

HUAWEI CLOUD Enterprise Intelligence Application Platform



Objectives

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

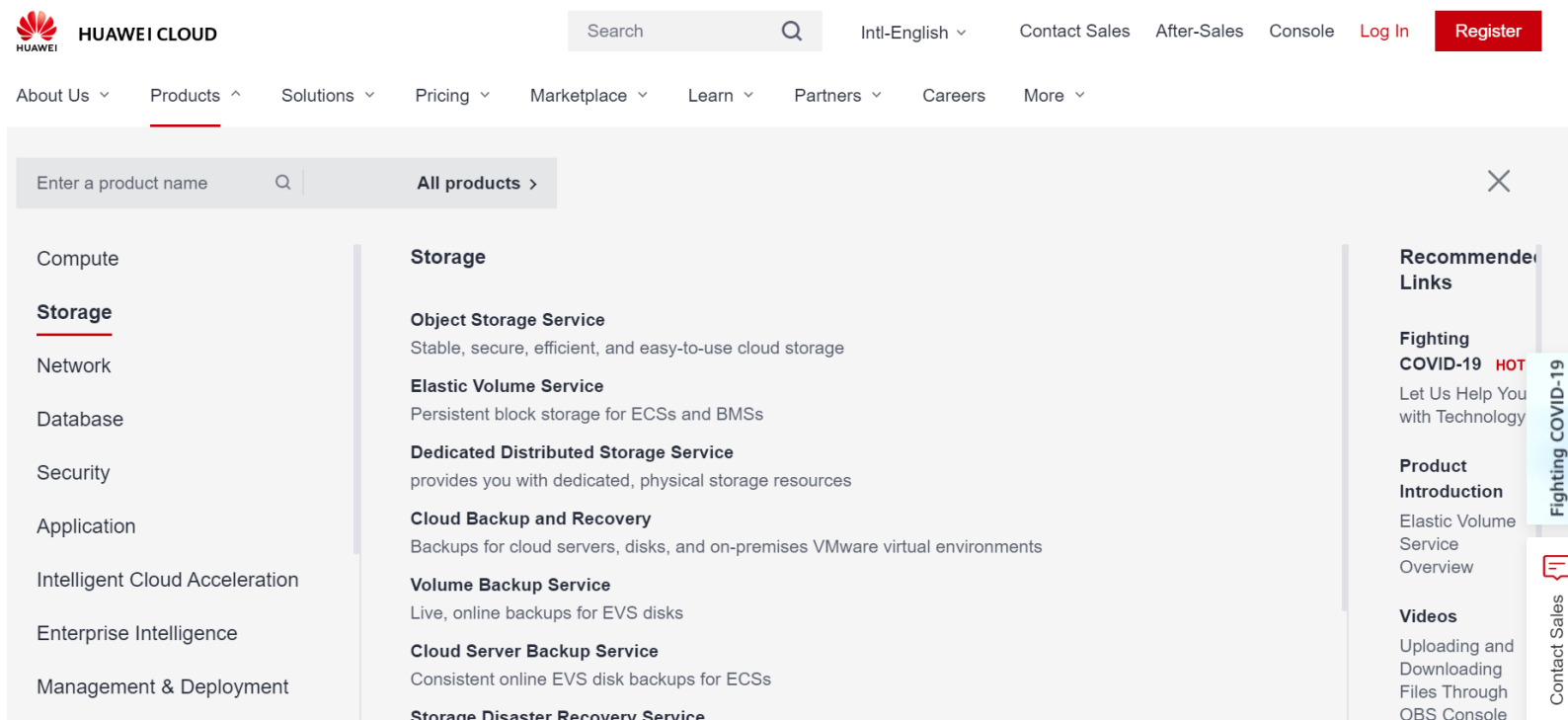
- Know the HUAWEI CLOUD enterprise intelligence (EI) ecosystem and services.
- Know the Huawei ModelArts platform and how to perform operations on the platform.

Contents

- 1. Overview of HUAWEI CLOUD EI**
2. ModelArts
3. HUAWEI CLOUD EI Solutions

HUAWEI CLOUD EI Services

- HUAWEI CLOUD EI is a driving force for enterprises' intelligent transformation. Relying on AI and big data technologies, HUAWEI CLOUD EI provides an open, trustworthy, and intelligent platform through cloud services (in mode such as public cloud or dedicated cloud). It allows enterprise application systems to understand and analyze images, videos, languages, and texts to satisfy the requirements of different scenarios, so that more and more enterprises can use AI and big data services conveniently, accelerating business development and contributing to society progress.



HUAWEI CLOUD EI

Industry know-how

Deep understanding of industry pain points, driving AI implementation

Industry data

Processing and mining of abundant industry data to create huge values

HUAWEI CLOUD EI

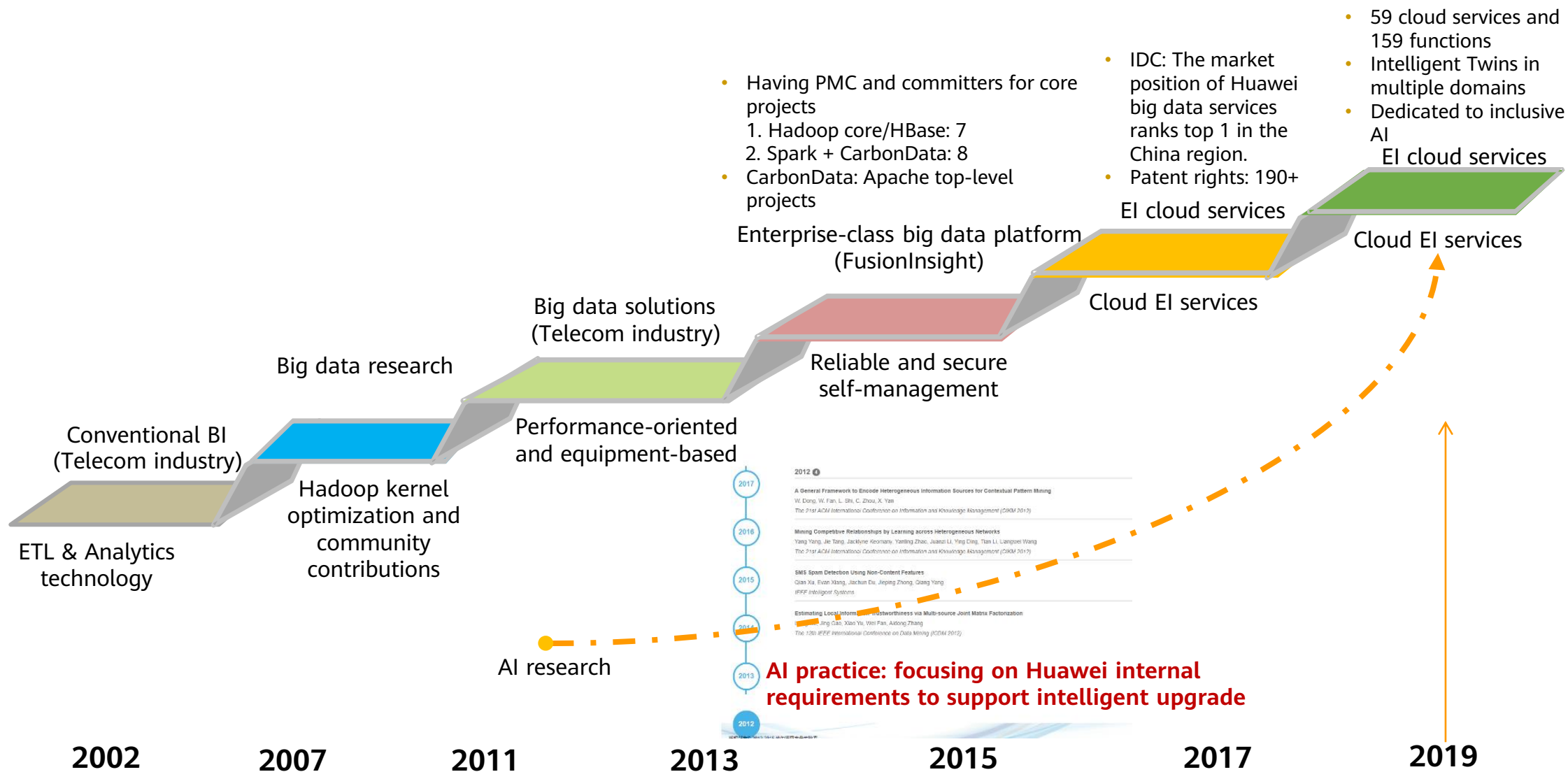
Algorithms

Various algorithm libraries and model libraries
general AI services and one-stop development platform

