HIKVISION®

DEEPER INTELLIGENCE.
DEEPER SURVEILLANCE.
HIKVISION DEEP LEARNING SOLUTION

# DEEP LEARNING
## TECHNOLOGY

In this ever-expanding era of Surveillance Data Technology (SDT), deep intelligence will become the foundation for the security industry. Technologies that "learn" will become more common and more powerful. This trend will strengthen critical security efforts in every sphere. Now, Hikvision's DeepinView Cameras and DeepinMind NVRs will lead the way in this new world of surveillance technology by making invisible intelligence visible for users, and then putting that intelligence to good use.
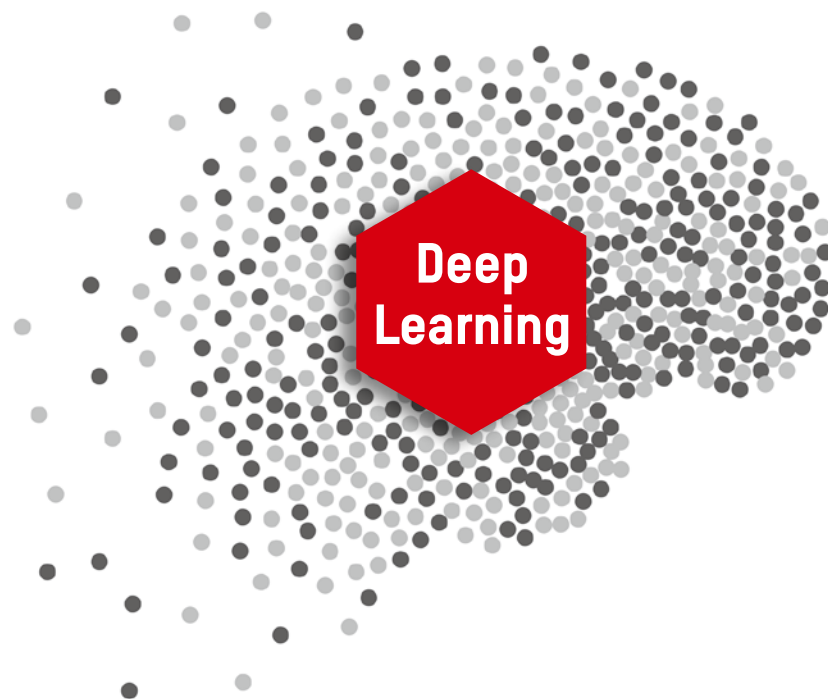
**Deep Learning**

# ADVANTAGES OF
# DEEP LEARNING

## 1. Traditional Intelligent Algorithm

The number of video surveillance devices and the sheer amount of data are both rapidly increasing in their own rite, while the traditional intelligent algorithm continues to operate only on the surface level. Current systems suffer from:

01 Low Accuracy

02 Poor Environmental Suitability

03 Fewer Recognition Types

## 2. From "Shallow" to "Deep"

The algorithmic model for deep learning has a much deeper structure than the two 3-layered structures of traditional algorithms. In deep learning, an original signal passes through layers of processing; next, it takes a partial understanding (shallow) to an overall abstraction (deep) where it can perceive an object.
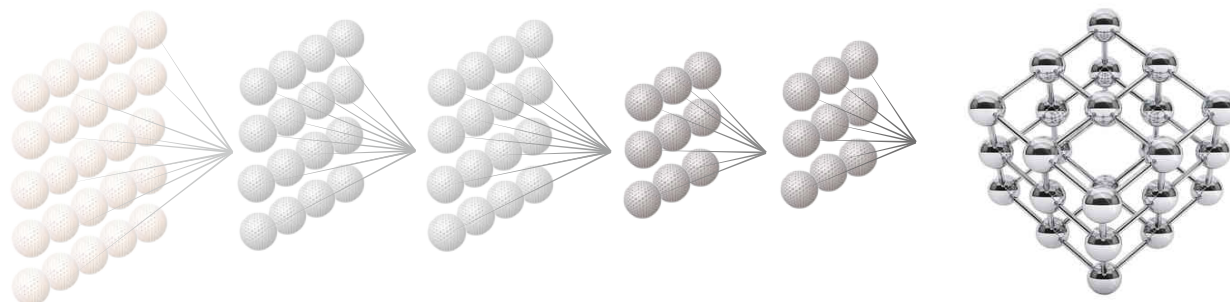
## 3. From "Artificial Features" to "Feature Learning"

Deep learning does not require manual intervention but relies on a computer to extract features by itself. The more features there are, the more accurate the recognition and classifications will be.

