

In order to solve the problem that the existing memory access speed is seriously lagging behind the computing speed of the processor, the new fully programmable, reconfigurable architecture (CGRA) chips, memory computing chips, and the new processor architecture IPU with high memory bandwidth may introduce the AI chip bottom ecology.

In addition, chip programming methods and software architecture design will also become an important part of AI chip innovation. For example, NVIDIA has greatly reduced the programming difficulty of its GPU by virtue of its CUDA framework, making GPU widely used in AI acceleration. In the future, more AI processors will provide multi-layer software stacks and development tool chains to help developers use underlying hardware resources more effectively, improve development efficiency, and reduce the low flexibility of special chips through software diversity.

AI Development Platform Structure



1.1.2 Evolution path of AI chip

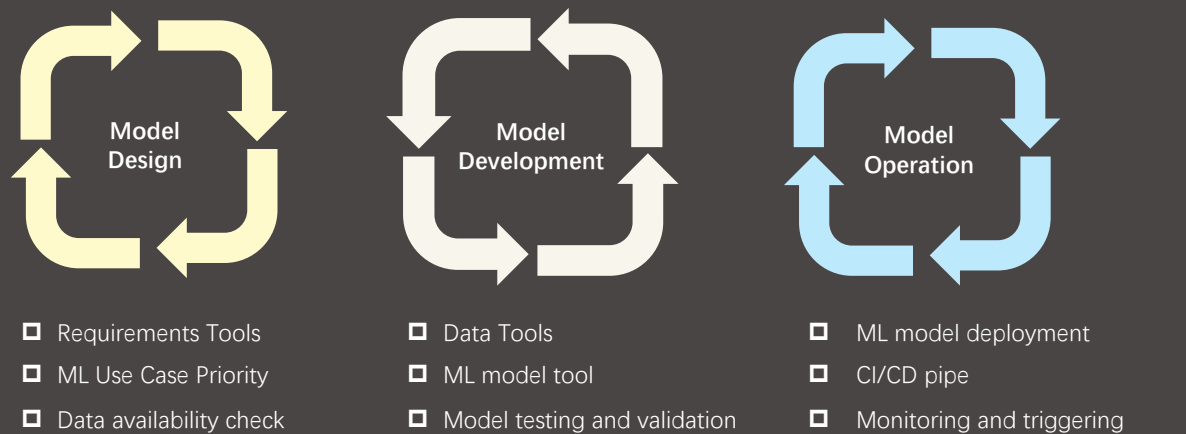
One of the goals of AI chip innovation is to maintain a high energy efficiency ratio of the chip while adapting to the evolution of AI algorithms. In the future, the system-on-a-chip form of general-purpose plus dedicated chips will become mainstream (CPU+NPU, CPU+ASIC, etc.) and have a broader scope of application.

Traditional processor instruction sets (including x86 and ARM, etc.) evolve for general-purpose computing, and their basic operations are arithmetic operations (addition, subtraction, multiplication and division) and logical operations (with or without), which often require hundreds of instructions to complete the processing of a neuron in deep learning, and the processing efficiency of deep learning is not high. To solve the sub-pain point, the chip form needs to break the traditional von Neumann structure. The neural network processor NPU uses circuitry to simulate human neuron and synapse structures. In NPU, storage and processing are integrated in neural networks, which are reflected by synaptic weights. For example, the world's first deep learning processor instruction set DianNaoYu proposed by Cambrian can directly face the processing of large-scale neurons and synapses, which can complete the processing of a set of neurons through a single instruction, and provides a series of specialized support for the transmission of neuron and synaptic data on the chip. In AI training acceleration applications, Cambrian also launched the latest MLU370-X8 training acceleration card equipped with dual-chip quad-core particle SiYuan 370, in YOLOv3, Transformer, BERT and ResNet101 tasks, the average performance of 8 cards in parallel up to 155% of 350W RTX GPU.

