AI Overview

HUAWEI

Foreword

- Mankind is welcoming the fourth industrial revolution represented by intelligent technology. New technologies such as AI, IoT, 5G and bioengineering are integrated into all aspects of human society; driving changes in global macro trends, such as sustainable social development and economic growth. New kinetic energy, smart city upgrading, industrial digital transformation, consumer experience, etc.
- As the world‘s leading provider of ICT (information and communications) infrastructure and smart terminals, Huawei actively participates in the transformation of artificial intelligence and proposes Huawei’s full-stack full-scenario AI strategy. This chapter will mainly introduce AI Overview, Technical Fields and Application Fields of AI, Huawei's AI Development Strategy, AI Disputes, Future Prospects of AI.

Objectives

Upon completion of this course, you will be able to:

- Understand basic concepts of AI.
- Understand AI technologies and their development history.
- Understand the application technologies and application fields of AI.
- Know Huawei's AI development strategy.
- Know the development trends of AI.

Contents

1. **AI Overview**
2. Technical Fields and Application Fields of AI
3. Huawei's AI Development Strategy
4. AI Disputes
5. Future Prospects of AI

AI in the Eyes of the Society

- People get to know AI through news, movies, and actual applications in daily life. What is AI in the eyes **of the public?**

Haidian Park: First AI-themed Park in the World
StarCraft II: AlphaStar Beat Professional Players
AI-created Edmond de Belamy Sold at US$430,000
Demand for AI Programmers:↑ 35 Times! Salary: Top 1!
50% Jobs Will be Replaced by AI in the future
Winter is Coming? AI Faces Challenges
...

The Terminator
2001: A Space Odyssey
The Matrix
I, Robot
Blade Runner
Elle
Bicentennial Man
...

Self-service security check
Spoken language evaluation
Music/Movie recommendation
Smart speaker
Ai facial fortune-telling
Vacuum cleaning robot
Self-service bank terminal
Intelligent customer service
Siri
...

News	Movies	Applications in daily life
AI Applications AI industry outlook Challenges faced by AI ...	AI Control over human beings Fall in love with AI Self-awareness of AI ...	Security protection Entertainment Smart Home Finance ...

AI in the Eyes of Researchers

"I propose to consider the question, 'Can machines think?'"

— Alan Turing 1950

The branch of computer science concerned with making computers behave like humans.

— John McCarthy 1956

The science of making machines do things that would require intelligence if done by men.

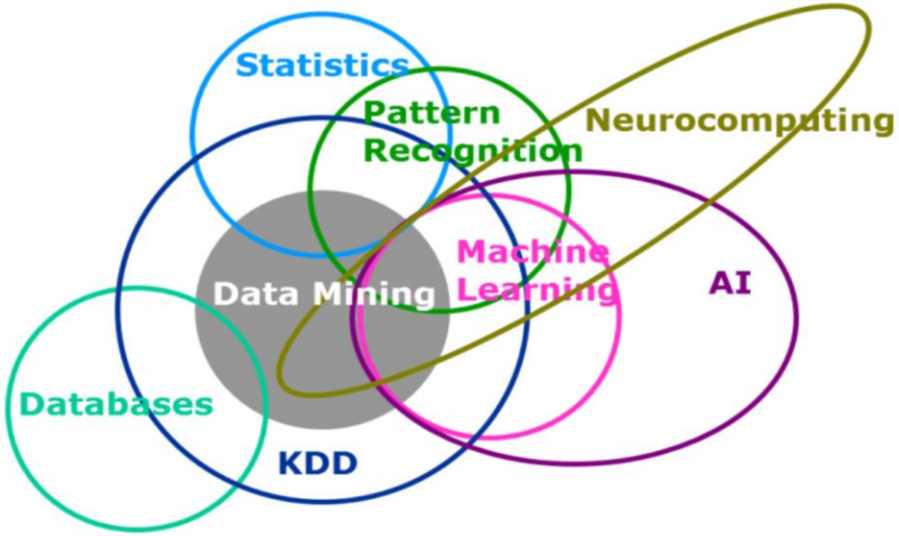
— Marvin Minsky

What Are Intelligences?

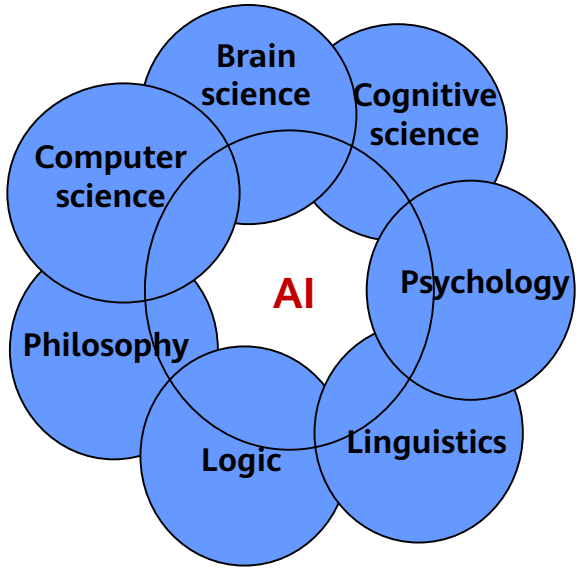
- Howard Gardner's Multiple Intelligences
- Human intelligences can be divided into seven categories:
  - Verbal/Linguistic
  - Logical/Mathematical
  - Visual/Spatial
  - Bodily/Kinesthetic
  - Musical/Rhythmic
  - Inter-personal/Social
  - Intra-personal/Introspective

What Is AI?

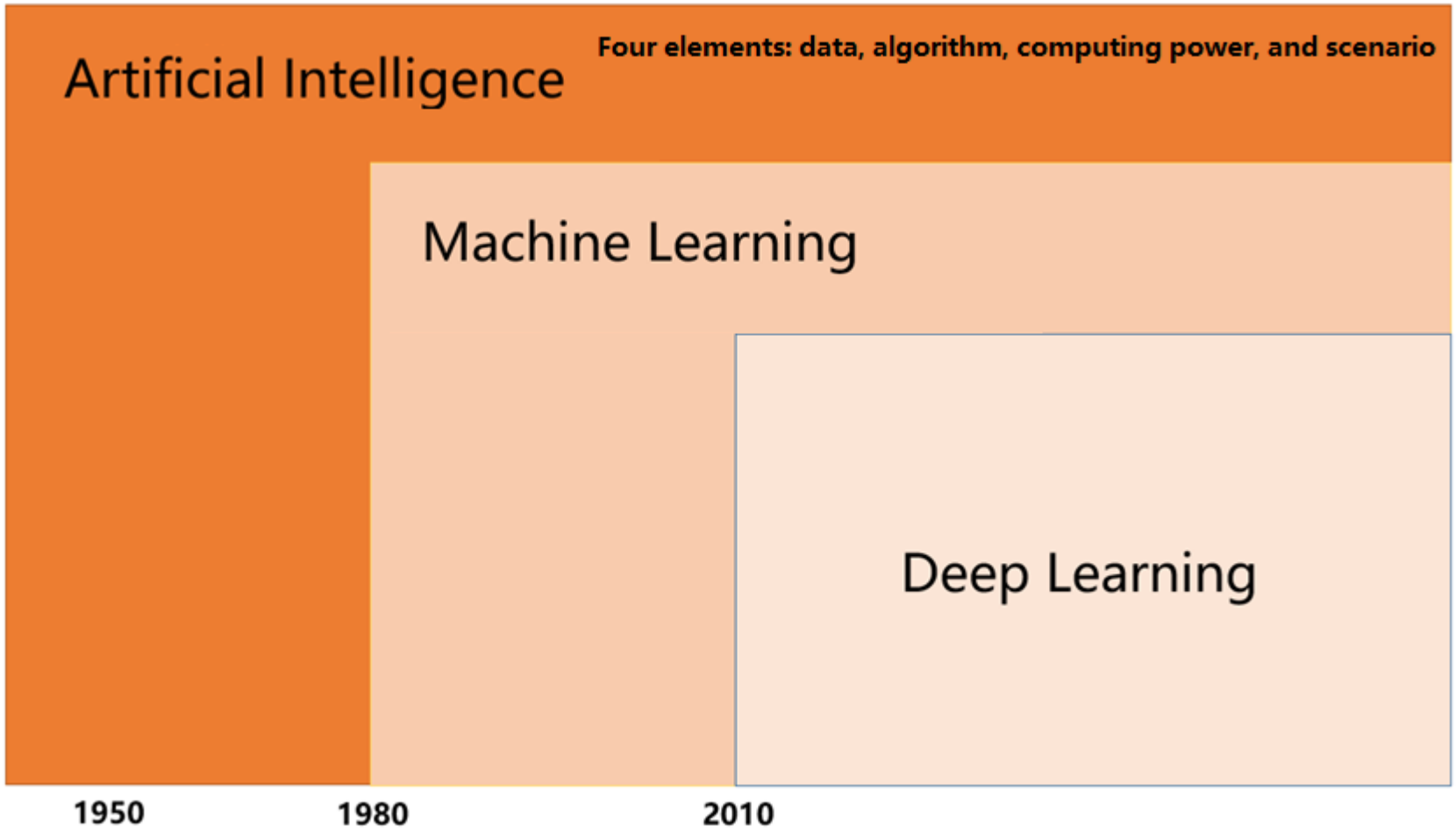
- Artificial Intelligence (AI) is a new technical science that studies and develops theories, methods, techniques, and application systems for simulating and extending human intelligence. In 1956, the concept of AI was first proposed by John McCarthy, who defined the subject as "science and engineering of making intelligent machines, especially intelligent computer program". AI is concerned with making machines work in an intelligent way, similar to the way that the human mind works. At present, AI has become an interdisciplinary course that involves various fields.



Identification of concepts related to AI and machine learning
AI Development Report 2020



Relationship of AI, Machine Learning, and Deep Learning



Relationship of AI, Machine Learning and Deep Learning

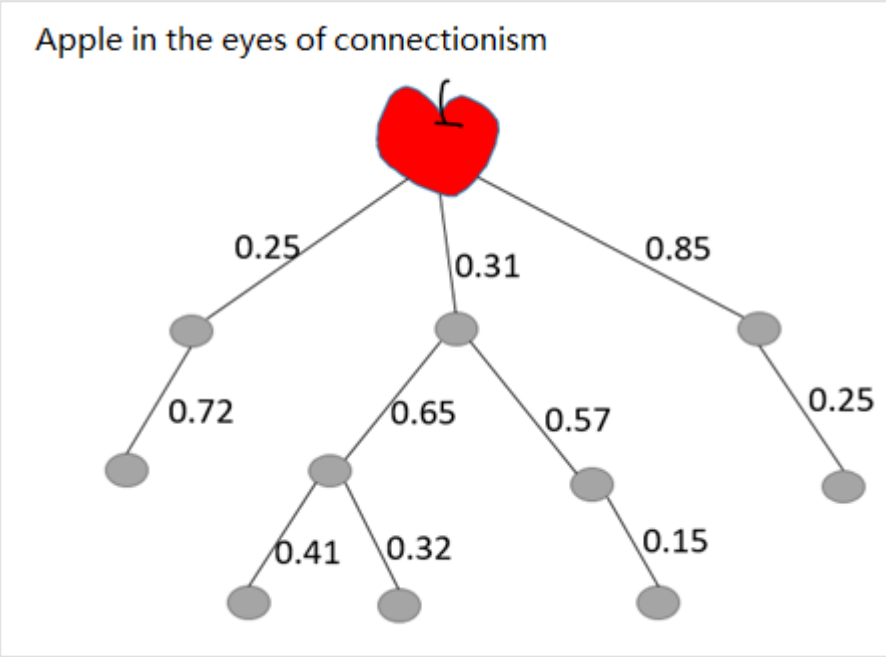
- AI: A new technical science that focuses on the research and development of theories, methods, techniques, and application systems for simulating and extending human intelligence.
- Machine learning: A core research field of AI. It focuses on the study of how computers can obtain new knowledge or skills by simulating or performing learning behavior of human beings, and reorganize existing knowledge architecture to improve its performance. It is one of the core research fields of AI.
- Deep learning: A new field of machine learning. The concept of deep learning originates from the research on artificial neural networks. The multi-layer perceptron (MLP) is a type a deep learning architecture. Deep learning aims to simulate the human brain to interpret data such as images, sounds, and texts.