Computing power

30 years of information and communications technology (ICT) accumulation
for most powerful and cost-effective AI computing power

HUAWEI CLOUD EI Development History



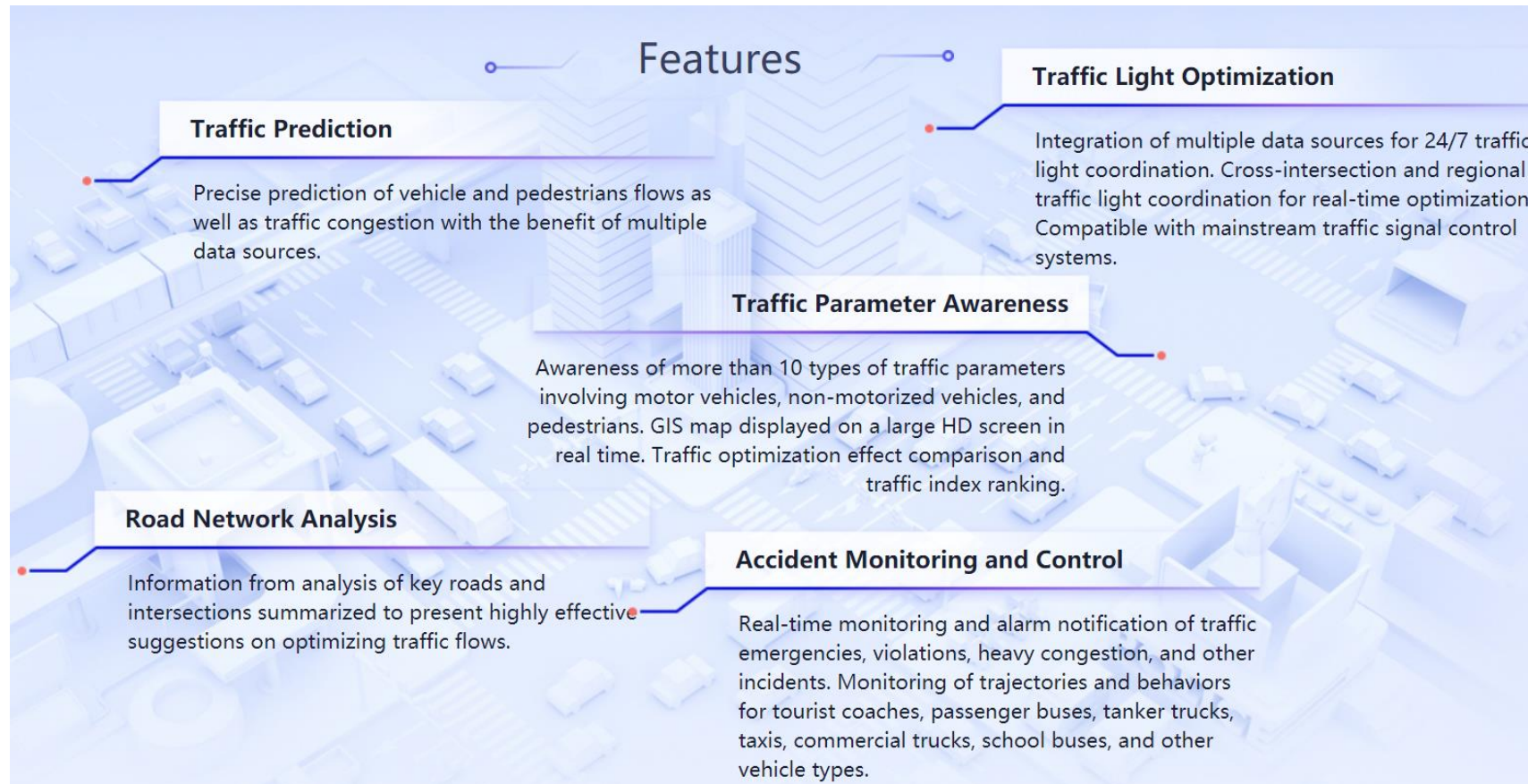
AI Intelligent Twins

- The AI Intelligent Twins integrates AI technologies into application scenarios of various industries and fully utilizes advantages of AI technologies to improve efficiency and experience.



Traffic Intelligent Twins (TrafficGo)

- The Traffic Intelligent Twins (TrafficGo) enables 24/7 and all-area traffic condition monitoring, traffic incident detection, real-time traffic signal scheduling, traffic situation large-screen display, and key vehicle management, delivering an efficient, environment-friendly, and safe travel experience.



Industrial Intelligent Twins

- The Industrial Intelligent Twins uses big data and AI technologies to provide a full series of services covering design, production, logistics, sales, and service. It helps enterprises gain a leading position.











Campus Intelligent Twins

- The Campus Intelligent Twins manages and monitors industrial, residential, and commercial campuses. It adopts AI technologies such as video analytics and data mining to make our work and life more convenient and efficient.



EI Products and Services

 ModelArts <p>ModelArts is a one-stop development platform that helps AI developers build models and manage the AI development lifecycle with data preprocessing, semi-automated data labeling, and distributed training.</p>	 Graph Engine Service <p>Graph Engine Service (GES) facilitates querying and analysis of graph-structure data based on various relationships. It is specifically suited for scenarios requiring analysis of rich relationship data.</p>	 Data Lake Insight <p>Data Lake Insight (DLI) is a Serverless big data compute and analysis service that is fully compatible with Apache Spark and Apache Flink ecosystems and supports batch streaming.</p>
 Video Ingestion Service <p>Video Ingestion Service (VIS) ingests massive volumes of video data in real time. Its superb data collection, real-time transmission, and video retention capabilities allow easy intelligent video analysis.</p>	 Data Warehouse Service <p>Data Warehouse Service (DWS) is a fast, easy-to-use, and reliable enterprise-class converged data warehouse service that can extend queries and analysis to your data lake with the help of DWS Express.</p>	 Cloud Stream Service <p>Cloud Stream Service (CS) is designed to process streaming data in real time. Computing clusters are fully managed by CS, allowing you to run StreamSQL or custom jobs without learning any programming skills.</p>
 MapReduce Service <p>MapReduce Service (MRS) provides enterprise-level big data clusters on the cloud. Tenants can fully control clusters and easily run big data components such as Hadoop, Spark, HBase, Kafka, and Storm.</p>	Question Answering Bot <p>Question Answering Bot (QABot) helps enterprises quickly build, publish, and manage intelligent Q&A bots.</p>	 Image Recognition <p>Image Recognition uses deep learning technologies to accurately identify objects, scenes, and concepts in images using a pool of visual content tags.</p>