1.3.5. Technical service: MLOps improves team collaboration efficiency

- Along with the development trend of industrial intelligence, AI is becoming a common technology for transformation and upgrading in many industries. Currently, the most mature and widespread application areas of AI include public security, transportation, finance, education, etc. The demand for AI applications in other industries is highly fragmented and the scenarios are diverse, but the demand for AI applications still exists widely. The AI development platform provides cloud-based natural language understanding, automatic speech recognition, visual search, image recognition, text-to-speech conversion, and machine learning hosting services for different application scenarios, and provides developers or enterprise users with convenient operations for building advanced text and voice chatbots and intelligent machine learning applications.
- For individual or enterprise developers, development time and development cost are the main metrics to consider when building AI applications. With cloud-native and elastic distributed computing architecture, users can reduce cost and increase efficiency at the training and inference level of AI models, and with MLOps, the development and deployment efficiency of teams will be significantly improved.
- MLOps is DevOps for ML. machine learning (ML) models built by data scientists need to work closely with other teams (business teams, engineering teams, operations teams, etc.). MLOps brings flexibility and speed to the system: MLOps reduces development time and delivers high-quality results through reliable and effective ML lifecycle management; MLOps carries over from DevOps to continuous development (CD), continuous Continuous Development (CD), Continuous Integration (CI), Continuous Training (CT), and other methods and tools carried over from DevOps guarantee the repeatability of AI workflows and models, allowing developers to easily deploy high-precision machine learning models anytime, anywhere and integrate management systems to continuously monitor machine learning resources.
- MLOps also place higher demands on the platform in terms of data and hyperparameter version control, iterative development and experimentation, testing, security, production monitoring, infrastructure, etc. MLOps platform data plays an equally important role in defining output as written code, thus increasing data complexity compared to DevOps platforms. In response to the challenges faced by the MLOps platform, the MLOps implementation process includes five phases: use case discovery, data engineering, machine learning pipeline, production deployment, and production monitoring, and its workflow is mainly implemented through an agile approach.

MLOps Definition : MLOps=ML+DevOps



Source: Frost Sullivan, LeadLeo

Chapter 2 AI Platform Business Model

With the gradual expansion of the scale, the average cost of a single customer of the AI development platform will decrease significantly, and the service profit margin will gradually increase

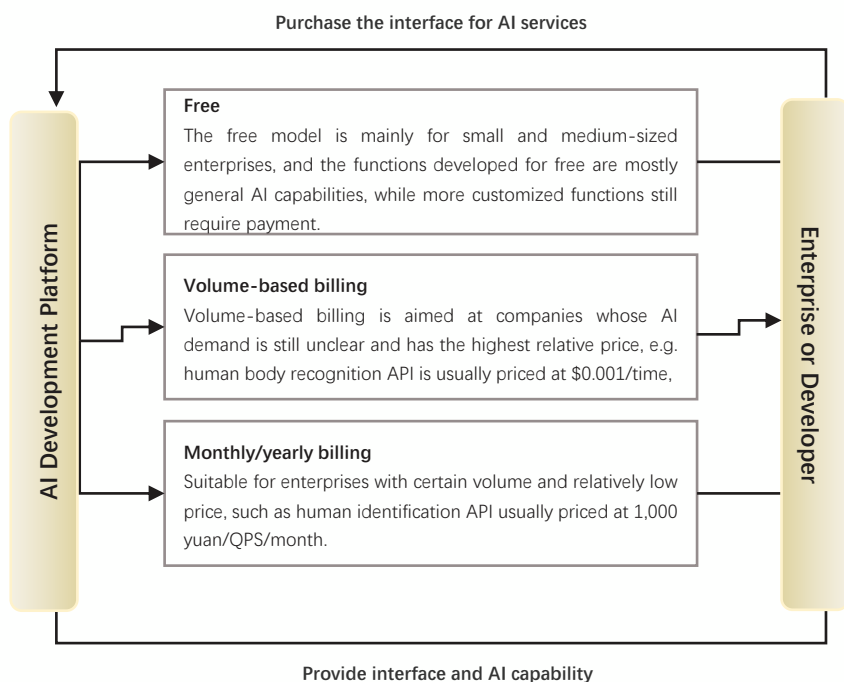
2 Business Model

With the gradual expansion of the scale, the average cost of a single customer of the AI development platform will decrease significantly, and the service profit margin will gradually increase. Therefore, realizing large-scale operation is an important development strategy of the AI development platform, which can help the platform reduce costs while giving the platform greater bargaining space. This phenomenon also explains the bottom business logic that large manufacturers can still make profits under the "partially free" mode, and also reflects the market competitive advantage of large manufacturers compared with small and medium-sized manufacturers.