Three Major Schools of Thought: Symbolism

- Basic thoughts
  - The cognitive process of human beings is the process of inference and operation of various symbols.
  - A human being is a physical symbol system, and so is a computer. Computers, therefore, can be used to simulate intelligent behavior of human beings.
  - The core of AI lies in knowledge representation, knowledge inference, and knowledge application. Knowledge and concepts can be represented with symbols. Cognition is the process of symbol processing while inference refers to the process of solving problems by using heuristic knowledge and search.
- Representative of symbolism: inference, including symbolic inference and machine inference

Three Major Schools of Thought: Connectionism

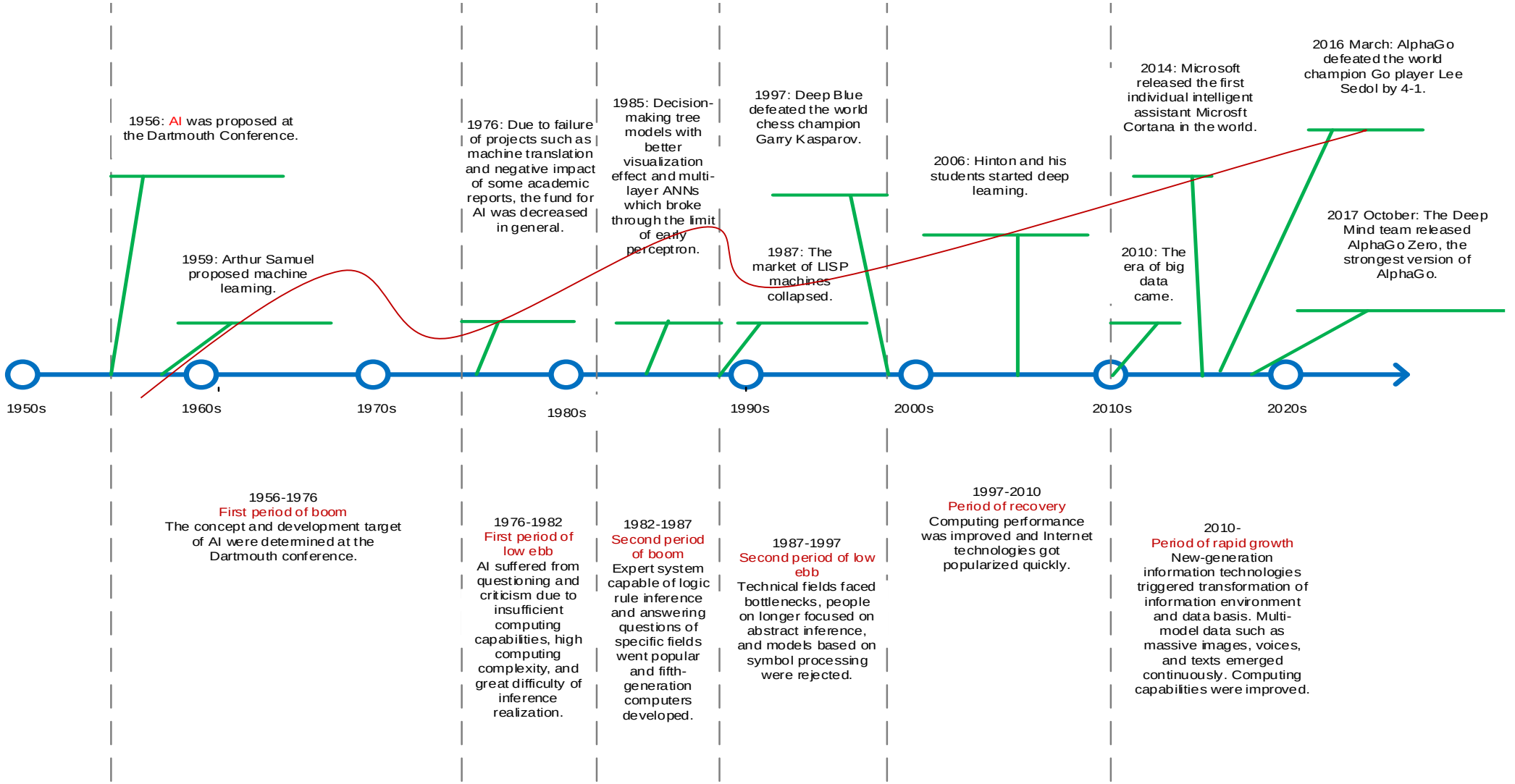
- Basic thoughts
  - The basis of thinking is neurons rather than the process of symbol processing.
  - Human brains vary from computers. A computer working mode based on connectionism is proposed to replace the computer working mode based on symbolic operation.
- Representative of connectionism: neural networks and deep learning



Three Major Schools of Thought: Behaviorism

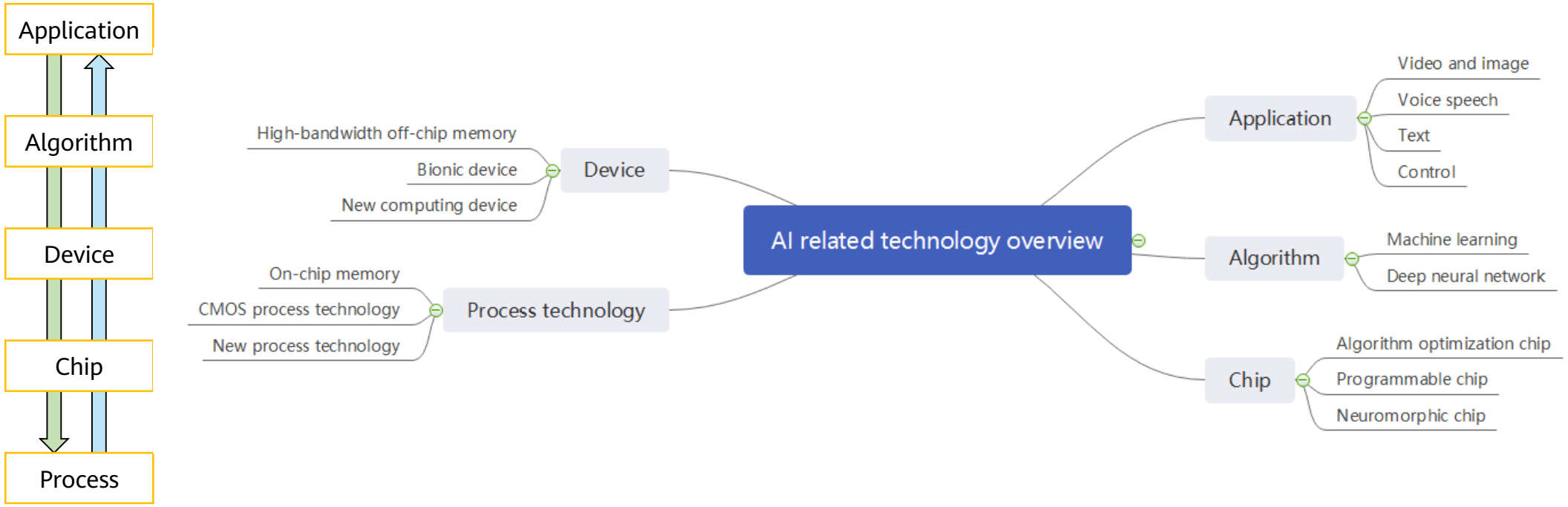
- Basic thoughts:
  - Intelligence depends on perception and action. The perception-action mode of intelligent behavior is proposed.
  - Intelligence requires no knowledge, representation, or inference. AI can evolve like human intelligence. Intelligent behavior can only be demonstrated in the real world through the constant interaction with the surrounding environment.
- Representative of behaviorism: behavior control, adaptation, and evolutionary computing

Brief Development History of AI



Overview of AI Technologies

- AI technologies are multi-layered, covering the application, algorithm mechanism, toolchain, device, chip, process, and material layers.



Types of AI

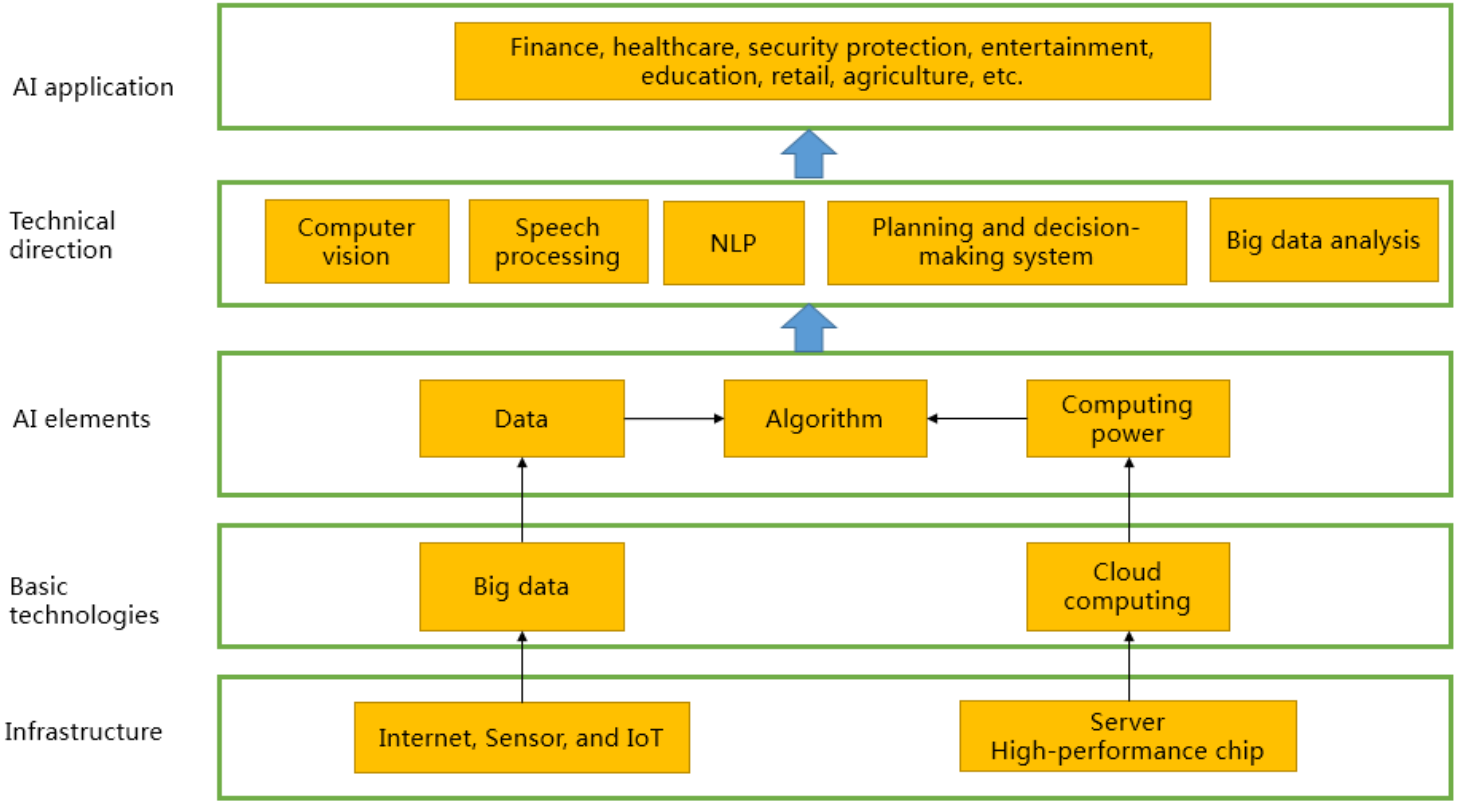
- Strong AI
  - The strong AI view holds that it is possible to create intelligent machines that can really reason and solve problems. Such machines are considered to be conscious and self-aware, can independently think about problems and work out optimal solutions to problems, have their own system of values and world views, and have all the same instincts as living things, such as survival and security needs. It can be regarded as a new civilization in a certain sense.
- Weak AI
  - The weak AI view holds that intelligent machines cannot really reason and solve problems. These machines only look intelligent, but do not have real intelligence or self-awareness.