AI Essential Platform

ModelArts

One-stop AI development platform

Huawei HiLens

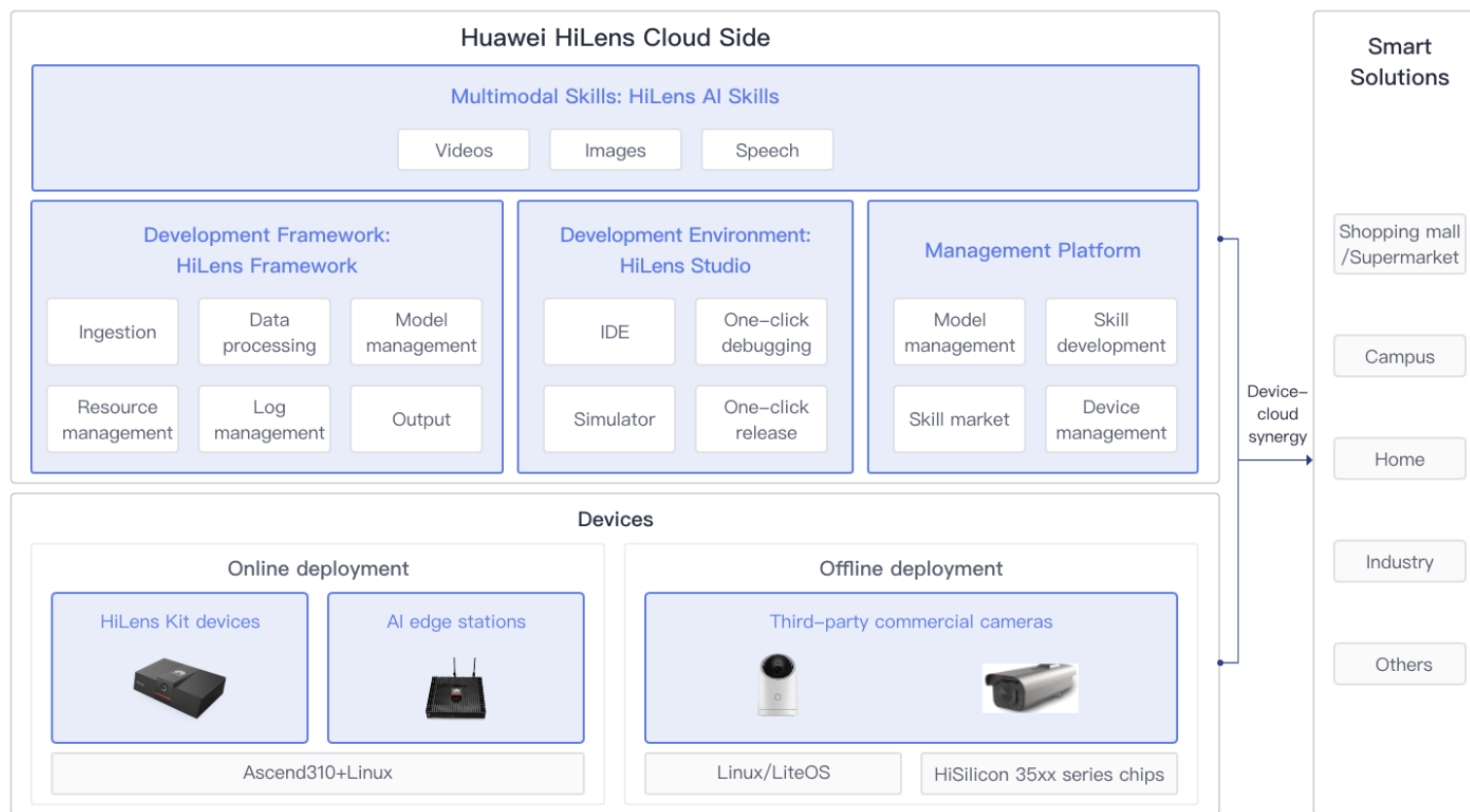
Multimodal AI development platform
that enables device-cloud synergy

Graph Engine Service (GES)

First commercial self-built distributed
native graph engine with independent
intellectual property rights in China

Huawei HiLens

- Huawei HiLens consists of computing devices and a cloud-based development platform, and provides a development framework, a development environment, and a management platform to help users develop multimodal AI applications and deliver them to devices, to implement intelligent solutions in multiple scenarios.

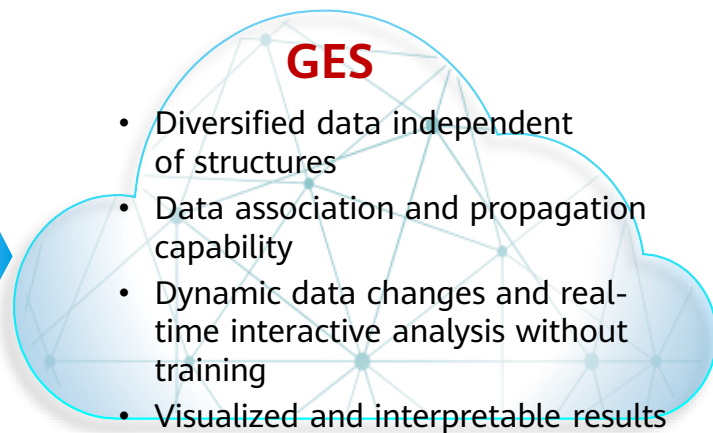


GES

GES facilitates **query and analysis** of **graph-structure** data based on various **relationships**. It uses the **high performance graph engine EYWA** as its kernel, and is granted many independent intellectual property rights. GES plays an important role in scenarios such as social apps, enterprise relationship analysis applications, logistics distribution, shuttle bus route planning, enterprise knowledge graph, and risk control.

- Social relationships
- Transaction records
- Call records
- Information propagation
- Browsing records
- Traffic networks
- Communications networks
- ...

The massive and complex associated data is graph data in nature.



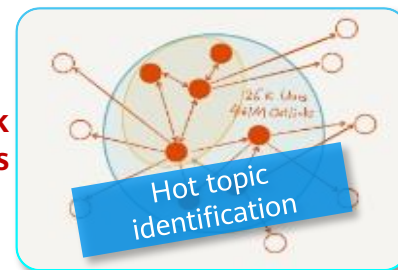
Individual analysis



Group analysis



Link analysis

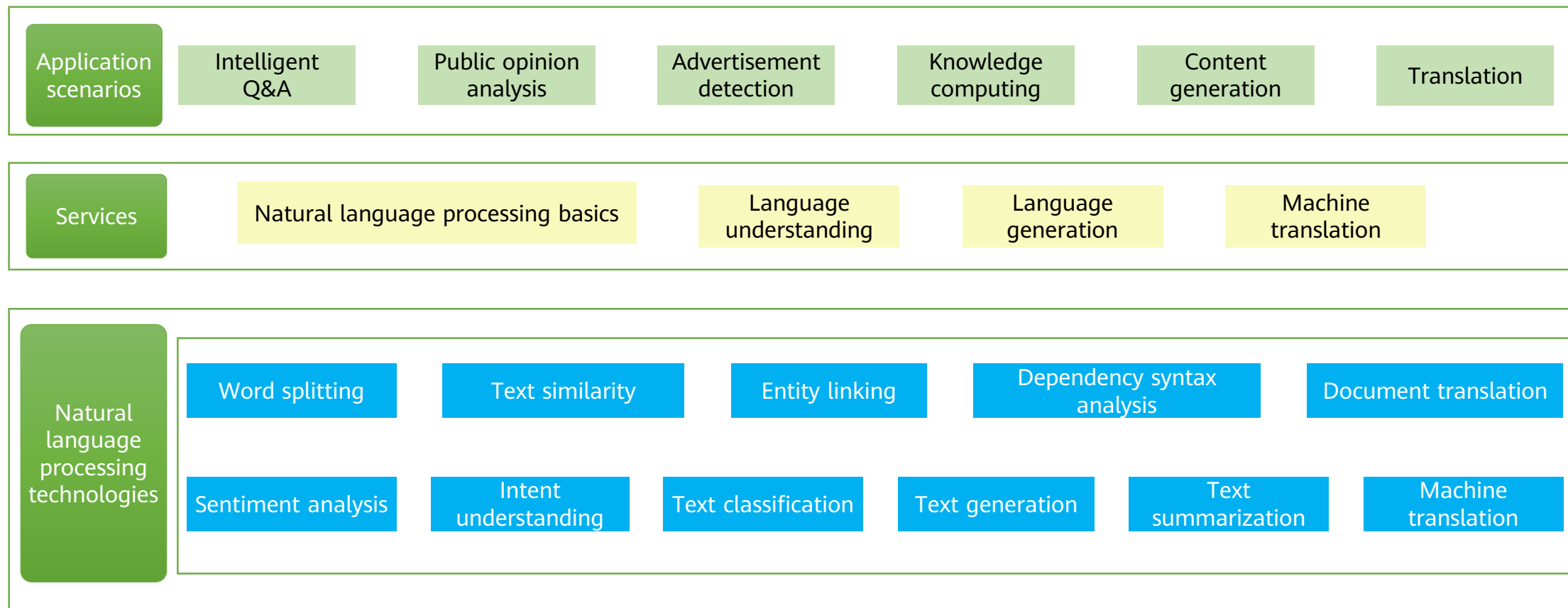


Conversational Bot Service (CBS)