“ AI development platform business model is relatively simple, developer volume and platform scale become its revenue decisive elements. ”

- The AI development platform business model is to profit from providing AI technology interfaces or AI development tools for enterprises or developers, and the billing methods mainly include free, per-call, annual or monthly.
 1. The free model provides enterprises or developers with common and general AI technology interfaces such as text recognition and face recognition, with a usage limit, usually 1-5QPS/day, mainly for small and medium-sized enterprises with low usage. The free model achieves profitability through data accumulation, building AI ecology and providing additional services.
 2. Compared with annual and monthly billing, the volume-based billing is higher, which is suitable for enterprises with unclear demand.
- In terms of product marketing, platform operators can improve the conversion rate of traffic through free trial, subsidies, online teaching, etc. Large platforms can further improve the conversion of traffic to users through permanent free universal products. Platform operators can also explore other value-added needs of users in customer service, such as cloud services, customized AI development solutions, etc.

AI Development Platform Business Model



Source: Frost Sullivan, LeadLeo



Chapter 3 AI Platform Market Size

From 2016 to 2020, market size of China's AI development platform expanded rapidly. In 2021, market size of China's AI development platform exceeded 23.5 billion yuan.



Chapter 4 Competitive Elements

In this chapter, Frost & Sullivan analyzes the core competitiveness of AI development platform in the market, which is divided into hard power of "improving data processing capability" and soft power of "enhancing platform usability" and "increasing ecological openness".

4

Competitive Elements

The users of AI development platforms are individual or developers of enterprises in the AI industry, and the core competition of AI development platforms will focus on how to provide developers with a more efficient and convenient development platform and other derivative services. Sullivan summarizes the core competencies of AI development platforms as the hard power of "improving the capability of data processing" and these two soft powers of "enhancing the ease of use of the platform" and "improving the openness of the ecology".

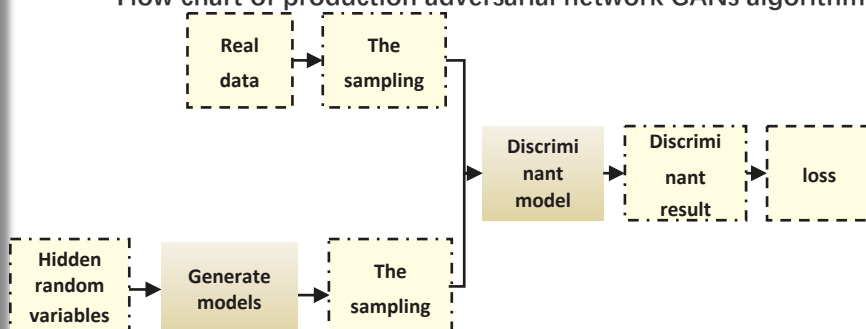
“The core competition of AI development platforms will focus on "improving capability of data processing", "enhancing ease of use of platform", and "improving openness of ecology"”

AI development platform providers offer more effective AI development platform services for developers with platform hardware, algorithm models and other capabilities as the underlying support.

The 1st hard power: Intelligent annotation -- a difficult breakthrough from "artificial" to "intelligent"