Classification of Intelligent Robots

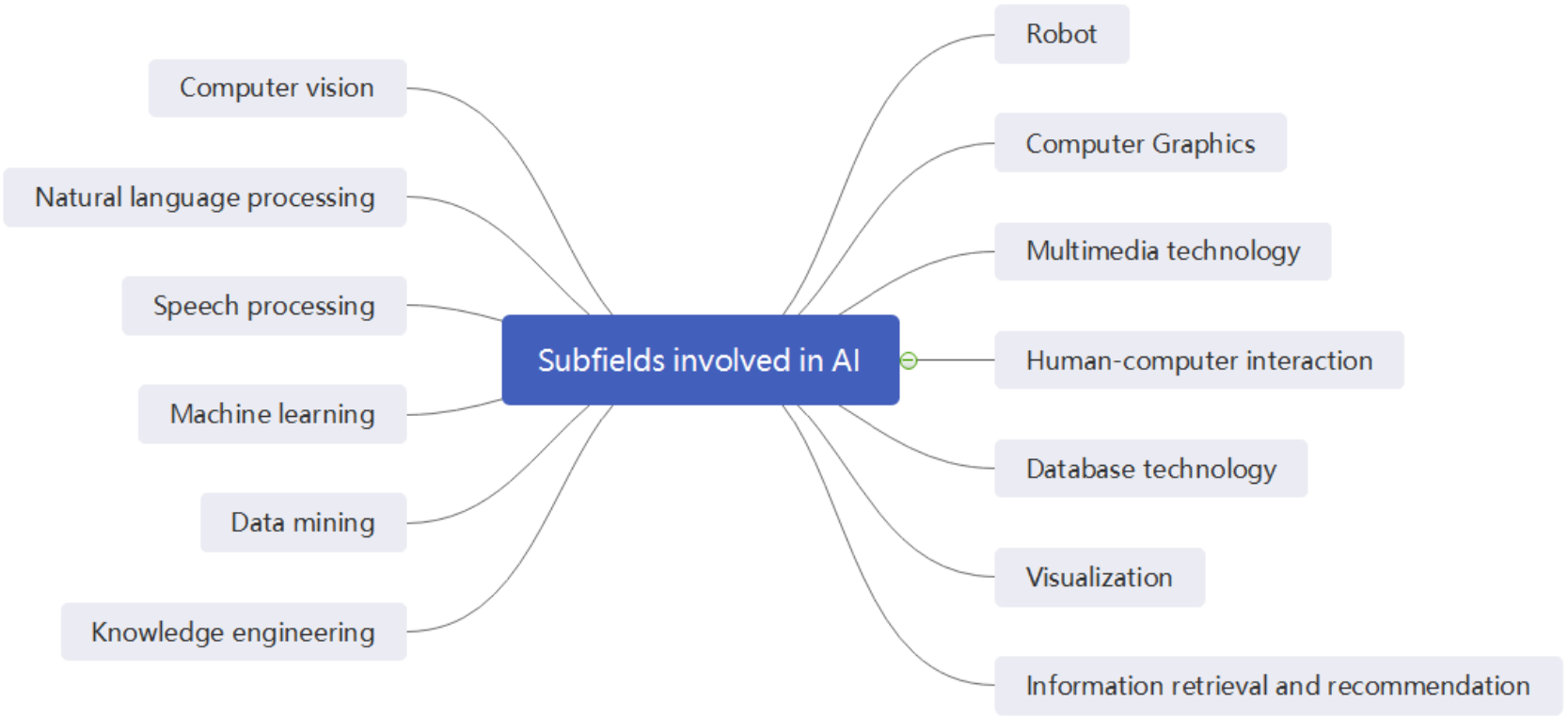
- Currently, there is no unified definition of AI research. Intelligent robots are generally classified into the following four types:
  - "Thinking like human beings": weak AI, such as Watson and AlphaGo
  - "Acting like human beings": weak AI, such as humanoid robot, iRobot, and Atlas of Boston Dynamics
  - "Thinking rationally": strong AI (Currently, no intelligent robots of this type have been created due to the bottleneck in brain science.)
  - "Acting rationally": strong AI

AI Industry Ecosystem

- The four elements of AI are data, algorithm, computing power, and scenario. To meet requirements of these four elements, we need to combine AI with cloud computing, big data, and IoT to build an intelligent society.



Sub-fields of AI



AI Development Report 2020

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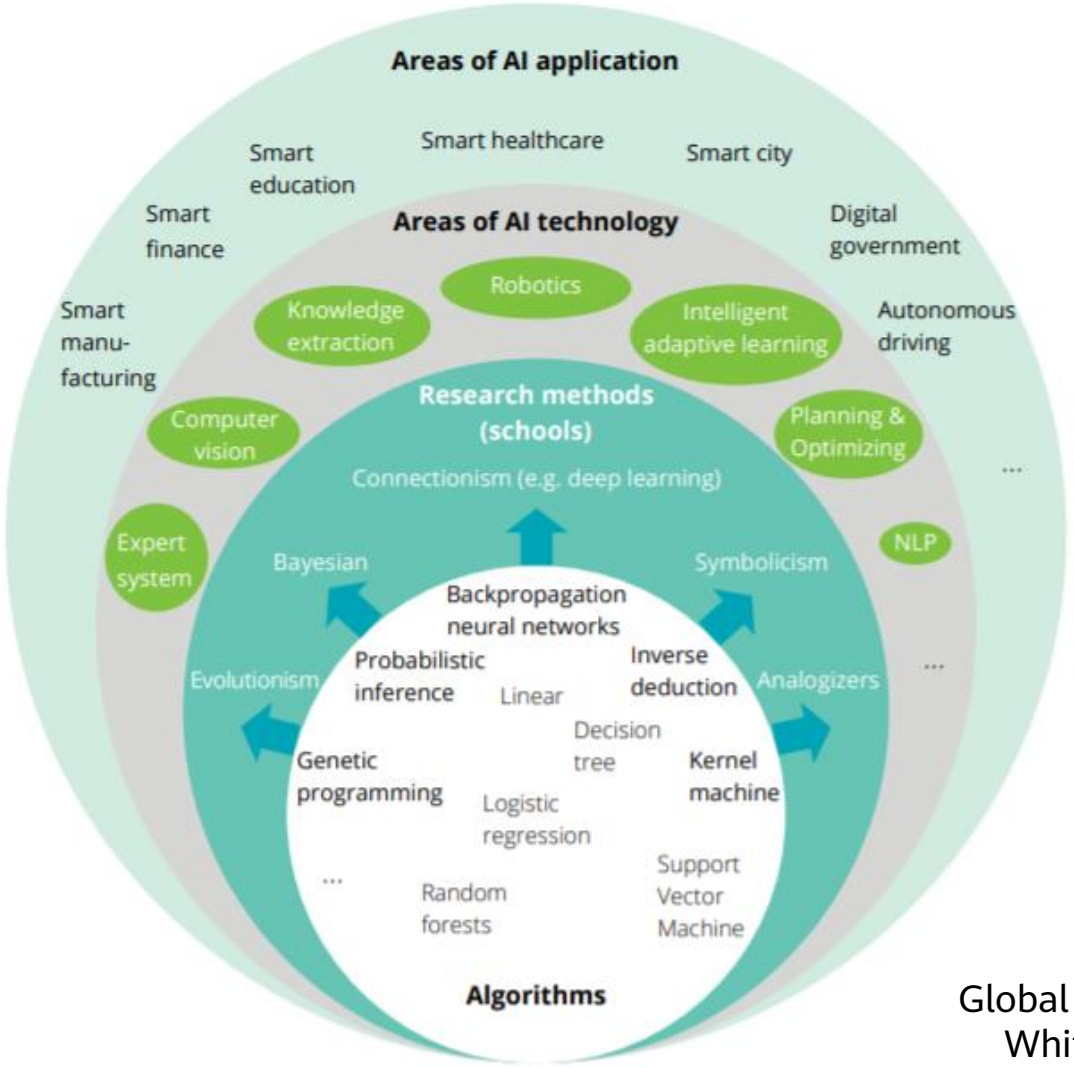
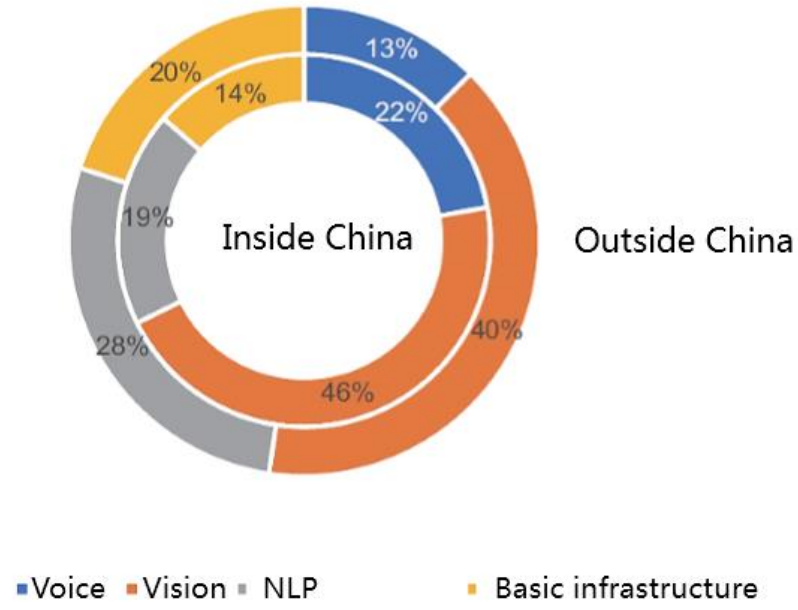
Technical Fields and Application Fields of AI



Global AI Development White Paper 2020

Distribution of AI Application Technologies in Enterprises Inside and Outside China

- At present, application directions of AI technologies mainly include:
  - **Computer vision**: a science of how to make computers "see"
  - **Speech processing**: a general term for various processing technologies used to research the voicing process, statistical features of speech signals, speech recognition, machine-based speech synthesis, and speech perception
  - **Natural language processing (NLP)**: a subject that use computer technologies to understand and use natural language

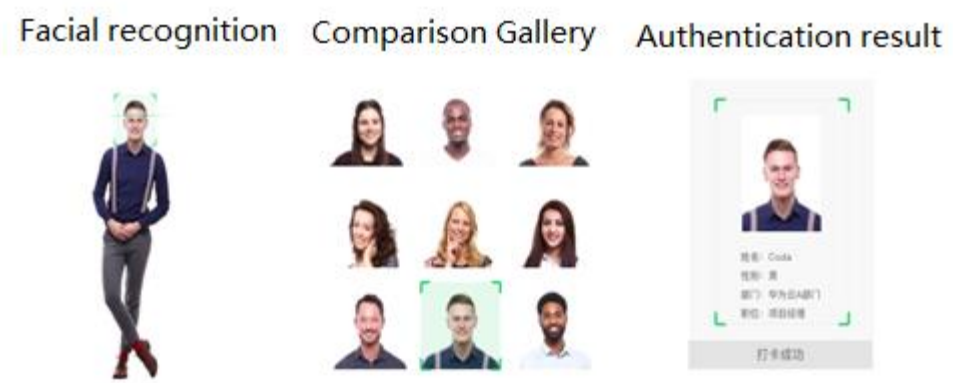


Distribution of AI application technologies in enterprises inside and outside China

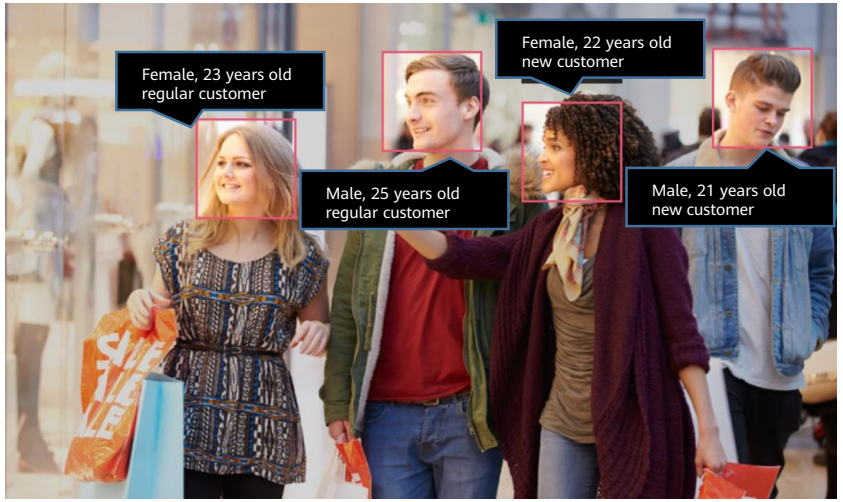
China AI Development Report 2018

Computer Vision Application Scenario (1)

- Computer vision is the most mature technology among the three AI technologies. The main topics of computer vision research include image classification, target detection, image segmentation, target tracking, optical character recognition (OCR), and facial recognition.
- In the future, computer vision is expected to enter the advanced stage of autonomous understanding, analysis, and decision-making, enabling machines to "see" and bringing greater value to scenarios such as unmanned vehicles and smart homes.
- Application scenarios:



Electronic attendance

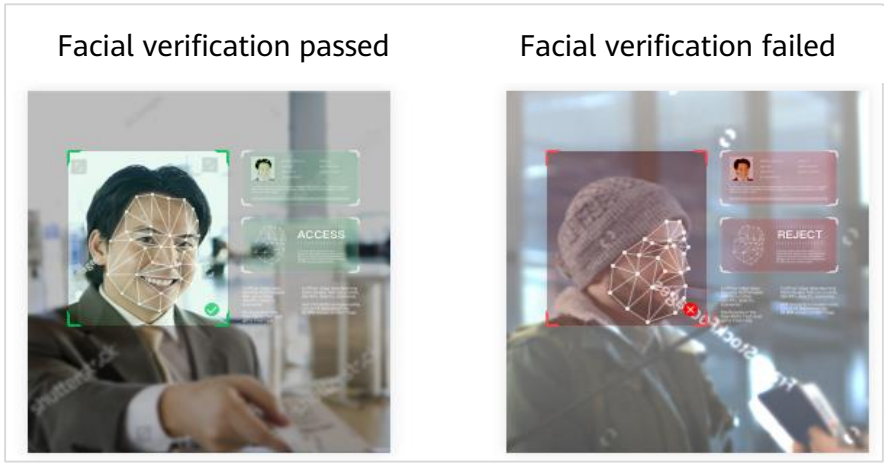


Traffic analysis

Computer Vision Application Scenario (2)