- Question-Answering bot (QABot)
- Task-oriented conversational bot (TaskBot)
- Speech analytics (CBS-SA)
- CBS customization



Natural Language Processing



Voice Interaction



Short sentence/speech recognition



Real-time speech recognition

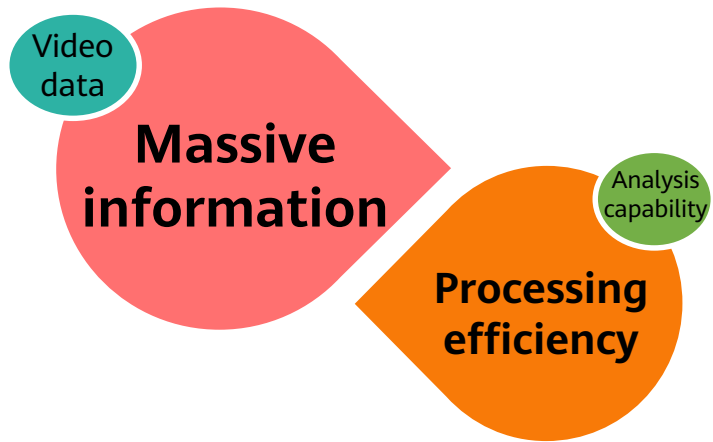


Audio recording recognition

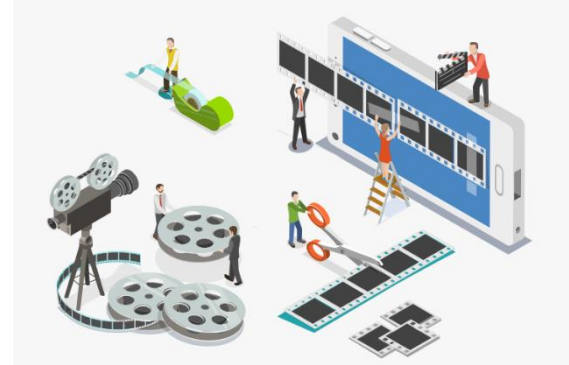


Audiobooks

Video Analytics



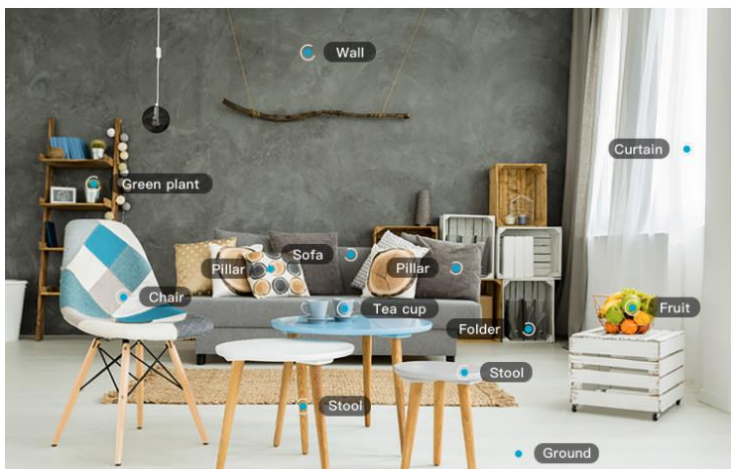
Video content analysis



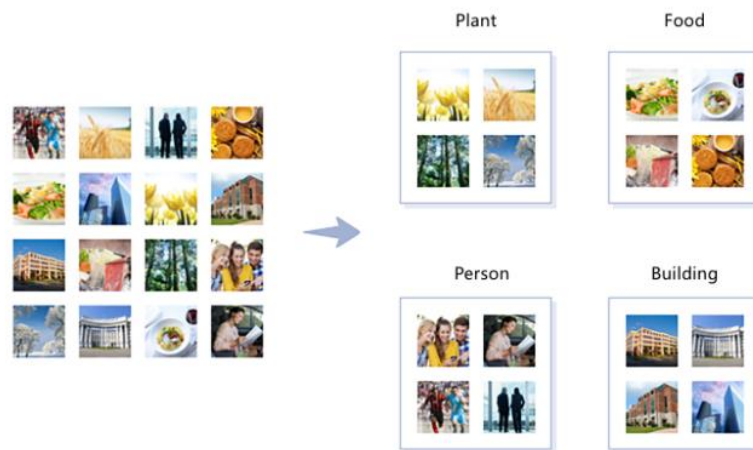
Provide the cover, splitting, and summarization capabilities based on the overall video analytics.

Video editing

Image Recognition



Scenario analysis



Smart album



Object detection

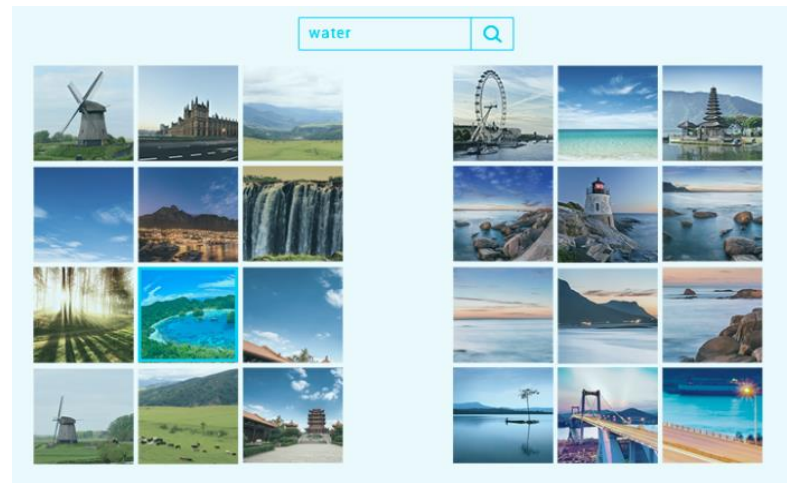


Image retrieval

Content Moderation

Content moderation adopts cutting-edge image, text, and video detection technologies that precisely detect advertisements, pornographic or terrorism-related material, and sensitive political information, reducing non-compliance risks in your business.

Moderation (image & text)

Sexy



Obscene content identification

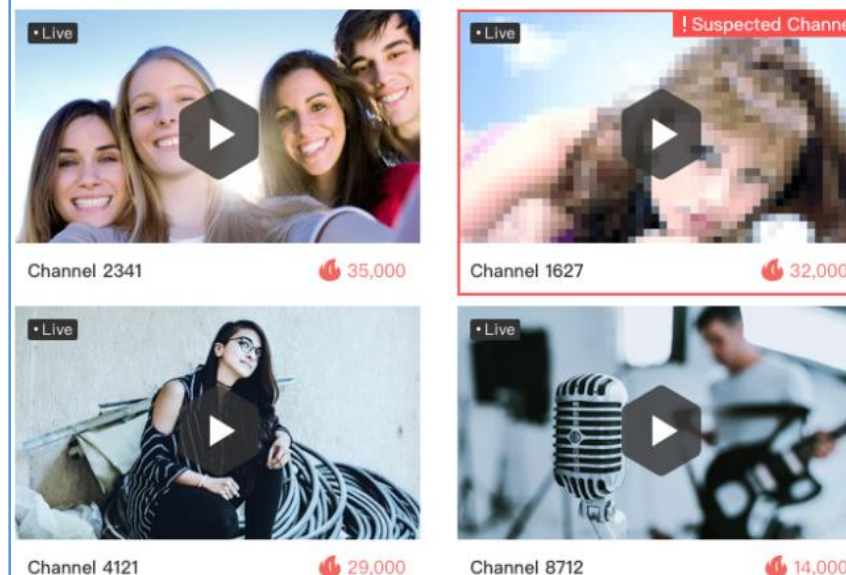


Terrorism identification



Political information detection

Moderation (video content)



Determine whether a video has non-compliance risks and provide non-compliance information from multiple dimensions such as image, sound, and subtitle.