- ❑ The intelligent replacement of data annotation is extremely difficult. At this stage, with the help of algorithms, annotation tools can already complete the basic annotation work, such as automatic recognition of labeled frames and recognition of speech, while the algorithms of annotation tools are being continuously developed and optimized.
- ❑ For AI development platforms, intelligent annotation is of high importance in optimizing the efficiency of self-developed algorithms and user experience. The available intelligent annotation for AI development platforms include introducing GANs to optimize the annotation effect, using semi-supervised learning mechanisms to solidify annotation, introducing difficult case screening mechanisms to optimize annotation results, and providing data annotation based on difficult cases to improve recommendations. However, in the actual application process, providers still need to address the limitations of the above approaches.
 - **GANs :** During the training process, the generator and discriminator will need high synchronization, but in the actual training, it is easy to generate scenarios where the discriminator converges and the generator diverges, which also requires extremely high standards for the optimization of the discriminator and generator; GANs will have the problem of model missing, during the training process, which means that the generator function degrades to generate the same sample points, resulting in the inability to continue the deep learning process.
 - **Semi-supervised learning:** Difficulty for models to correct itself; problems of over-smoothing, resulting in indistinguishable features of nodes.
 - **Hard example selection mechanism:** The hard cases can only be generated in the process of model training, which means that offline hard case mining is not possible, and users must modify themselves to use the online hard case mining function. The core of the difficult case screening mechanism is to generate the difficult case set by bootstrapping, and the generation method is only judged by the loss value of the training samples during training, which is a single dimension for judging and cannot guarantee the improvement effect of the model accuracy; the algorithm idea is not mature enough to form a systematic scheme.

Flow chart of production adversarial network GANs algorithm



Source: Polar Community, easyAI, Huawei Cloud, Frost & Sullivan , LeadLeo

The 2nd hard power : Machine Learning framework – improve framework defects, enhance user experience, and build AI ecology

TensorFlow and PyTorch are the dominant machine learning frameworks, with large developers, and many mature and available code. These two have over 90% of global market share of deep learning frameworks. However, TensorFlow and PyTorch have different features from each other.

TensorFlow:

- Pros: Suitable for industrial production environment; complete solution for both model training and deployment.
- Cons: Has too much different styles of APIs; newbie unfriendly; unclear updating ideas for distributed training; low support for cloud-native.

PyTorch:

- Pros: Simple, intuitive and understandable API style of programming; based on the deep learning model built by dynamic computational graphs, developers can debug quickly based on the stack information.
 - Cons: The deployment of the ecology is not yet completed, and some services are not supported.
- The limited number of developers is a uniform shortcoming of open-source machine learning frameworks developed by Chinese providers, with a significant gap in developers compared to TensorFlow and PyTorch, and only support Chinese and English. In contrast, TensorFlow and PyTorch support some minority languages, so the developer ecosystem is more complete.
- The global ecology of machine learning frameworks has basically stabilized. The general-purpose frameworks, such as TensorFlow and PyTorch, were open-sourced earlier and thus have an ecological advantage. The framework developed by Chinese providers themselves optimizes the framework architecture in terms of technical iterations of machine learning, and flaws of TensorFlow and PyTorch. Meanwhile, Chinese providers' self-developed frameworks can provide a better experience for developers. In the long term, the developer ecosystem of Chinese providers' self-developed frameworks is mostly concentrated in China, and more companies will use Chinese providers self-developed frameworks for machine learning in the future, but the global machine learning framework market is expected to remain dominated by TensorFlow and PyTorch.

Baidu, Huawei and other Chinese providers launch machine learning self-developed framework, such as PaddlePaddle and MindSpore.

PaddlePaddle:

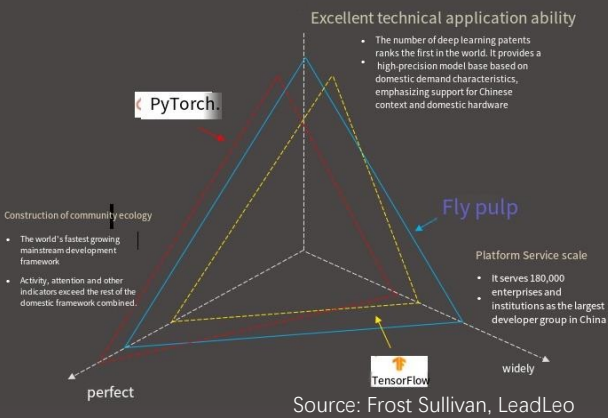
- Pros: Active community, complete ecosystem, user-friendly application, full-process support, fast-updating, supports large-scale asynchronous distributed training
- Cons: Individual developers dominate, not deployed by large-scale companies.