Action analysis

Authentication



Smart album

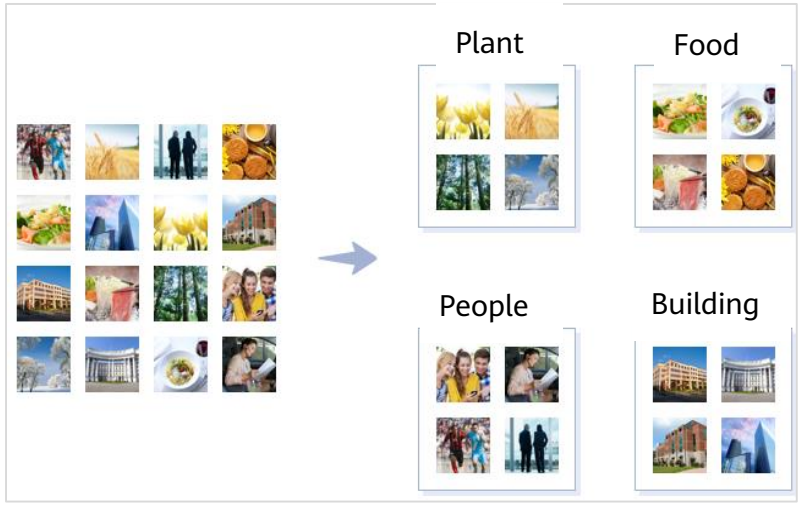
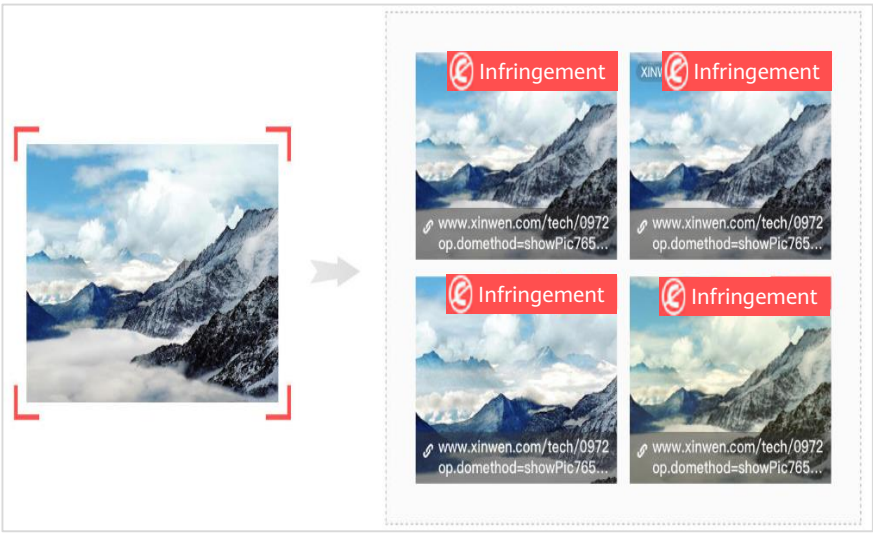


Image search



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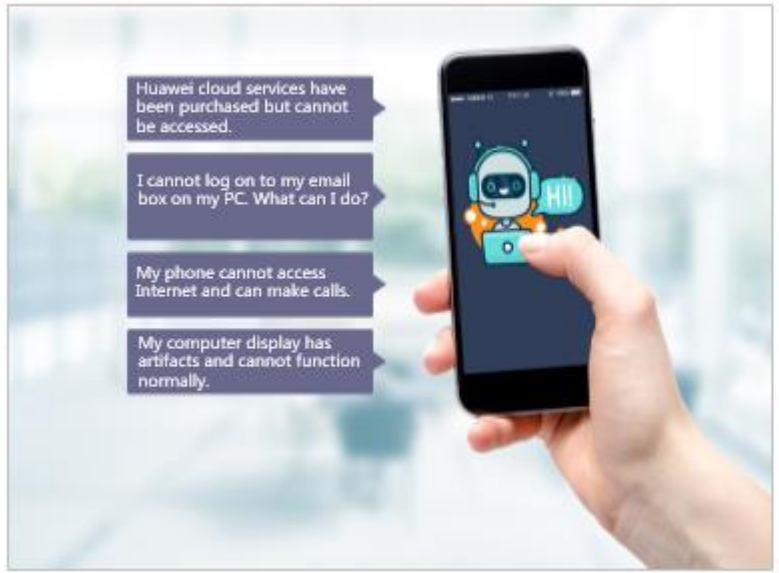
Voice Processing Application Scenario (1)

- The main topics of voice processing research include voice recognition, voice synthesis, voice wakeup, voiceprint recognition, and audio-based incident detection. Among them, the most mature technology is voice recognition. As for near field recognition in a quite indoor environment, the recognition accuracy can reach 96%.
- Application scenarios:

Question Answering Bot (QABot)



Voice navigation

Voice Processing Application Scenario (2)

Intelligent education

Real-time conference records

- Other applications:
  - Spoken language evaluation
  - Diagnostic robot
  - Voiceprint recognition
  - Smart sound box
  - ...

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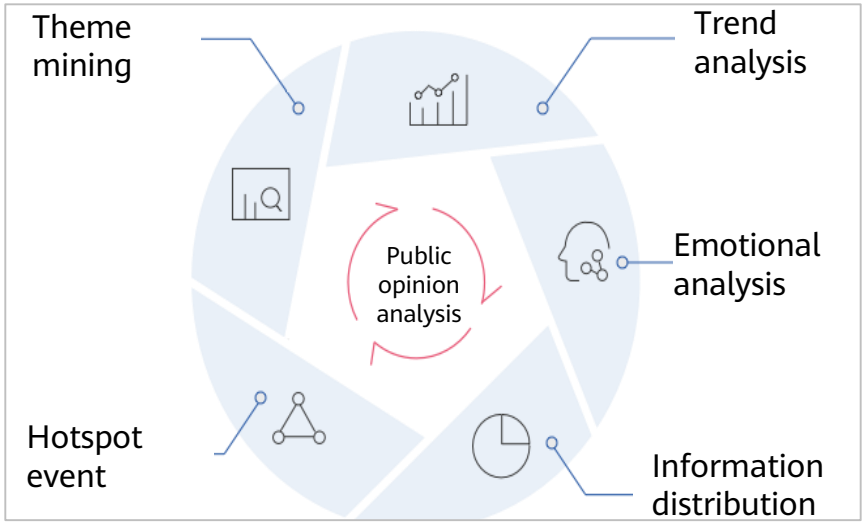
NLP Application Scenario (1)

- The main topics of NLP research include machine translation, text mining, and sentiment analysis. NLP imposes high requirements on technologies but confronts low technology maturity. Due to high complexity of semantics, it is hard to reach the human understanding level using parallel computing based on big data and parallel computing only.
- In future, NLP will achieve more growth: understanding of shallow semantics → automatic extraction of features and understanding of deep semantics; single-purpose intelligence (ML) → hybrid intelligence (ML, DL, and RL)
- Application scenarios:

Public opinion analysis



Evaluation analysis

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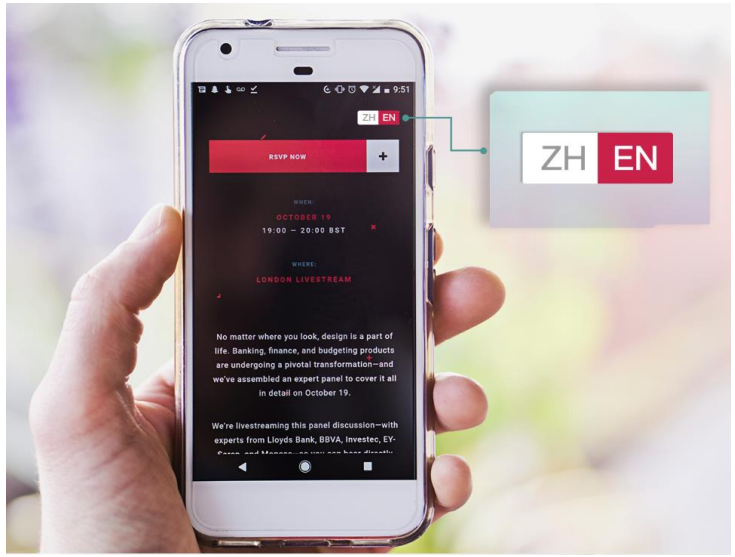
NLP Application Scenario (2)

Machine translation



Text classification

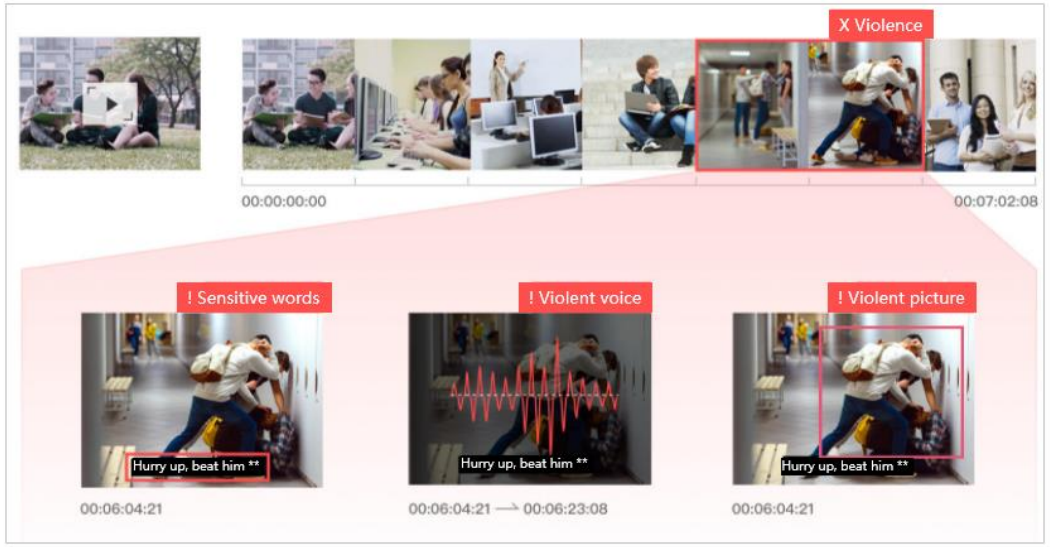
- Other applications:
  - Knowledge graph
  - Intelligent copywriting
  - Video subtitle
  - ...

AI Application Field - Intelligent Healthcare

- **Medicine mining:** quick development of personalized medicines by AI assistants
- **Health management:** nutrition, and physical/mental health management
- **Hospital management:** structured services concerning medical records (focus)
- **Assistance for medical research:** assistance for biomedical researchers in research
- **Virtual assistant:** electronic voice medical records, intelligent guidance, intelligent diagnosis, and medicine recommendation
- **Medical image:** medical image recognition, image marking, and 3D image reconstruction
- **Assistance for diagnosis and treatment:** diagnostic robot
- **Disease risk forecast:** disease risk forecast based on gene sequencing

AI Application Field - Intelligent Security

- Security protection is considered the easiest field for AI implementation. AI technologies applied in this field are relatively mature. The field involves massive data of images and videos, laying a sound foundation for training of AI algorithms and models. Currently, AI technologies are applied to two directions in the security protection field, namely, civil use and police use.
- Application scenarios:
  - **Police use:** suspect identification, vehicle analysis, suspect tracking, suspect search and comparison, and access control at key places
  - **Civil use:** facial recognition, eployment