AI Experience Center


- The AI Experience Center is an AI experience window built by Huawei, dedicated to lowering the threshold for using AI and making AI ubiquitous.

Image Tagging

Dark Enhance


Defog


Video Content Tagging



Result

Peacock	97.7%	Feather	95.3%
Birds	93.4%	Color	89.1%
Beautiful	88.8%	Bird	87.1%
Feathers	86.9%	Gorgeous	86.5%
Colorful ph...	84.7%	Wing	81.8%
Background	76.4%	Animal	75.3%
Close-up	73.1%	Gorgeous	71.5%
Colorful	71.4%		



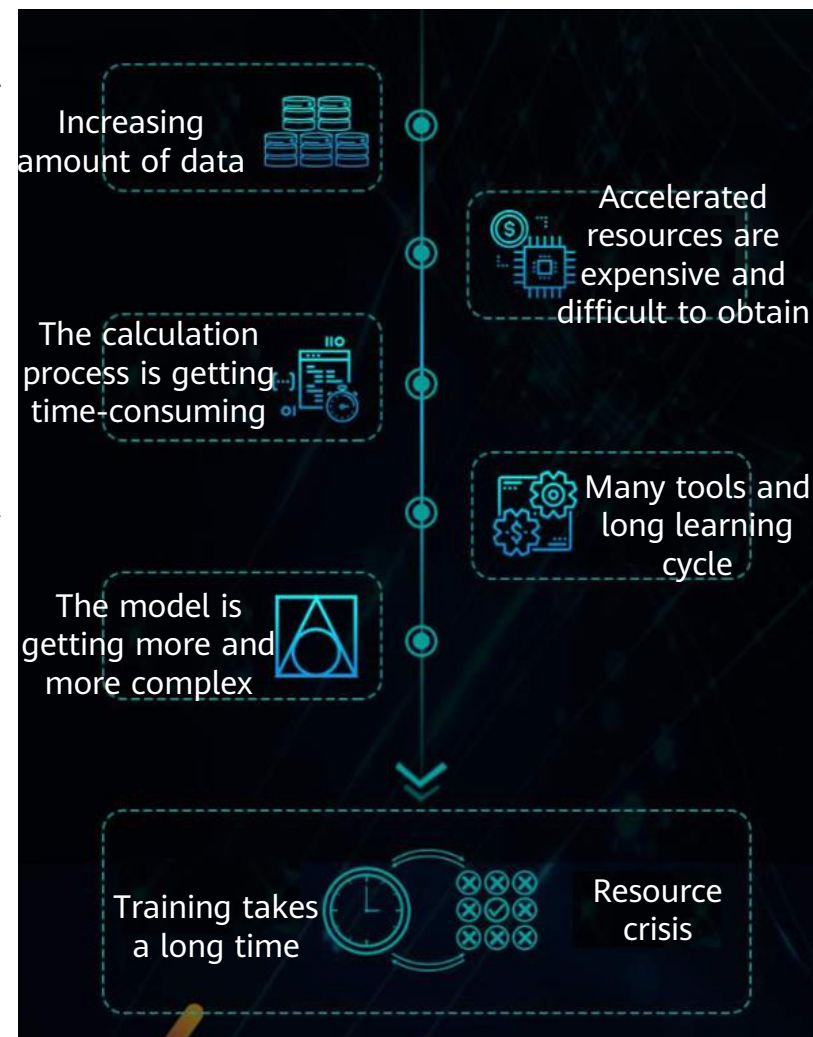
 Upload Image

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ModelArts

- ModelArts is a one-stop development platform for AI developers. With data preprocessing, semi-automatic data labeling, large-scale distributed training, automatic modeling, and on-demand model deployment on devices, edges, and clouds, ModelArts helps AI developers build models quickly and manage the AI development lifecycle.



ModelArts Functions



Data Management

ModelArts manages data preparation, such as collection, filtering, and labeling, and dataset versions, especially for deep learning datasets.



Rapid and Simplified Model Training

Huawei's MoXing deep learning framework enables high-performance distributed training. To accelerate model development, it uses automatic hyperparameter tuning and standalone and distributed training.



Model Deployment

ModelArts deploys models in various production environments such as devices, the edge, and the cloud, and supports online and batch inference jobs.



ExeML

ModelArts supports code-free modeling and auto learning with image classification, object detection, and predictive analytics.



Visualized Workflow

ModelArts works with Graph Engine Service (GES) to manage and visualize the lifecycle of AI development workflows, implementing data and model lineage.

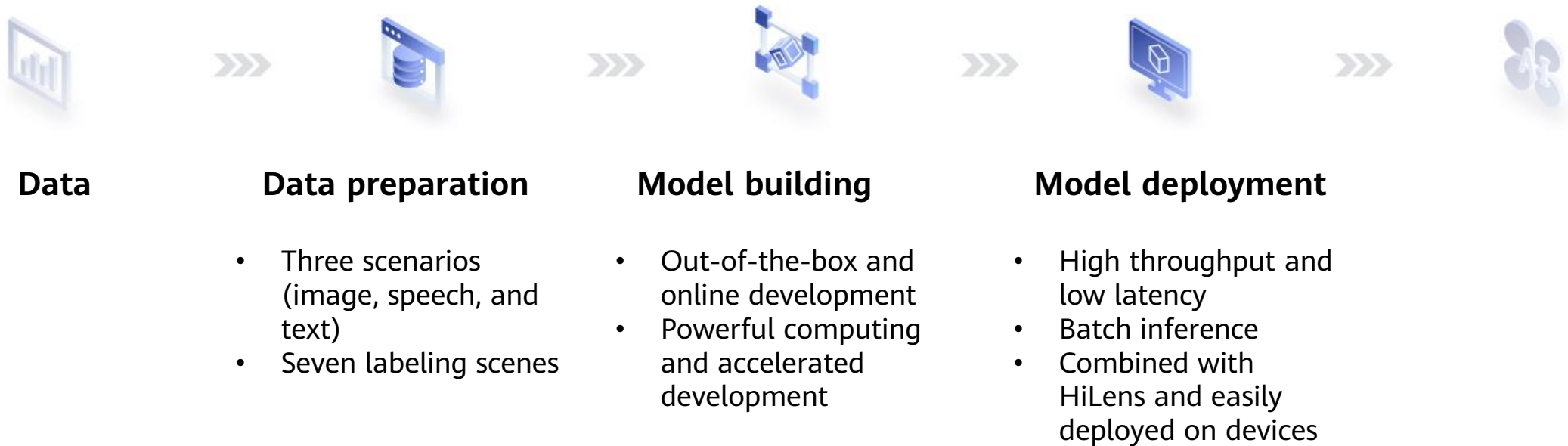


AI Marketplace

ModelArts supports common models and datasets, and internal or public sharing of enterprise models in the marketplace.

ModelArts Applications

AI development lifecycle



ModelArts Highlights



One-Stop Platform

The out-of-the-box and full-lifecycle AI development platform provides one-stop data processing, model development, training, management, and deployment.