MindSpore:

- Pros: Support visual boosting, differential privacy, second-order optimization, graph neural networks, quantization training, hybrid heterogeneity, MindSpore Serving, PS distributed training, MindIR, debugger; support multi-platform; advocate software and hardware collaborative design; support multiple modes of distributed training.
- Cons: Small number of users in the community; some functions need to be improved.

Along with the maturity of technology, industry and policy, AI has crossed the period of accumulation of technology theory and construction of tool platform, and started to enter the golden decade of industry empowerment with the goal of large-scale application and high-value release. With the implementation of AI, the up-and-down extension and construction of intelligent ecological platform, based on deep learning framework, will become the common choice of domestic and foreign technology top companies.

ML frameworks compete for elements





Chapter 5

Comprehensive Performance

The conclusion of this report on the comprehensive competitiveness performance of AI development platform application products and services of providers is only applicable to the development of its application market at this stage.

Chapter 6 Dimensions of Scoring

In this chapter, Frost & Sullivan Consulting (China) scores AI development platforms based on two dimensions: innovation index and growth index.



Chapter 7

Leader Vendors Cases

In this chapter, Frost & Sullivan introduces China AI Development Platform providers.



Amazon Web Services

For more than 15 years, Amazon Web Services has been known for its technological innovation, abundant services and broad adoption.

Amazon Web Services continues to expand its portfolio of services to support virtually any workload on the cloud, and now offers more than 200 full-featured services across computing, storage, database, network, data analytics, Machine Learning and AI, IoT, mobile, security, hybrid cloud, virtual and augmented reality, media, and application development, deployment and management; with infrastructure in 96 availability zones across 30 geographic regions and has announced plans for 5 new regions and 15 availability zones in Australia, Canada, Israel, New Zealand and Thailand.

Millions of customers around the world, including fast-growing startups, large enterprises and leading government agencies, trust Amazon Web Services to support their infrastructure, improve agility and reduce costs with Amazon Web Services' services.

Unique Advantages :

- Broad and abundant cloud service
- Various customer practice
- Global infrastructure
- Leading security compliance
- Trustworthy partner

“AWS aims to bestow ML on developers by providing a highly compatible, highly functional and modular AI development platform service”

- ❑ Amazon Web Services has a full-stack supply of hardware and software for AI development, including infrastructure, AI platforms, out-of-the-box solutions for various scenarios. Integrated with the series of cloud services, Amazon Web Services has the ability of satisfying the diversified demands of various types of customers:
 1. **AI Infrastructure** : Self-developed ML inference chip, Amazon Inferentia, together with the ML training chip, Amazon Trainium, enable end-to-end machine learning hardware acceleration from inference to training. Combined with server chip Amazon Graviton3, Amazon Web Services provides energy efficient and effective machine learning infrastructure.
 2. **AI Platform** : Amazon SageMaker offers a set of feature-rich capabilities for developers, data scientists and ML engineers. Amazon SageMaker Studio Lab offers free resources. Amazon SageMaker Jumpstart and Amazon SageMaker Canvas provide low-code/no-code quick-start features. Amazon SageMaker Pipelines provides automated ML processes. Amazon SageMaker Ground Truth Plus provides intelligent annotation services. Amazon SageMaker Data Wrangler has more than 300 built-in data transformations. Amazon SageMaker Autopilot automates AutoML execution.
 3. **AI Services** : Natural Language Understanding (NLU), Automatic Speech Recognition (ASR), Visual Search and Image Recognition, Text-to-Speech (TTS) and Machine Learning (ML) hosting services.
- ❑ The "Lake House Architecture" combines machine learning and data management platforms to provide an integrated data intelligence unified data governance experience. Amazon Redshift ML and Amazon Athena ML both support model training requests in the form of SQL statements, and Amazon SageMaker Canvas AutoML capabilities provide model training and return in the form of SQL.
- ❑ Amazon Web Services has attracted more than 100,000 customers with the partnership and talent ecology. Amazon Cloud Technologies has more than 80 ML/AI capability partners to provide customers with abundant and well-established industry solutions. There are more than 1,000 machine learning products from more than 300 ISVs in the Marketplace, covering a range of customers from healthcare, retail, financial services, social entertainment, manufacturing, energy, etc.