AI Application Field - Smart Home

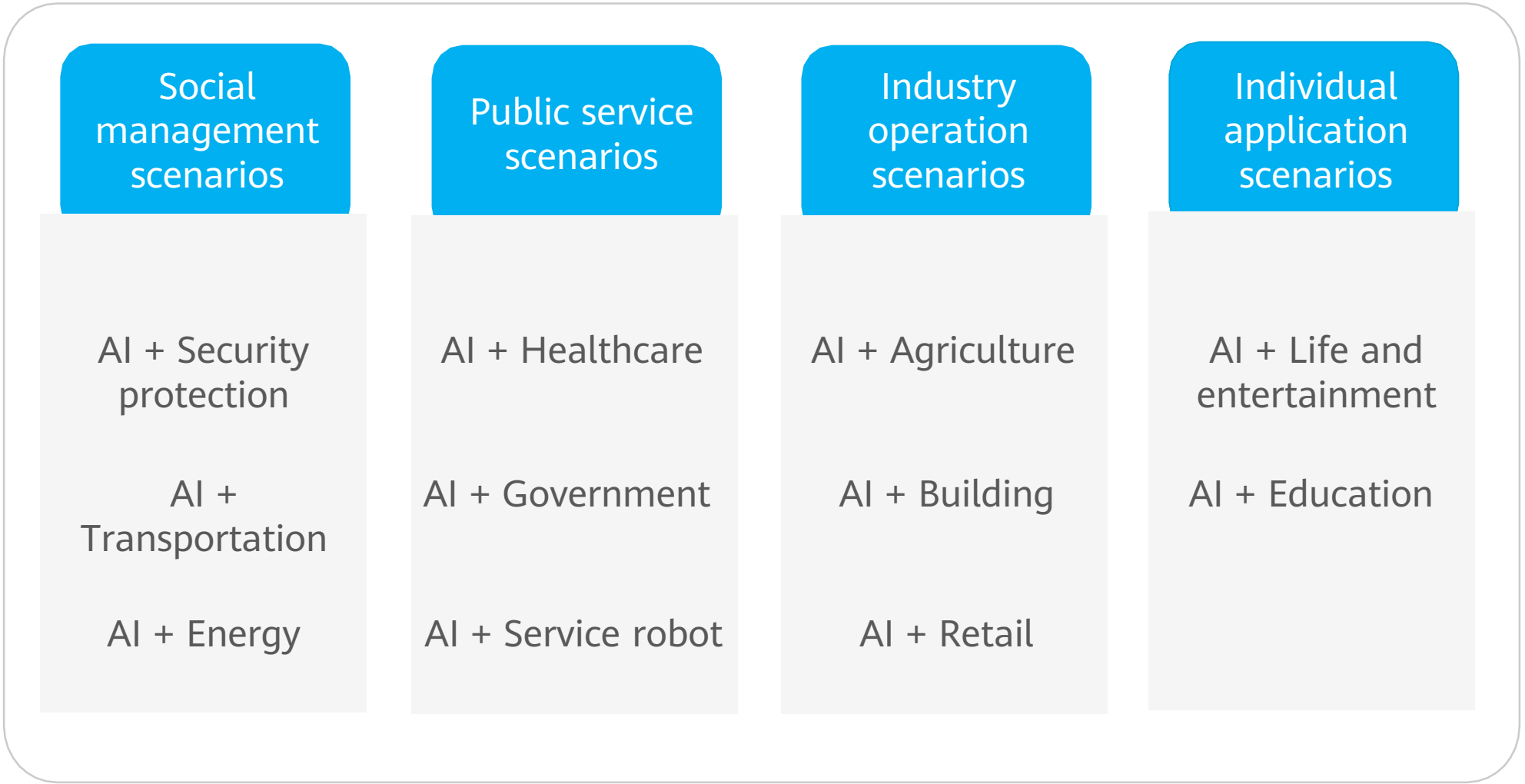
- Based on IoT technologies, a smart home ecosystem is formed with hardware, software, and cloud platforms, providing users personalized life services and making home life more convenient, comfortable, and safe.

Control smart home products with voice processing such as air conditioning temperature adjustment, curtain switch control, and voice control on the lighting system.

Implement **home security protection** with computer vision technologies, for example, facial or fingerprint recognition for unlocking, real-time intelligent camera monitoring, and illegal intrusion detection.

Develop user profiles and recommend content to users with the help of machine learning and deep learning technologies and based on historical records of smart speakers and smart TVs.

AI Application Field - Smart City



AI Application Field - Retail

- AI will bring revolutionary changes to the retail industry. A typical symptom is unmanned supermarkets. For example, Amazon Go, unmanned supermarket of Amazon, uses sensors, cameras, computer vision, and deep learning algorithms to completely cancel the checkout process, allowing customers to pick up goods and "just walk out".
- One of the biggest challenges for unmanned supermarket is how to charge the right fees to the right customers. So far, Amazon Go is the only successful business case and even this case involves many controlled factors. For example, only Prime members can enter Amazon Go. Other enterprises, to follow the example of Amazon, have to build their membership system first.

AI Application Field - Autonomous Driving

- The Society of Automotive Engineers (SAE) in the U.S. defines 6 levels of driving automation ranging from 0 (fully manual) to 5 (fully autonomous). L0 indicates that the driving of a vehicle completely depends on the driver's operation. The system above L3 can implement the driver's hand-off operation in specific cases, L5 depends on the system when vehicles are driving in all scenarios.
- Currently, only some commercial passenger vehicle models, such as Audi A8, Tesla, and Cadillac, support L2 and L3 Advanced driver-assistance systems (ADAS). It is estimated that by 2020, more L3 vehicle models will emerge with the further improvement of sensors and vehicle-mounted processors. L4 and L5 autonomous driving is expected to be first implemented on **commercial vehicles in closed campuses**. A wider range of passenger vehicles require advanced autonomous driving, which requires further improvement of technologies, policies, and infrastructure. It is estimated that L4 and L5 autonomous driving will be supported by common roads in 2025–2030.

AI Will Change All Industries

Public sector

- Safe City
- Intelligent transport
- Disaster prediction

Education

- Personalization
- Attention improvement
- Robot teacher

Healthcare

- Early prevention
- Diagnosis assistance
- Precision cure

Media

- Real-time translation
- Abstraction
- Inspection

Pharmacy

- Fast R&D
- Precise trial
- Targeted medicine

Logistics

- Routing planning
- Monitoring
- Auto sorting

Finance

- Doc process
- Real-time fraud prevention
- Up-sell

Insurance

- Auto detection
- Fraud prevention
- Innovative service

Retail

- Staff-less shops
- Real-time inventory
- Precise recommendations

Manufacturing

- Defect detection
- Industrial internet
- Predictive maintenance

Telecom

- Customer service
- Auto O&M
- Auto optimization

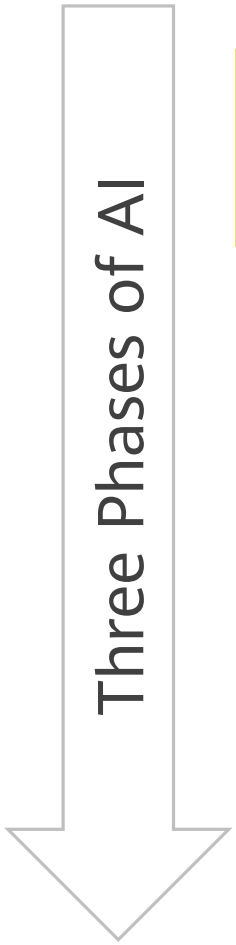
Oil and gas

- Localization
- Remote maintenance
- Operation optimization

Agriculture

- Fertilization improvement Remote operation
- Seeds development

AI: Still in Its Infancy



	Ability	Example Value	Benefits
Computing intelligence	**Capable of storage and computing:** Machines can compute and transfer information as human beings do.	Distributed computing and neural network	Help human beings store and quickly process massive data, laying a foundation for perception and cognition.
Perceptual intelligence	**Capable of listening and seeing:** Machines can listen and see, make judgments, and take simple actions.	Cameras capable of facial recognition and speakers able to understand speeches	Help human beings efficiently finish work related to listening and seeing.
Cognitive intelligence	**Capable of understanding and thinking:** Machines can understand, think, and make decisions like human beings.	Unmanned vehicles enabling autonomous driving and robots acting autonomously	Fully assist in or replace partial work of human beings.

As-is of AI: initial stage of **perceptual intelligence**

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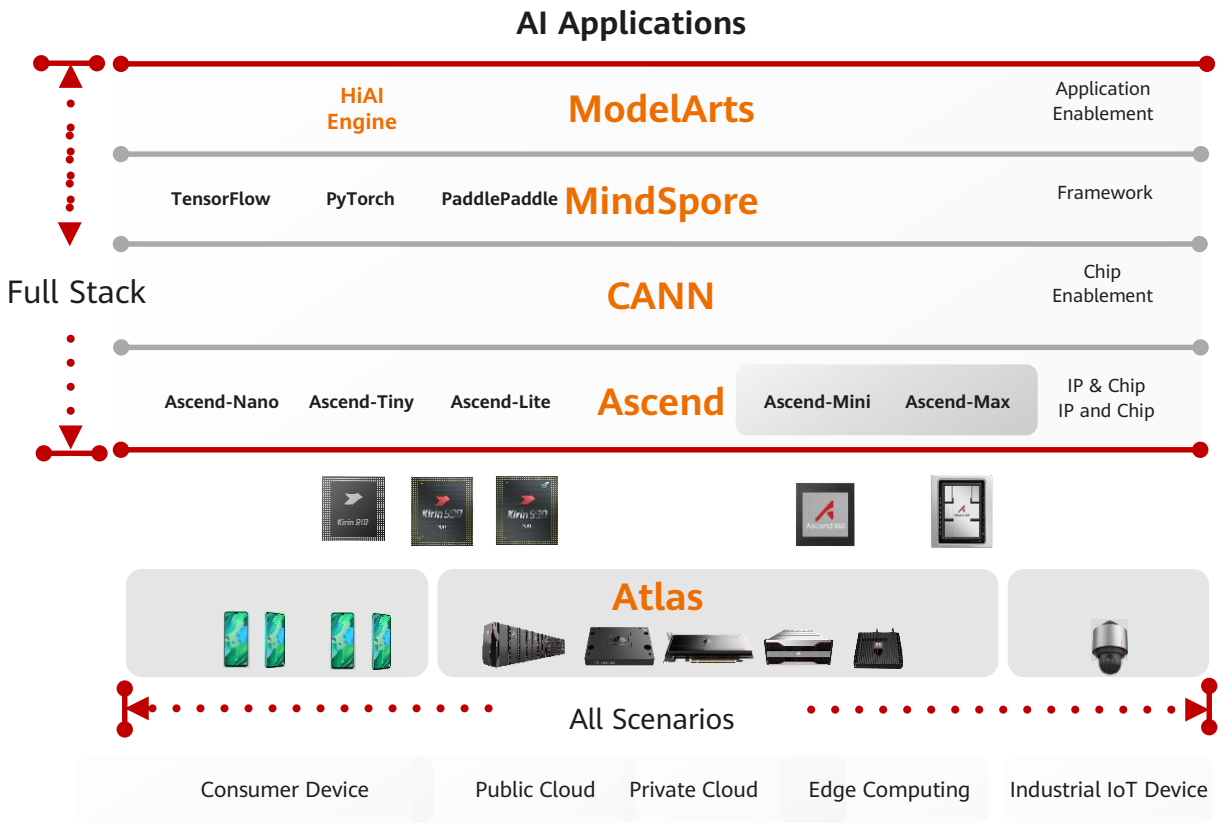
Huawei's Full-Stack, All-Scenario AI Portfolio



Application enablement: provides end-to-end services (ModelArts), layered APIs, and pre-integrated solutions.

MindSpore: supports the unified training and inference framework that is independent of the device, edge, and cloud.

CANN: a chip operator library and highly automated operator development tool.

Ascend: provides a series of NPU IPs and chips based on a unified, scalable architecture.

Atlas: enables an all-scenario AI infrastructure solution that is oriented to the device, edge, and cloud based on the Ascend series AI processors and various product forms.

Huawei's "all AI scenarios" indicate different deployment scenarios for AI, including public clouds, private clouds, edge computing in all forms, industrial IoT devices, and consumer devices.

Full Stack - ModelArts Full-Cycle AI Workflow

EI Intelligent Twins

EI Cognition Service AI Service

Data

AI data framework

Efficient filtering and semi-automated labeling, data preprocessing
Efficiency improved by 100 times

Algorithm development

Out-of-the-box development environment compatible with mainstream frameworks
MoXing library, simplifying model development
Built-in model algorithms, improving development efficiency

Training

Distributed training, shortening training period **from weeks to minutes**

Wizard-based AutoLearning**, code-free development, enabling model training from scratch**

Deployment

One-click deployment on device, edge, and cloud
All-scenario deployment
Inference on the Ascend AI processor

Market

AI sharing platform helps enterprises build internal and external **AI ecosystems**

AI applications

Visualized Workflow Management

Version management, traceable and worry-free development

ModelArts

AI data framework accelerates data processing by 100 folds.

Visualized workflow management makes development worry-free.

Distributed training shortens training from weeks to minutes.