Easy to Use

Various built-in open source models and automatic hyperparameter tuning help you start model training from scratch. Models can be deployed on the device, edge, and cloud with just one click.



Excellent Performance

The Huawei-developed MoXing framework delivers high-performance algorithm development and training. GPU utilization is optimized for online inference. Huawei Ascend chips significantly accelerate inference.



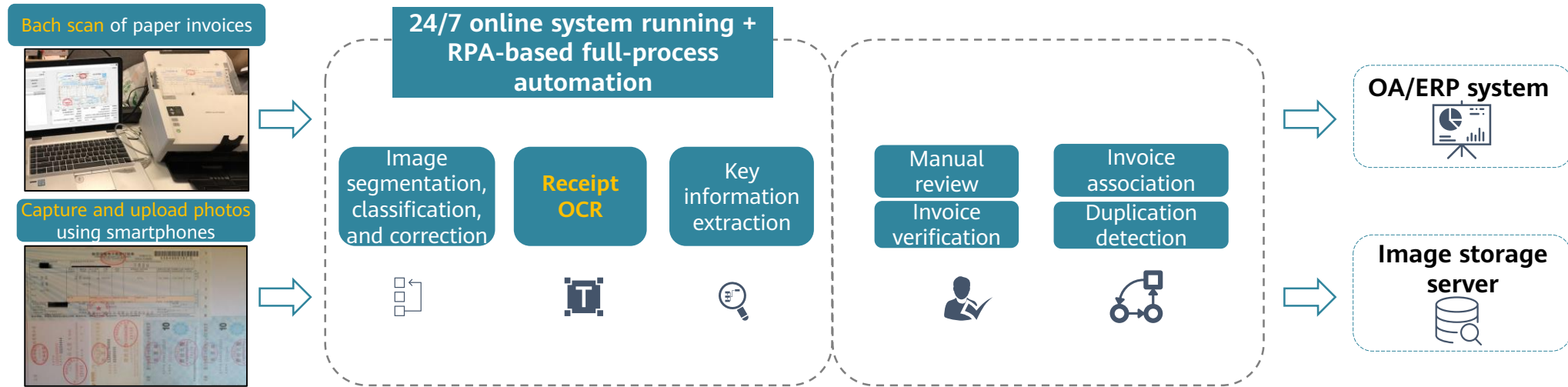
High Flexibility

ModelArts supports multiple mainstream open source frameworks, such as TensorFlow and Apache Spark MLlib, mainstream GPUs, and the Huawei-developed Ascend AI chips. Exclusive use of resources and custom images ensure flexible development experience.

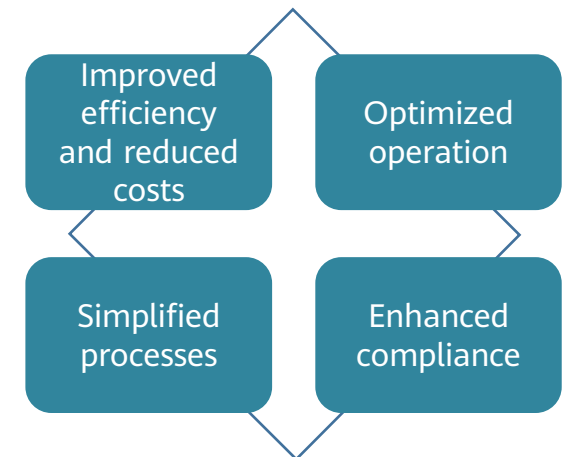
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Case: OCR Implements Full-Process Automation for Reimbursement Through Invoices.



- **Multiple access modes:** automatic connection to scanners to obtain images in batches; image capture by using high-speed document scanners and mobile phones
- **Flexible deployment:** multiple deployment modes such as public cloud, HCS, and appliance, and unified standard APIs
- **Support for various invoices:** regular/special/electronic/ETC/roll value-added tax (VAT) invoices, and taxi/train/flight itinerary/quota/toll invoices
- **One image for multiple invoices:** automatic classification and identification of multiple types of invoices
- **Visualized comparison:** return of OCR character location information and conversion of such information into an Excel file for statistics collection and analysis



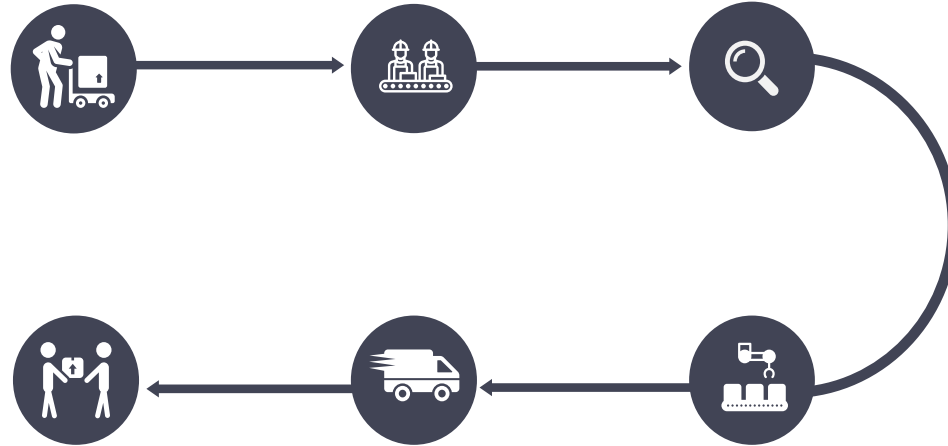
Case: Intelligent Logistics with OCR

➤ ID card OCR

- ID card photographing, recognition, and verification with mobile apps

➤ Screenshot OCR

- After an e-commerce platform receives a buyer's address and chat screenshots, OCR recognizes and extracts the information automatically.



➤ Electronic waybill OCR

- Automatic extraction: waybill number, and name, phone number, and address of the receiver/sender

➤ Paper waybill OCR

- Text and seal detection

➤ Receipt OCR

- Invoice information recognition

Efficiency

Accuracy

Cost

Privacy

Conventional mode

AI + OCR



24/7 service, identification of a single waybill in only **2s**



Up to 98% accuracy, reducing unnecessary reshooting and **eliminating external interference**