Amazon Web Services AI Platform user cases



OPPO's conversational AI product "Xiaobu" with over 100 million monthly activities, in order to achieve industry-leading conversational semantic understanding, innovates on Amazon EC2 Inf1 to develop efficient inference service modules that can support pre-training large models, which is expected to reduce the cost of model inference services by more than 35% on some business scenarios, and aims to gradually expand to more and more new scenarios. With Amazon EC2 Inf1, OPPO's machine learning team continues to innovate with more sophisticated algorithmic models and accelerate improvements in the overall customer experience.



With Amazon SageMaker and its database and computing services, Schneider Electric has successfully built an intelligent industrial vision quality inspection solution, the "Cloud-Side Collaborative AI Industrial Vision Inspection Platform". With Amazon SageMaker, Schneider Electric was able to successfully and accurately build machine learning models adapted to real-world manufacturing scenarios to identify complex defects in products through automated industrial vision inspection by comparing product images from production lines with standard samples of qualified products. The solution was first launched in Schneider Electric's Wuhan factory, significantly improving the inspection efficiency of the production line, reducing the false detection rate to within 0.5% and achieving a zero-miss detection rate.



Youdao LeRead is based on Amazon Personalize's personalized recommendations and big data services to provide accurate book recommendations for end-users. With Amazon Personalize, you can design personalized book recommendations through simple API calls without the need to have machine learning experience. Amazon Personalize service works out of the box and effectively helps you achieve accurate book recommendations and predictions within a month, thus ensuring a quality user experience and increasing monthly active users by 20%. In addition, compared with the previous monthly iteration cycle, the delivery is now basically on a daily basis, even on the same day of the update.

Baidu AI Cloud

Baidu's AI development platform consists of a full-featured AI development platform (BML), a zero-code AI development platform (EasyDL), and an AI development training platform (AI Studio). It has accumulated 4.77 million developers and 180,000 enterprises in China. Baidu AI development platform covers the life cycle of AI model application, including data processing, algorithm development, model training, etc.

2022 Product Updates:

- **Data Analytics Engine:** a data analytics engine, which can perform cross-database federal queries and support automatic data analysis and visualization.
- **Feature Store:** be able to ensure consistency of feature data used for model training and prediction services, decouples feature production and consumption, and enables feature sharing and reuse among different teams.
- **XAI:** provides 6 model interpretation algorithms and graphs, providing interpretability for most conventional machine learning models and deep learning models. Also, it can reduce risk of use.
- **MLOps:** Provide complete automation capability and customized development SDK in lifecycle of model development. It can be connected to enterprise CI/CD system to realize model production and operation integration and improve development efficiency and standardization.

- ❑ Baidu's AI development platform consists of a full-featured AI development platform (BML), a zero-code AI development platform (EasyDL), and an AI development training platform (AI Studio), which are unified and enabled by Baidu's self-developed PaddlePaddle platform. It has accumulated 4.77 million developers and 180,000 users from enterprises and institutions in China.
- ❑ Baidu's AI development platform provides rich and comprehensive functions, which cover the entire lifecycle process of AI models from project creation to deployment of inference services. It also provides different forms of services to customers, including online platform and on-premise deployment.
- ❑ In terms of cutting-edge technology, Baidu's AI development platform has started to have complete MLOps capabilities, covering data processing, feature engineering, model development, training tasks, drift monitoring, automatic retraining, and workflow to automate execution for efficient integration of model production and operation; In the XAI domain, Baidu AI development platform can realize the risk management of models' lifecycle through the MRM(model risk management) module to meet the regulatory needs of specific industries and organizations; at the same time, more advanced features, such as the deep learning model interpretability and model robustness/security capability, are realized with the empowerment of the PaddlePaddle. There are also more new features in the areas of intelligent annotation and AutoML than in the previous report.
- ❑ With the support of Baidu's own PaddlePaddle platform, Baidu AI development platform has built-in development kits and pre-trained models for mainstream domains, as well as foundational models for currently popular domains. Among them, the Wenxin ERNIE is the largest single NLP model in China. .
- ❑ At the localization, Baidu AI development platform has supported or adapted to a variety of Chinese local chips, thus forming a full-level localization solution.