# KEY FACTORS OF
## DEEP LEARNING

The rapid development of GPUs, supercomputers, cloud computing, and other high performance hardware platforms has made deep learning possible.

**Scale of Data**

**Computing Power**

**Network Architecture**
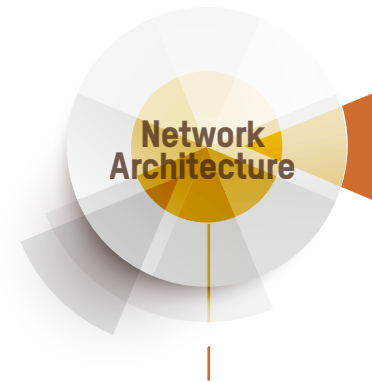
User experience has improved and more users are involved, facilitating a larger scale of data. With such a large amount of quality training data, object pattern recognition models will become more accurate for video surveillance use.

Through the constant optimization of deep learning algorithms, better target-object recognition is continually being achieved.

# KEY FEATURES OF DEEP LEARNING

Facial Detection is only the beginning for Deep Learning features. With analytics that take business solutions into the next century, and with automatic alarm accuracy above 90%, this technology is a step above and beyond anything video surveillance as you know it. Hikvision's Deep Learning technology filters out insignificant objects and movements in a scene that would trigger normal alarm systems.

Vehicle data gets recorded and shapes the database to perform numerous security functions. People Counting systems give businesses an advantage in marketing and conversion efforts. Hikvision's solutions add value on multiple levels.

95%
Similar

# 1. Facial Detection

Facial Detection software will analyse images and determine the presence of a human face. When a face is detected, the system captures its position, size, and expression. The video stream will judge whether there is a human face. If so, the position, size, and main features will be recorded. Identifying characteristics can be obtained from this information. When compared against recorded human faces in a database, a face can be identified. Facial comparison is the process by which structured data information operates after data modeling and analysis for the human face.



**95% Similar**
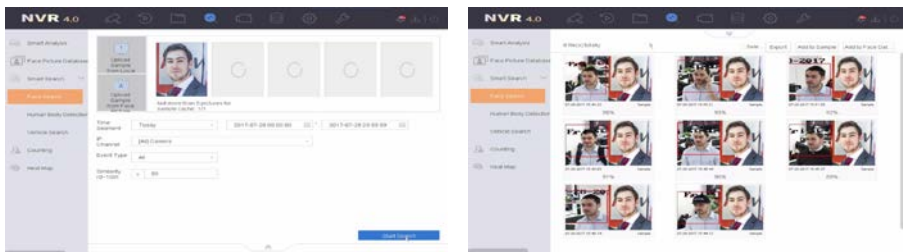


# 2. False Alarm Filter

The False Alarm Filter enables the system to perform secondary recognition for human body targets in behavioral detection events (line crossing detection, intrusion detection), effectively reducing the false alarms caused by shaking leaves, shadows, light variations, vehicles, small animals, etc.

Images and alarm messages from IP Cameras



| Line Crossing Detection | Intrusion Detection |

DeepinView Primeter detection
Human Detection & Analysis NVR

Cats          Leaves

After DeepinMind NVR processes images, the false alarms are filtered out!

Light     Cats     Rain

Birds     Leaves     • • •

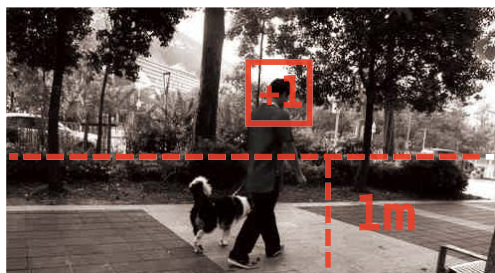People

Alarm accuracy at least
**90%**

## 3. People Counting

The People Counting function counts people entering, exiting and passing by a specific scene, such as in a supermarket or museum where large crowds move through on foot.