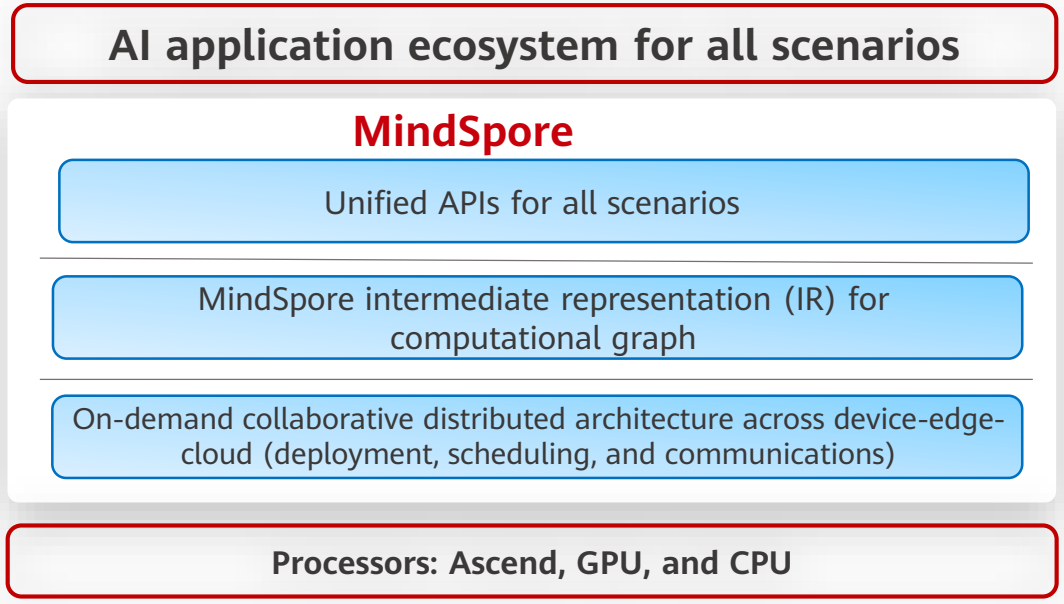
One-click deployment on device, edge, and cloud supports various deployment scenarios.

Automatic learning enables you to start from scratch.

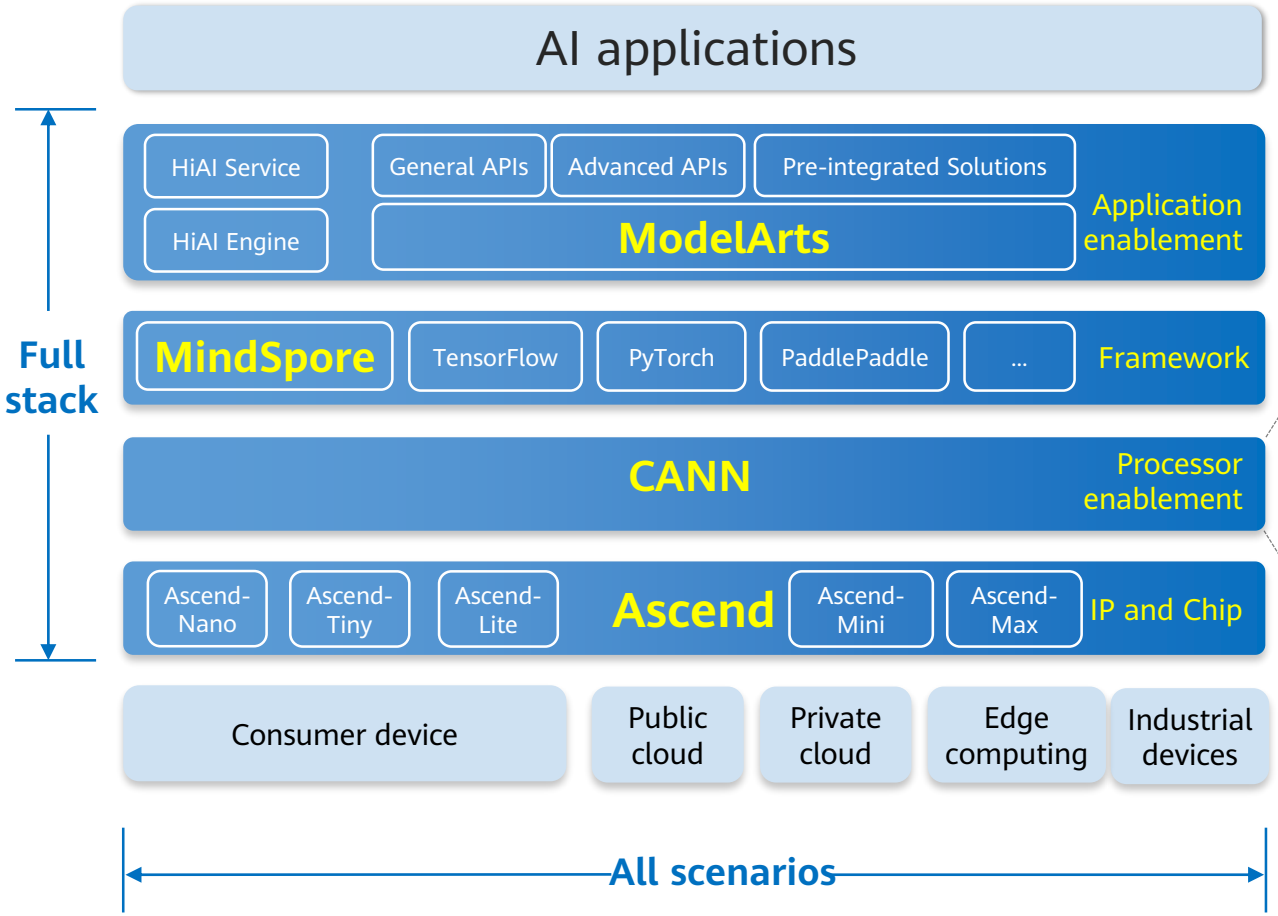
AI sharing platform builds internal and external AI ecosystems for enterprises.

Full Stack — MindSpore (Huawei AI Computing Framework)

- MindSpore provides automatic parallel capabilities. With MindSpore, senior algorithm engineers and data scientists who focus on data modeling and problem solving can run algorithms on dozens or even thousands of AI computing nodes with only a few lines of description.
- The MindSpore framework supports both large-scale and small-scale deployment, adapting to independent deployment in all scenarios. In addition to the Ascend AI processors, MindSpore also supports other processors such as GPUs and CPUs.



Full Stack — CANN

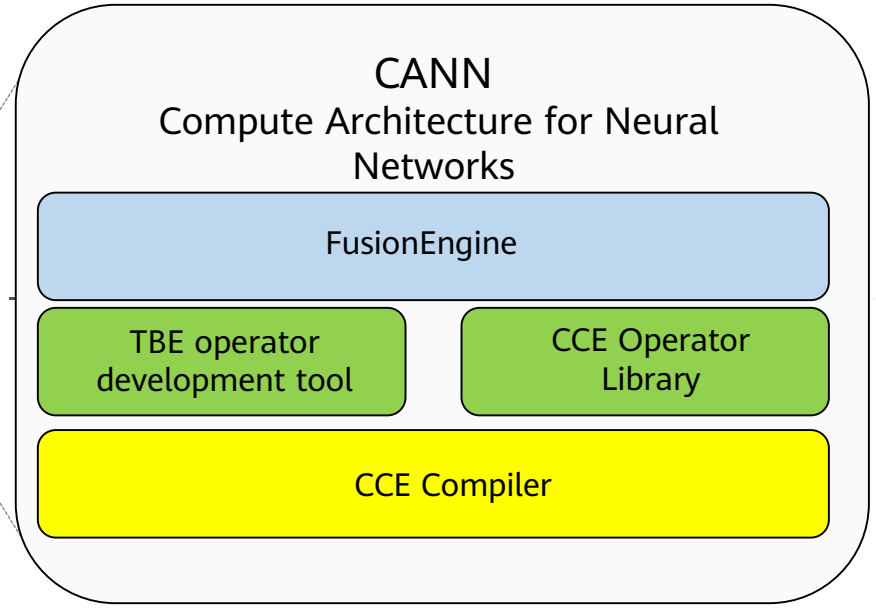


CANN:

A chip operators library and highly automated operator development toolkit

Optimal development efficiency, in-depth optimization of the common operator library, and abundant APIs

Operator convergence, best matching the performance of the Ascend chip



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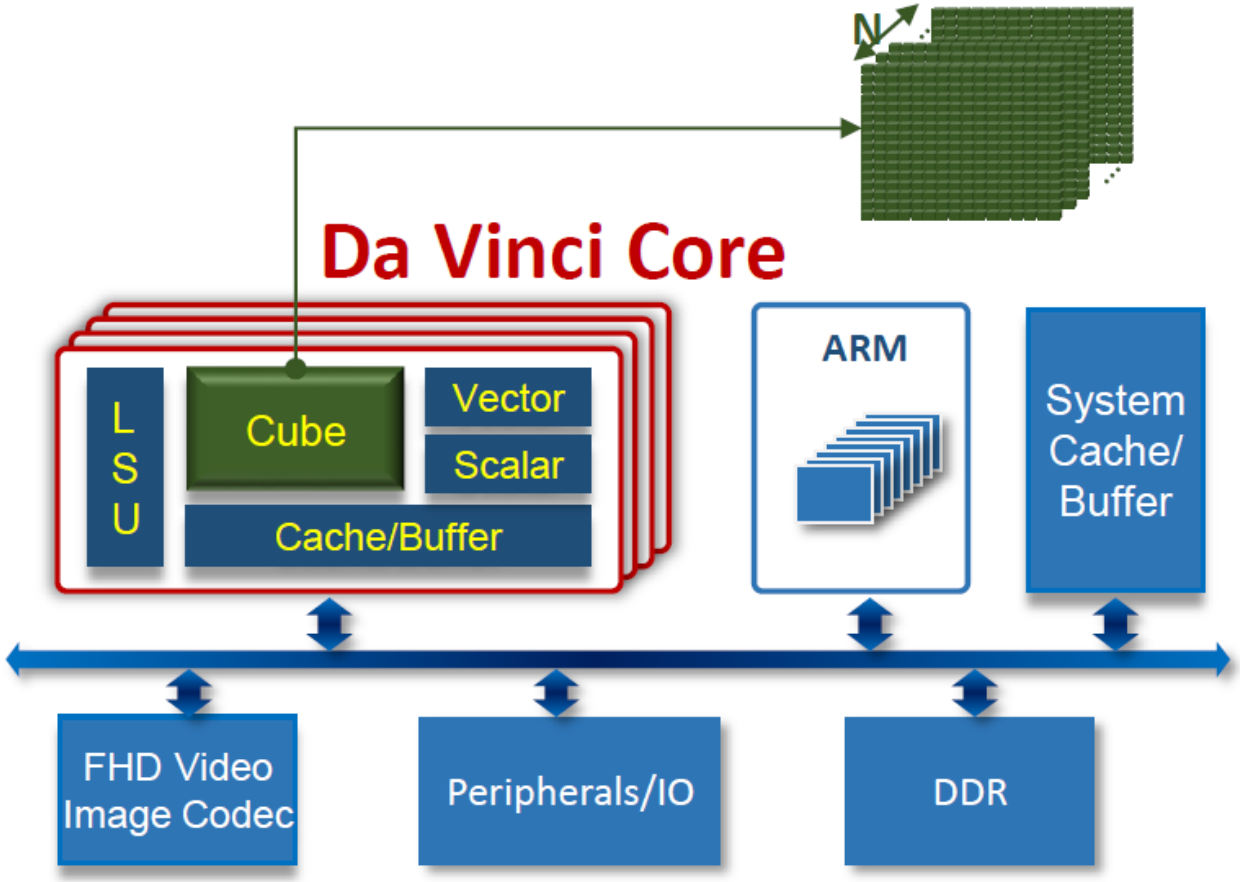
Full Stack — Ascend 310 AI Processor and Da Vinci Core

SPECIFICATIONS	Description
Architecture	AI co-processor
Performance	Up to 8T @FP16
	Up to 16T@INT8
Codec	16 Channel Decoder – H.264/265 1080P30 1 Channel Encoder
Memory Controller	LPDDR4X
Memory Bandwidth	2*64bit @3733MT/S
System Interface	PCIe3.0 /USB 3.0/GE
Package	15mm*15mm
Max Power	8Tops@4W, 16Tops@8W
Process	12nm FFC



Note: This is typical configuration, high performance and low power sku can be offered based on your requirement.