Shandong Electric Power: Transmission line safety inspection

The wide geographical distribution and complex and changing environment pose a serious challenge to the safe operation of transmission lines. The visualization of transmission channels and intelligent analysis greatly enhance the efficiency of transmission line safety inspection and provide a reliable guarantee for the safe and stable operation of transmission lines.



Postal Saving Bank Intelligent System

Realizing the R&D management of the whole life cycle of AI models from training, testing, deployment, operation and iteration, introducing various machine learning and deep learning advanced algorithms and models, and accelerating the implementation of AI applications in business scenarios of the whole bank.



Changsha Metro's intelligent maintenance helmet

By combining EasyDL object detection training tool with classification recognition model, accumulating 500 training pictures and iterating 17 versions, Changsha Metro developed a detachable structure "intelligent maintenance helmet", whose model accuracy rate reached 88.9%. It can automatically take pictures and identify the name and quantity of common tools, which provides timely and effective guarantee for the inventory of tools and makes a breakthrough in the innovative application of smart helmet.

Source: Baidu AI Cloud, Frost & Sullivan, LeadLeo

Terms

- ◆ **QPS:** Queries per second, query rate per second. QPS is a measure of the traffic handled by a specific query server within a specified time. It can be interpreted as the number of concurrent requests per second. 1QPS calls about 86400 times.
- ◆ **API:** Application Programming Interface. API is a pre-defined function, which aims to provide the ability for applications and developers to access a set of routines based on a certain software or hardware without accessing the source code or understanding the details of the internal working mechanism.
- ◆ **Convolution:** a mathematical concept that generates the third function through two functions f and g , representing the integral of the overlapping length of the product of the overlapping part function values of function f and g after flip and translation.
- ◆ **CGRA:** Coarse grained Reconfigurable Architecture. CGRA is a parallel computing mode in the airspace, which organizes computing resources with different granularity and different functions in the airspace hardware structure. In the runtime, according to the characteristics of the data flow, the configured hardware resources are interconnected to form a relatively fixed computing path, which is close to the "dedicated circuit" for computing; When the algorithm and application are transformed, they are re configured into different computing paths to perform different tasks.
- ◆ **CUDA:** Compute Unified Device Architecture is a parallel computing platform and programming model created by NVIDIA based on their GPUs (Graphics Processing Units, which can be commonly understood as graphics cards).
- ◆ **DevOps:** a combination of Development and Operations, which is a general term for a group of processes, methods and systems, and is used to promote communication, collaboration and integration among development (application/software engineering), technical operation and quality assurance (QA) departments.
- ◆ **Data annotation:** the process of annotation of metadata such as text, video, image, etc. The marked data will be used to train ML models.
- ◆ **Cloud native:** a set of cloud technology product system based on container, micro service, DevOps and other technologies, which is a distributed cloud based on distributed deployment and unified operation management.

Methodology

- ◆ Frost & Sullivan has conducted in-depth research on the market changes of 10 major industries and 54 vertical industries in China with more than 500,000 industry research samples accumulated and more than 10,000 independent research and consulting projects completed.
- ◆ Rooted on the active economic environment in China, the research institute, starting from data management and big data fields, covers the development of the industry cycle, follows from the enterprises' establishment, development, expansion, IPO and maturation. Research analysts of the institute continuously explore and evaluate the vagaries of the industrial development model, enterprise business and operation model, Interpret the evolution of the industry from a professional perspective.
- ◆ Research institute integrates the traditional and new research methods, adopts the use of self-developed algorithms, excavates the logic behind the quantitative data with the big data across industries and diversified research methods, analyses the views behind the qualitative content, describes the present situation of the industry objectively and authentically, predicts the trend of the development of industry prospectively. Every research report includes a complete presentation of the past, present and future of the industry.
- ◆ Research institute pays close attention to the latest trends of industry development. The report content and data will be updated and optimized continuously with the development of the industry, technological innovation, changes in the competitive landscape, promulgations of policies and regulations, and in-depth market research.
- ◆ Adhering to the purpose of research with originality and tenacity, the research institute analyses the industry from the perspective of strategy and reads the industry from the perspective of execution, so as to provide worthy research reports for the report readers of each industry.

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