Good Anti-Interference Ability



Height Filtering



Loitering Filtering

## 4. Vehicle Structured Data

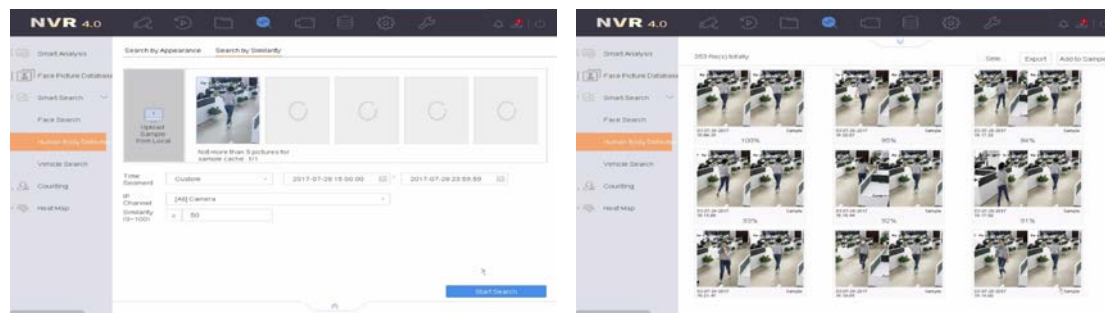Vehicle Structured Data refers to a bivariate table formed by extracting the vehicle information, like licence plate number, vehicle color, model, brand, sub-brand, etc., and is used for vehicle information retrieval.
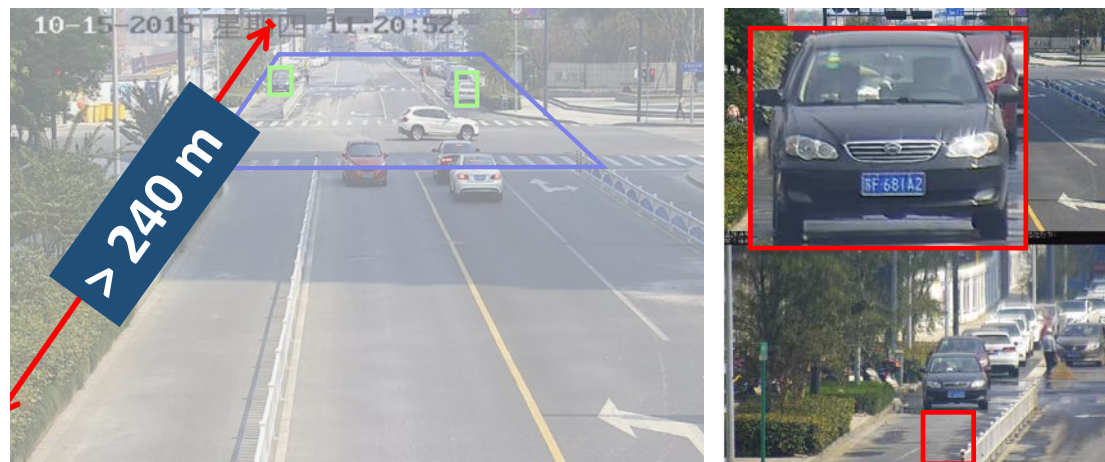


## 5. Human Body Search

The search by human body picture feature enables the system to use a provided human body picture to find matching images and information in recorded footage.

# APPLICATIONS
## SELECTED PRODUCTS

# RETAIL

Brick-and-mortar retailers need to better understand their customers' behaviors to boost competitiveness against online competitors. And loss prevention plays an important role in boosting profits. Deep Learning technology helps users accomplish these tasks – and much more – providing advanced analytics and video surveillance.

### Customer Behaviour
• People Counting: Identify peak hours and days and assign staff accordingly. Use together with POS data to calculate conversion rates.
• Dual-Lens People Counting Camera iDS-2CD6810F/C

### Loss Prevention
• Facial Recognition: Loss prevention managers can be notified when a suspected "habitual thief" visits. His or her face can be shared across all chain stores.
• Dual-lens facial recognition iDS-2CD8426G0/F

### Intrusion Alarms
• Accurate human body detection: Deep Learning technology dramatically increases the accuracy of intrusion, it eliminates the influences from animal, shaking leaves and etc.
• DeepinView Primeter detection cameras DS-2CD7X26G0

Residential buildings, industrial plants, stadiums – there are many types of structures, but security is the one thing that each one requires. Access control and perimeter protection are the most common requirements. Deep Learning technology establishes more accurate intrusion alarms and more convenient access control.

# BUILDING

## Human Body Detection and Analysis
• Hikvision's DeepInmind Series NVRs are the first embedded NVR based on a deep learning algorithm executed by its GPU, making it faster and more accurate than conventional CPUs. This NVR effectively filters out alarms triggered by animals and inanimate objects, with greater than 90% accuracy.
• Deep learning has come to the security industry in this amazing video recording unit iDS-9632NXI-I8/8S(/16S), iDS-7716(32)NXI-I4(/16P)/8S

## Intrusion Alarms
• Accurate human body detection: the Deep Learning technology dramatically increases  the accuracy of intrusion and eliminates the influences from animal, shaking leaves and etc.
• DeepinView Primeter detection cameras DS-2CD7X26G0

## Facial Recognition
• Control building access using facial recognition cameras and get alarmed of suspicious visitors.
• Facial recognition technology helps to eliminate buddy clocking and timesheet abuse.