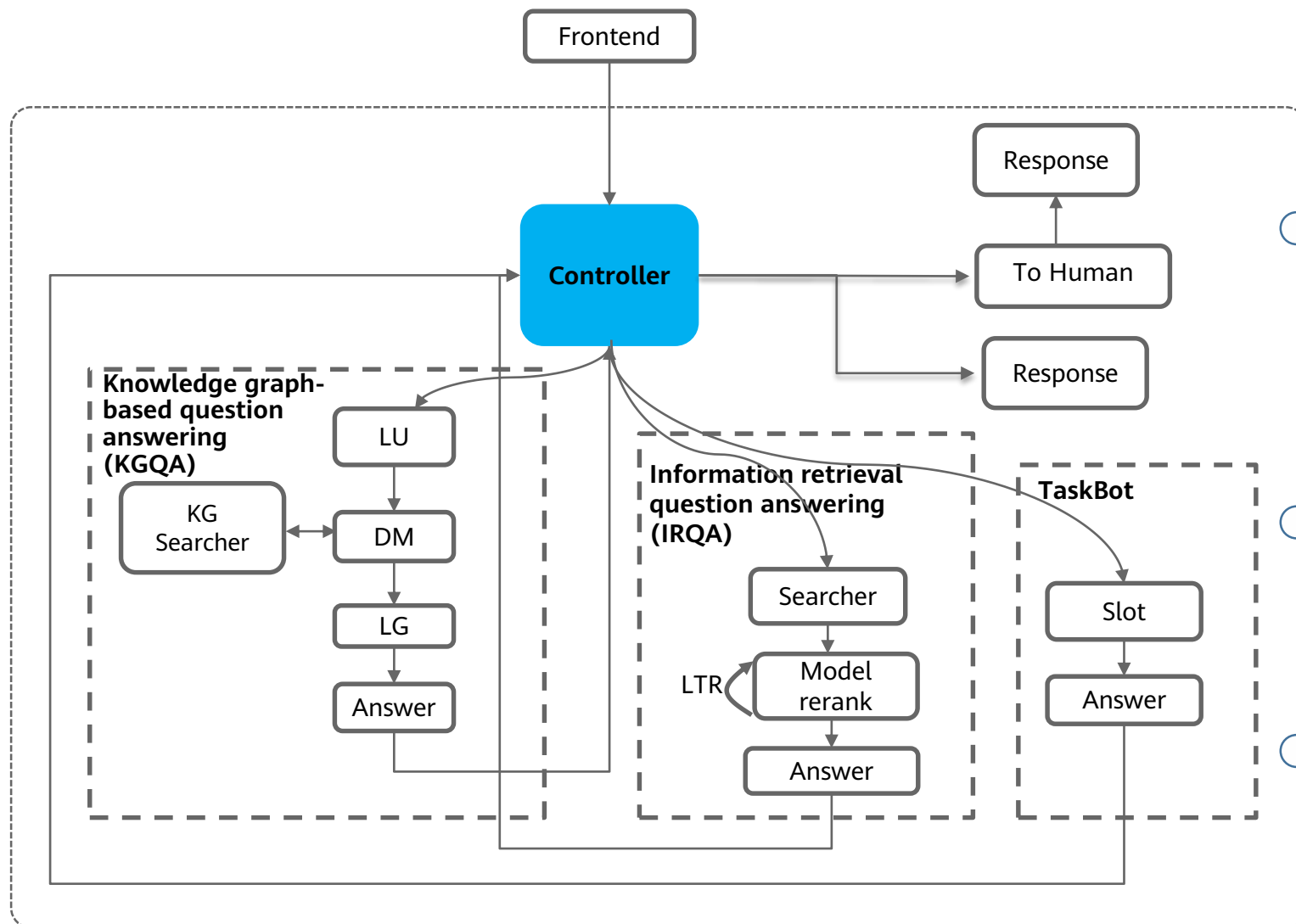


Streamlined automation process, **reducing manual intervention and costs**



Automatic identification without manual intervention, ensuring **privacy security**

CBS



Intelligent integration of multiple robots for more comprehensive services

Robots with respective advantages are integrated and can automatically learn knowledge and optimize services to recommend optimal answers to customers.

Intelligent guidance via multiple rounds of interactions to better understand you

Multiple rounds of natural interactions are performed to accurately identify users' intentions and understand users' hidden meanings.

Knowledge graphs for more intelligence

Common domain language models + domain knowledge graphs
Dynamic updates of graph content
More intelligence of graph-based robots

Case: Conversational Bot with Vehicle Knowledge

Recommendations

- ✓ Please recommend a car priced at about CNY30,0000.
- ✓ Please recommend a commercial vehicle.
- ✓ Please recommend vehicle models with a torque greater than 310 Nm.

Open consulting

- ✓ How about Mercedes-Benz E?
- ✓ How is the security of S90?
- ✓ How is Audi A6L's interior?

Precise answers based on vehicle knowledge graphs

How about the Mercedes-Benz A200 sports sedan?

The Mercedes-Benz A200 sports sedan... is equipped with... (details)

How is the security performance?

Active braking is provided in the standard configuration... (Introduce the security advantages.)
The unique xxx solution is additionally provided...

Comparison

- ✓ Comparison between Mercedes-Benz E300L Sedan and BMW 530Li xDrive
- ✓ Which of Audi A6L and the BMW 5 series is better?

Performance

- ✓ What is the wheel-base of 530 Li?
- ✓ What is the fuel consumption of Mercedes-Benz E300L?
- ✓ Can seats of Lexus ES be heated?

Multiple rounds of interactions and multimodal input

How is the interior?

...xxx top leather... (description of the interior)



After-sales

- ✓ What can I do if the steering wheel does not move?
- ✓ Why does the indicator keep blinking? (Figure)
- ✓ How long will the insurance be paid?

Pre-sales

- ✓ Is test driving available for S90?
- ✓ Which 4S store has stock?
- ✓ Can I try Audi A4L next Wednesday?

Proactive guidance and preferential answers

What is the difference between S90 T5 and BMW 530Li?

The price of S90 T5 is CNY410,800, and that of the BMW 530Li is CNY519,900. BMW 530Li has 9 standard configurations as its selling points, while S90 T5 has 10. **The cost of BMW 530Li further increases if one additional configuration needs to be added for BMW 530Li to equal S90 T5.**

Case: Intelligent Q&A of Enterprises in a Certain District



Agent Assistant

Improves productivity and customer satisfaction with real-time analysis and helps on improving the interaction between agents in the call center and customers. During a call, the bot automatically extracts keywords, coils problems, searches for and displays the best answers to matching semantics, and provides real-time support for agents.

Advantages

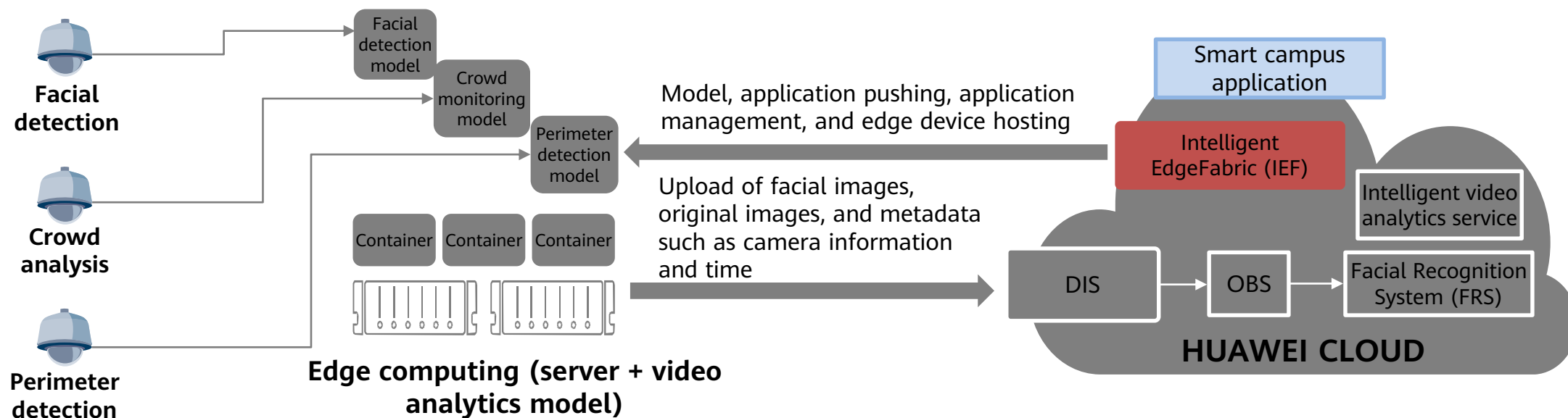
- **Real-Time Support**

Offers real-time support for human agents by attempting to understand customer questions and matching the answers with high relevancy.

- **Improved Efficiency & Satisfaction**

Enables human agents to answer customers' questions at a faster speed.

Case: Smart Campus



Device-side common HD IPCs:

- Face capturing
- Video analytics at the edge

Campus surveillance



Edge side:

- GPU servers are recommended.
- IEF pushes the facial detection, crowd monitoring, and perimeter detection algorithms for deployment on edge nodes.
- IEF manages the application lifecycle (with the algorithms iteratively optimized).
- IEF centrally manages containers and edge applications.