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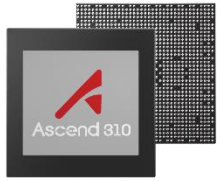
Ascend AI Processors: Infusing Superior Intelligence for Computing



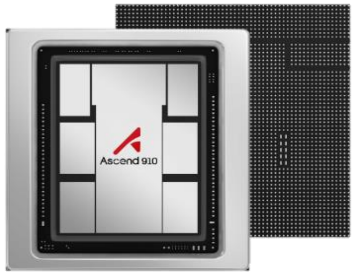
Ascend 310

AI SoC with ultimate energy efficiency

Ascend-Mini
Architecture: Da Vinci

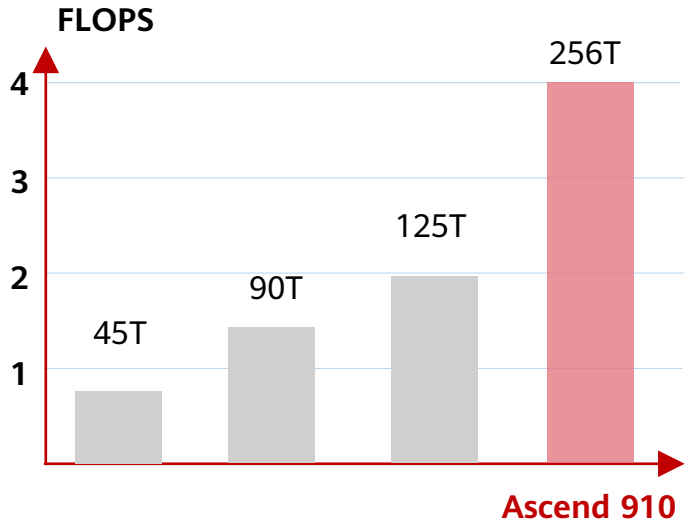
Half-precision (FP16): 8 TFLOPS
Integer precision (INT8): 16 TOPS
16-channel full-HD video decoder: H.264/265
1-channel full-HD video encoder: H.264/265

Max. power: 8 W



Ascend 910

Most powerful AI processor



Ascend-Max
Architecture: Da Vinci

Half-precision (FP16): 256 TFLOPS
Integer precision (INT8): 512 TOPS
128-channel full HD video decoder: H.264/265

Max. power: 310 W

Atlas AI Computing Platform Portfolio

Internet, security, finance, transportation, power, etc.

Application Enablement

Atlas intelligent edge platform
Industry SDK/Container engine/Basic service repository

Atlas deep learning platform
Cluster management/Model management/Data pre-processing

Framework

MindSpore

TensorFlow/PyTorch/Caffe/MxNet

Framework Adapret

CANN

AscendCL

Graph engine for graph optimization

Operator/Acceleration/Communication libraries (BLAS, FFT, DNN, Rand, Solver, Sparse, HCCL)

Runtime

Driver

Common components

Unified O&M and configuration management subsystem

Safety subsystem

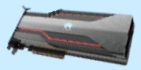
AXE toolchain (log/profiling/Mind Studio)

Chips & Hardware

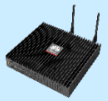
Atlas 200
16 TOPS INT8

Atlas 200 developer kit

Atlas 300 inference accelerator card
64 TOPS INT8



Atlas 300 training card
256 TFLOPS FP16



Atlas 500
16 TOPS INT8

Atlas 800 AI inference server
512 TOPS INT8

Atlas 800 AI training server
2 PFLOPS FP16

Atlas 900
256–1024 PFLOPS FP16

Ascend 310

Da Vinci Architecture

Ascend 910

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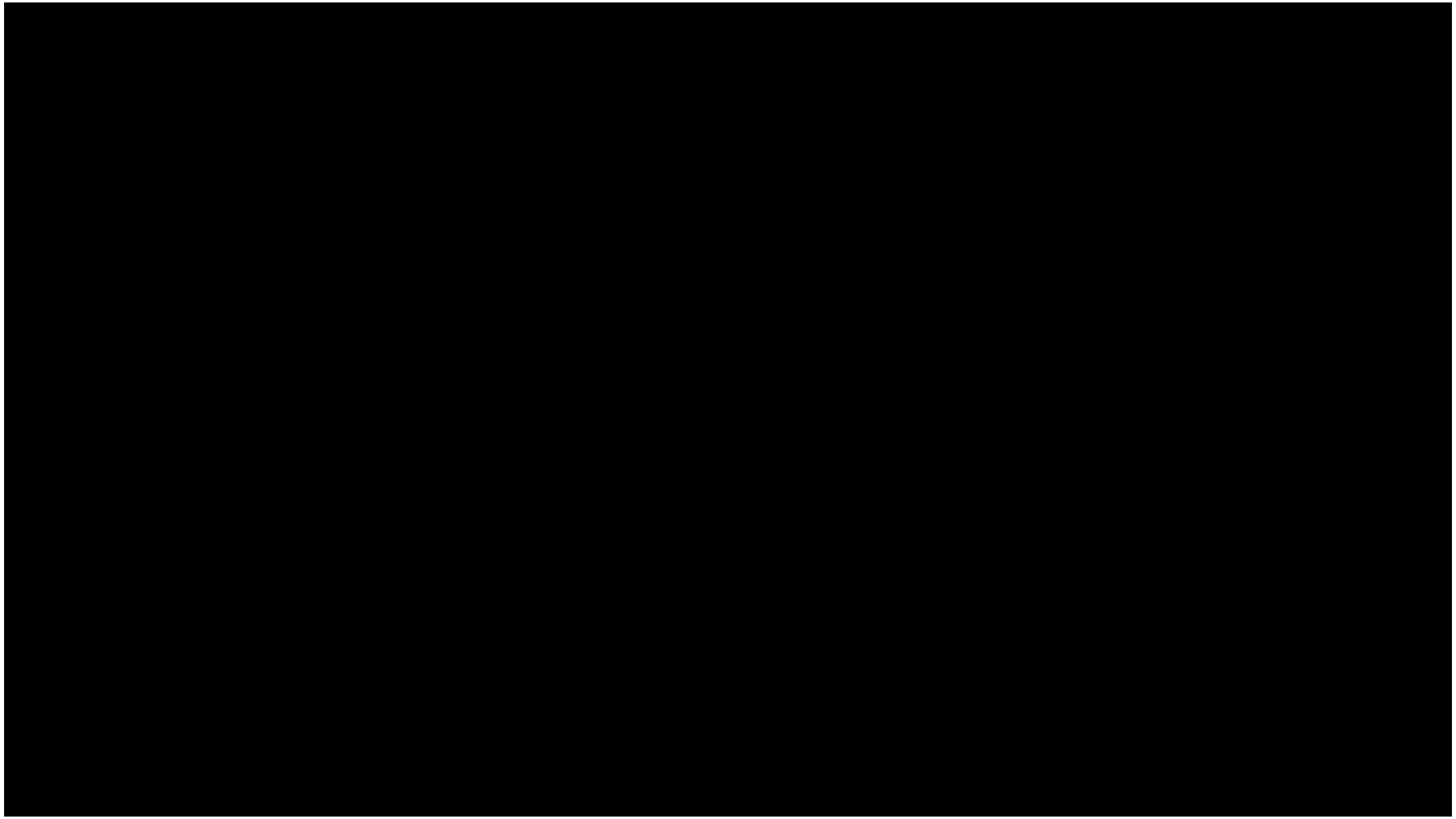
Huawei Atlas Computational Reasoning Platform

HUAWEI CLOUD AI and HUAWEI Mobile Phones Help RFCx Protect the Rainforest



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1. AI Overview
2. Technical Fields and Application Fields of AI
3. Huawei's AI Development Strategy
4. **AI Disputes**
5. Future Prospects of AI

Algorithmic Bias

- Algorithmic biases are mainly caused by data biases.
- When we use AI algorithms for decision-making, the algorithms may learn to discriminate an individual based on existing data including race and gender, and therefore create unfair outcomes, such as decisions that are discriminatory based on race, sex or other factors. Even if factors such as race or gender are excluded from the data, the algorithms can make discriminatory decisions based on information of names and addresses.

If we search with a name sounds like an African American, an advertisement for **a tool used to search criminal records** may be displayed. The advertisement, however, is not likely displayed in other cases.

Online advertisers tend to display advertisements of lower-priced goods to **female users**.

Google's image software once mistakenly labeled an image of black people as **"gorilla"**.

Privacy Issues

- The existing AI algorithms are all data-driven. In this case, we need a large amount of data to train models. We enjoy the convenience brought by AI every day while technology companies like Facebook, Google, Amazon, and Alibaba are obtaining an enormous amount of user data, which will reveal various aspects of our lives including politics, religions, and gender.

In principle, technology companies can record each click, each page scrolling, time of viewing any content, and browsing history when users access the Internet.

Technology companies can know our privacy including where are we, where we go, what we have done, education background, consumption capabilities, and personal preferences based on our ride-hailing records and consumption records.

Seeing = Believing?

- With the development of computer vision technologies, reliability of images and videos is decreasing. Fake images can be produced with technologies such as PS and generative adversarial networks (GAN), making it hard to identify whether images are true or not.
- Example:
  - A suspect provided fake evidence by forging an image in which the suspect is in a place where he has never been to or with someone he has never seen using PS technologies.
  - In advertisements for diet pills, people's appearances before and after weight loss can be changed with PS technologies to exaggerate the effect of the pills.
  - Lyrebird, a tool for simulating voice of human beings based on recording samples of minutes, may be used by criminals.
  - Household images released on rent and hotel booking platforms may be generated through GAN.

AI Development = Rising Unemployment?

- Looking back, human beings have always been seeking ways to improve efficiency, that is, obtain more with less resources. We used sharp stones to hunt and collect food more efficiently. We used steam engines to reduce the need for horses. Every step in achieving automation will change our life and work. In the era of AI, what jobs will be replaced by AI?
- The answer is repetitive jobs that involve little creativity and social interaction.

Jobs Most Likely to Be Replaced by AI	Jobs Most Unlikely to Be Replaced by AI
Courier	Writer
Taxi driver	Management personnel
Soldier	Software engineers
Accounting	HR manager
Telesales personnel	Designer
Customer service	Activity planner
...	...

Problems to Be Solved

- Are AI-created works protected by copyright laws?
- Who gives authority to robots?
- What rights shall be authorized to robots?
- …

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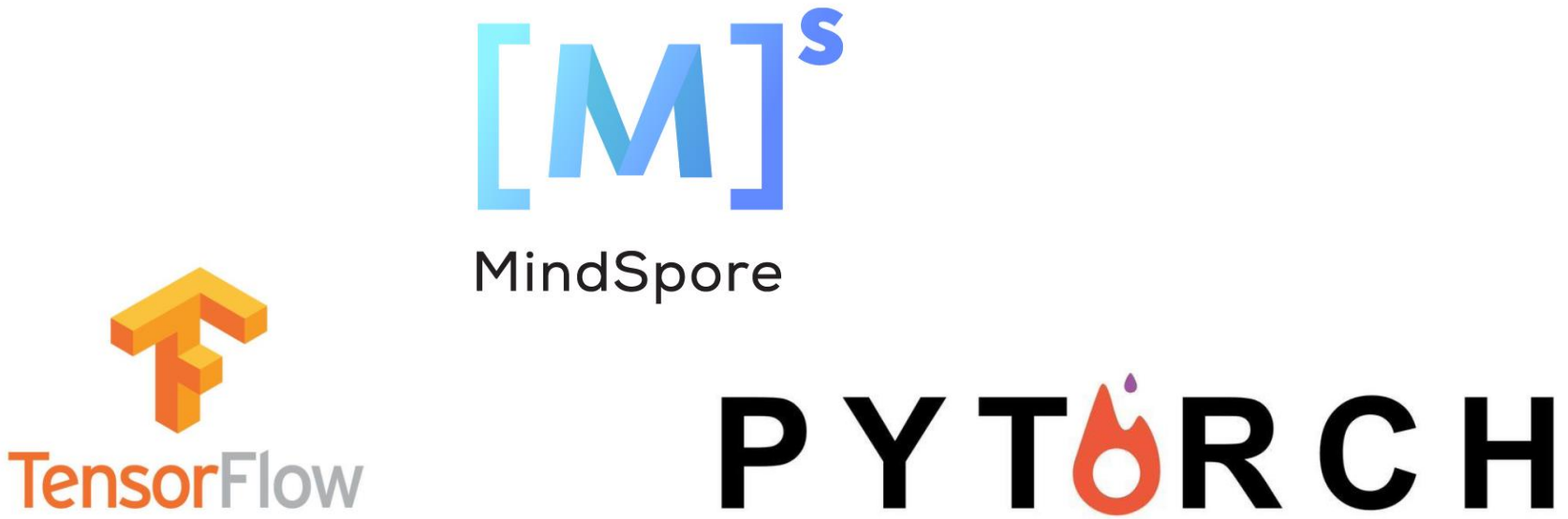
Development Trends of AI Technologies

- Framework: easier-to-use development framework
- Algorithm: algorithm models with better performance and smaller size
- Computing power: comprehensive development of device-edge-cloud computing
- Data: more comprehensive basic data service industry and more secure data sharing
- Scenario: continuous breakthroughs in industry applications

Easier-to-Use Development Framework

- Various AI development frameworks are evolving towards ease-of-use and omnipotent, continuously lowering the threshold for AI development.

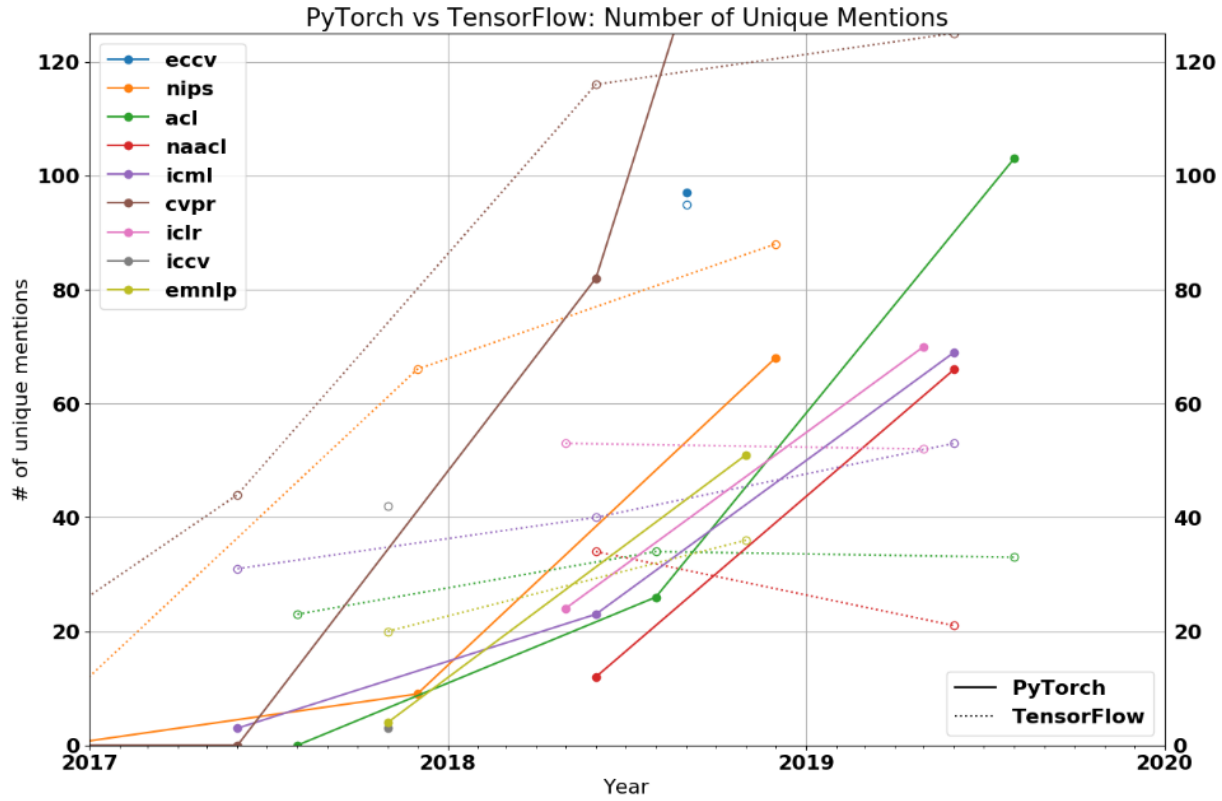


Tensorflow 2.0

- TensorFlow 2.0 has been officially released. It integrates Keras as its high-level API, greatly improving usability.

Pytorch vs Tensorflow

- PyTorch is widely recognized by academia for its ease of use.



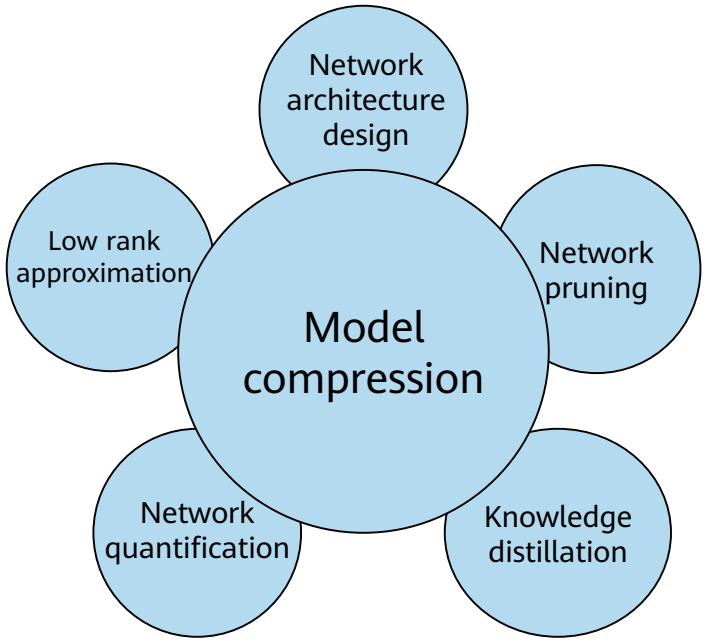
Comparison between PyTorch and TensorFlow usage statistics of top academic conferences

Algorithms Model with Better Performance

- In the computer vision field, GAN has been able to generate high-quality images that cannot be identified by human eyes. GAN-related algorithms have been applied to other vision-related tasks, such as semantic segmentation, facial recognition, video synthesis, and unsupervised clustering.
- In the NLP field, the pre-training model based on the Transformer architecture has made a significant breakthrough. Related models such as BERT, GPT, and XLNet are widely used in industrial scenarios.
- In the reinforcement learning field, AlphaStar of the DeepMind team defeated the top human player in StarCraft II.
- ...

Smaller Deep Learning Models

- A model with better performance usually has a larger quantity of parameters, and a large model has lower running efficiency in industrial applications. More and more model compression technologies are proposed to further compress the model size while ensuring the model performance, meeting the requirements of industrial applications.
  - Low rank approximation
  - Network pruning
  - Network quantification
  - Knowledge distillation
  - Compact network design



Computing Power with Comprehensive Device-Edge-Cloud Development

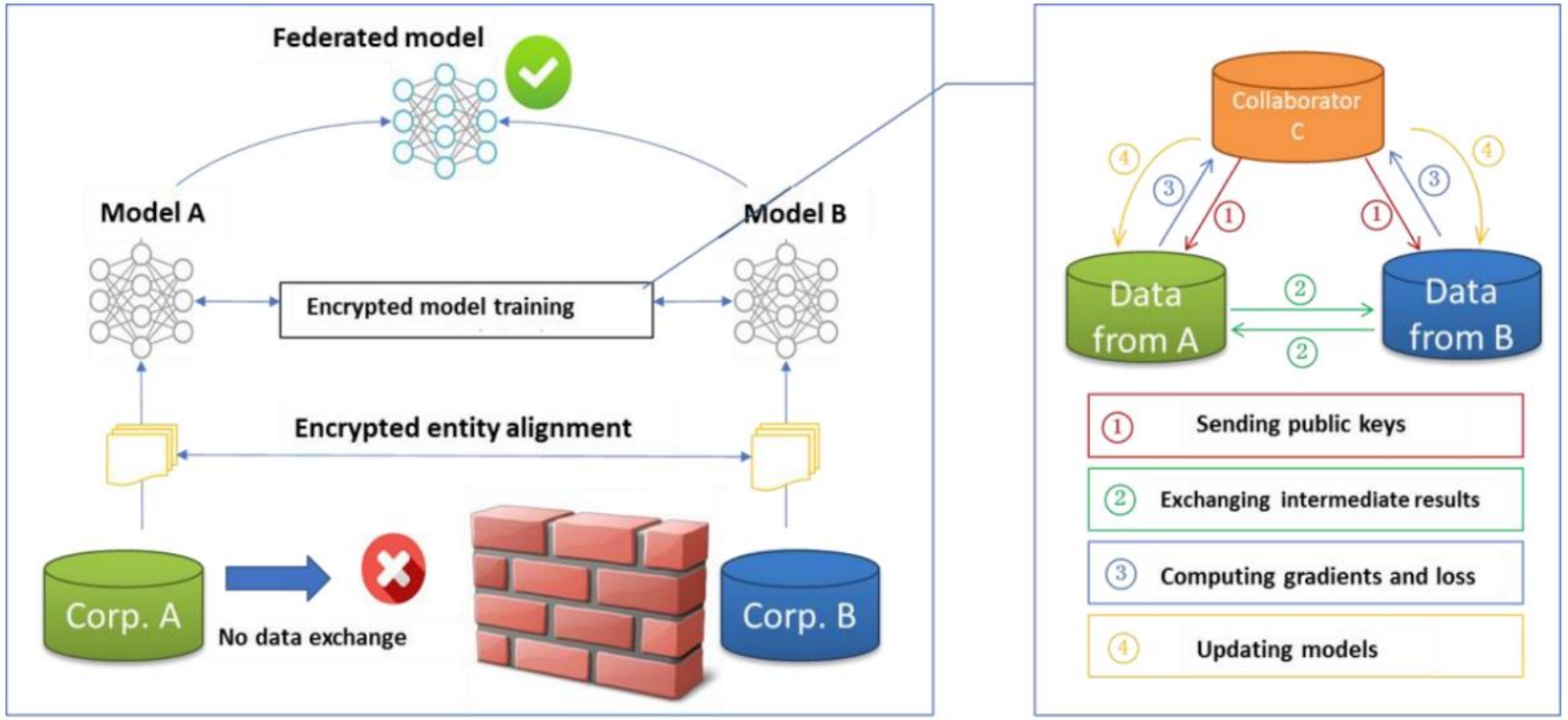
- The scale of AI chips applied to the cloud, edge devices, and mobile devices keeps increasing, further meeting the computing power demand of AI.

China AI Chip Industry Development White Paper 2020

Market Scale and Growth Prediction of AI Chips in China from 2020 to 2021

More Secure Data Sharing

- Federated learning uses different data sources to train models, further breaking data bottlenecks while ensuring data privacy and security.



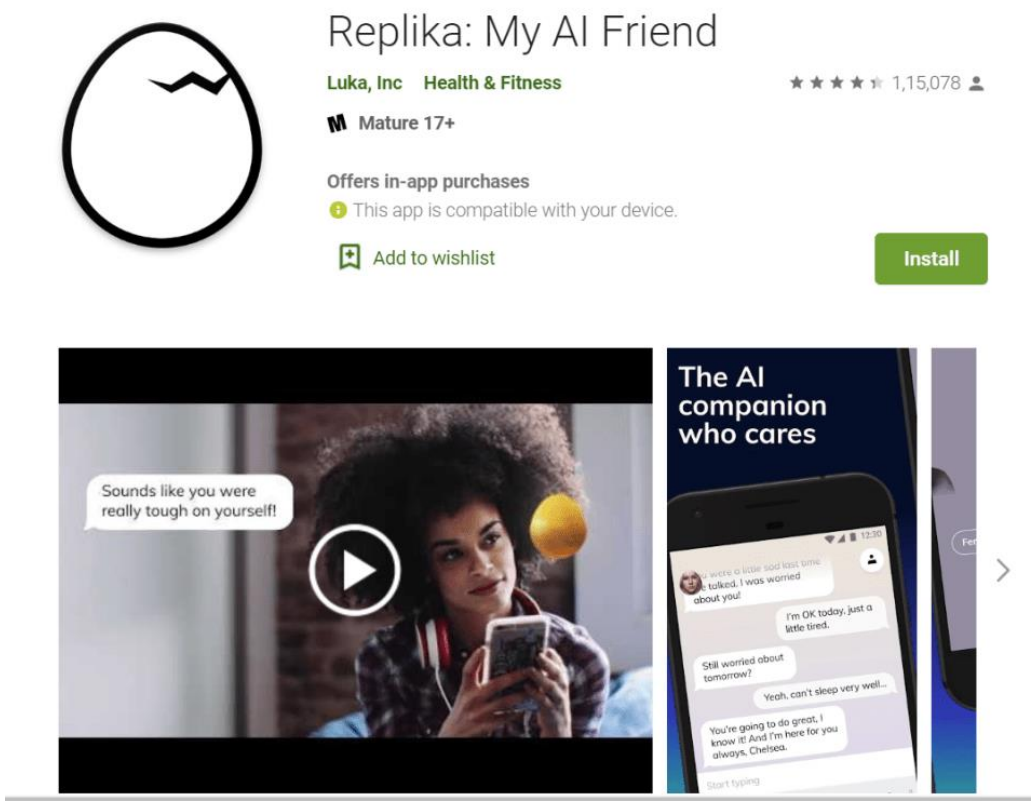
Federated Learning White Paper V1.0

Continuous Breakthroughs in Application Scenarios

- With the continuous exploration of AI in various verticals, the application scenarios of AI will be continuously broken through.
  - Mitigating psychological problems
  - Automatic vehicle insurance and loss assessment
  - Office automation
  - ...

Mitigating Psychological Problems

- AI chat robots help alleviate mental health problems such as autism by combining psychological knowledge.



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Automatic Vehicle Insurance and Loss Assessment

- AI technologies help insurance companies optimize vehicle insurance claims and complete vehicle insurance loss assessment using deep learning algorithms such as image recognition.

Office Automation

- AI is automating management, but the different nature and format of data makes it a challenging task. While each industry and application has its own unique challenges, different industries are gradually adopting machine learning-based workflow solutions.

Summary

- This chapter introduces the definition and development history of AI, describes the technical fields and application fields of AI, briefly introduces Huawei's AI development strategy, and finally discusses the disputes and the development trends of AI.