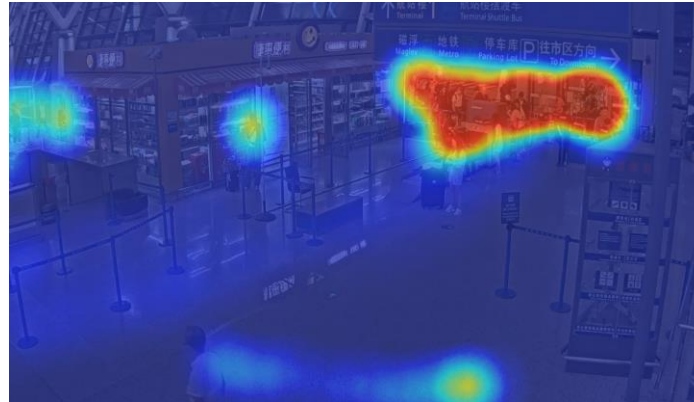
Competitiveness and values of edge video analytics

1. **Service values:** Intelligently analyze surveillance videos to detect abnormal security events such as intrusions and large crowd gatherings in real time, reducing labor costs.
2. **Edge-cloud synergy:** Perform full-lifecycle management and seamless upgrade of edge applications.
3. **Cloud model training:** Implement automatic training using algorithms that have good scalability and easy to update.
4. **High compatibility:** Reuse existing IPCs in campuses as smart cameras through edge-cloud synergy.

Case: Crowd Statistics and Heat Map



Region crowd statistics



Region crowd heat map



- **Functions:**

- Counting the crowd in an image.
- Collecting popularity statistics of an image.
- Supporting customized time settings.
- Enabling configurable intervals for sending statistics results.

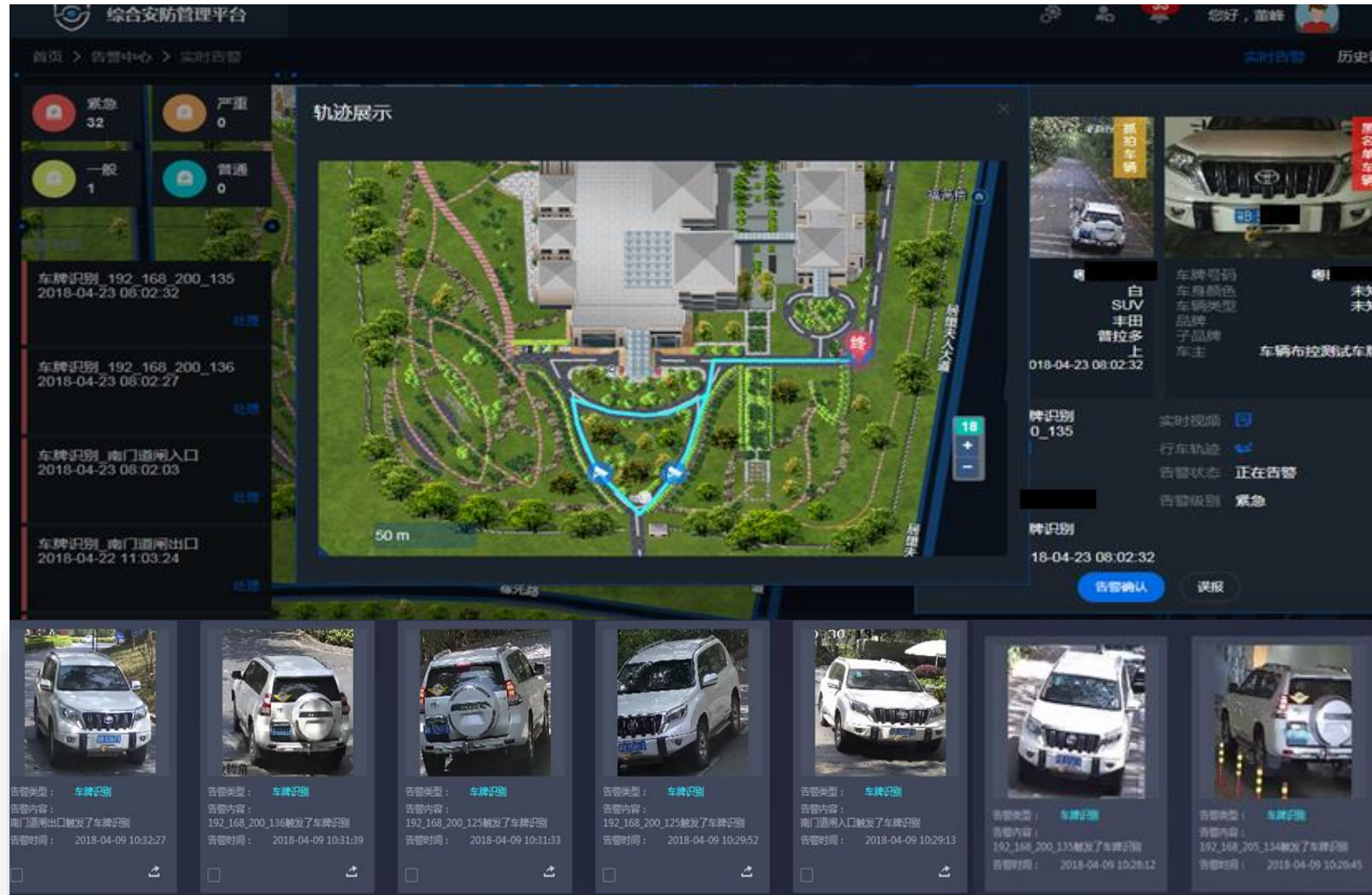
- **Scenarios:**

- Customer traffic statistics
- Visitor statistics
- Business district popularity identification

- **Advantages:**

- Strong anti-interference performance: crowd counting in complex scenarios, such as face blocking and partial body blocking
- High scalability: concurrent sending of pedestrian crossing statistics region statistics, and heat map statistics
- Ease-of-use: compatible with any 1080p surveillance camera

Case: Vehicle Recognition



- **Functions:**
 - Vehicle model detection
 - Vehicle color recognition
 - License plate recognition (LPR)
- **Scenarios:**
 - Campus vehicle management
 - Parking lot vehicle management
 - Vehicle tracking
- **Advantages:**
 - Comprehensive scenarios: recognition of vehicle models, styles, colors, and license plates in various scenarios such as ePolice and checkpoints
 - Ease-of-use: Compatible with any 1080p surveillance camera

Case: Intrusion Detection



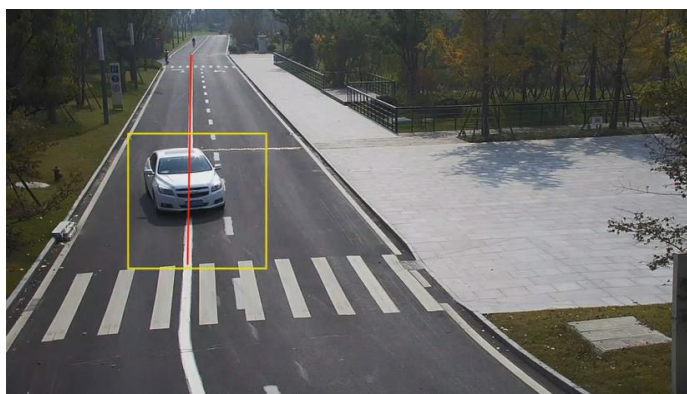
Personnel tripwire crossing detection



Area intrusion detection



Climbing detection



Vehicle tripwire crossing detection

Functions:

- Extracting moving objects from a camera's field of view and generating an alarm when an object crosses a specified area.
- Setting the minimum number of people in an alarm area.
- Setting the alarm triggering time.
- Setting the algorithm detection period.

Scenarios:

- Identification of unauthorized access to key areas
- Identification of unauthorized access to dangerous areas
- Climbing detection

Advantages:

- ✓ **High flexibility:** settings of the size and type of an alarm object
- ✓ **Low misreporting rate:** people/vehicle-based intrusion alarm, without interference from other objects
- ✓ **Ease-of-use:** compatible with any 1080p surveillance camera

Summary

- This chapter describes the following content:
 - HUAWEI CLOUD EI ecosystem, helping you understand the HUAWEI CLOUD EI services
 - ModelArts services in combination with experiments, helping you understand the ModelArts services more efficiently
 - EI cases