# SMART CITIES

Effective protection of citizens, their property and public areas, is a concern for city authorities around the world. In Safe City Project, Hikvision's Deep Learning technology is adopted to identity specific personnels and analyze human and vehicle behaviors. This can be used for locating a fugitive at large, finding lost people, preventing potential crimes, detecting parking violations, etc.

## Facial Recognition
• Indoor Dual-Lens Facial Recognition Camera iDS-2CD8426G0/F
• Facial Recognition NVR
iDS-9632NXI-I8/4F
• Facial Recognition Server DS-IE6308/16/32/64-E/FA

## Intelligent Traffic
• Video Vehicle Detector iDS-TCD200-A
• Traffic Capture Unit  iDS-TCV300/700  iDS-TCE300/700
• Traffic Incident Detection Server iDS-TP40-16B
• ANPR Bullet Camera iDS-2CD8626G0/P
• Parking Violation Detection PTZ Camera iDS-2VS235-F836

# OTHERS



AIRPORTS

GOVERNMENT SECTORS

RAILWAY STATIONS

PUBLIC SQUARES

CUSTOMS & BORDER CONTROL

## DeepinView

| Model | Picture | People counting | Facial recognition | ANPR | Human capture/ comparison | Parking violation detection | False alarm filter, line crossing detection, intrusion detection, region entry/exit | Vehicle brand/color recognition, special vehicle recognition (police, ambulance, fire truck, etc.) | Loitering detection | Queue detection | Crowd density detection and alarm | 9 kinds of traffic data collection | Vehicle capture | Vehicle feature detection | Behavior violation detection | Vehicle over-speed detection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| iDS-2CD6810F/C | | • | | | | | | | | | | | | | | |
| iDS-2CD6810F-IV/C | | • | | | | | | | | | | | | | | |
| iDS-2XM6810F-I(M)/C | | • | | | | | | | | | | | | | | |
| iDS-2CD8426G0/F | | | • | | | | | | | | | | | | | |
| iDS-2CD8626G0/P | | | | • | | | | • | | | | | | | | |
| iDS-2PT9122BX-DE/S iDS-2PT9142BX-DE/S | | | | | • | | | | | | | | | | | |
| iDS-2VS235-F836 | | | | • | | • | | | | | | | | | | |
| DS-2DF8xxxIX DS-2DF6xxxX | | | | | | | • | | | | | | | | | |
| DS-2CD7xxxG0 | | | | | | | • | | | | | | | | | |
| iDS-2CD86XX | | | | | | | | | | | • | | | | | |
| iDS-2CD8426G0/B | | | | | | | | | • | | | | | | | |
| DS-2CD7126G0/L | | | | | | | | | | • | | | | | | |
| iDS-TCD200-A | | | | | | | | | | | | | • | | | |
| iDS-TCV300 iDS-TCV700 | | | | • | | | | | | | | | • | • | | • |
| iDS-TCE300 iDS-TCE700 | | | | • | | | | | | | | | • | • | • | |

# PRODUCT SHOWCASE

**iDS-2CD6810F/C**
DeepinView Indoor Dual-Lens People Counting Camera

**DeepinView**

- Indoor dual-lens people counting
- People counting
- Stereo vision

**Scenario**
Buildings/airports

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**iDS-2CD6810F-IV/C**
DeepinView Outdoor Dual-Lens People Counting Camera

**DeepinView**

- Outdoor dual-lens people counting
- People counting
- Stereo vision

**Scenario**
Stadiums/parks

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**iDS-2XM6810F-I(M)/C**
DeepinView Mobile Dual-Lens People Counting Camera

**DeepinView**

- Mobile dual-lens people counting
- People counting
- Stereo vision

**Scenario**
Buses/trains

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**iDS-2CD8426G0/F**
DeepinView Dual-Lens Facial Recognition Camera

**DeepinView**

- Dual-lens face recognition
- Onboard face recognition, massive face library with up to 60,000 faces.
- H.265 Stereo vision

**Scenario**
Buildings/airports/stadiums

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**iDS-2CD8626G0/P**
DeepinView ANPR Bullet Camera

**DeepinView**

- ANPR bullet
- ANPR
- H.265

**Scenario**
Streets/checkpoints

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**iDS-2PT9122BX-DE/S**
**iDS-2PT9142BX-DE/S**
DeepinView PanoVu Camera

**DeepinView**

- PanoVu
- Works with DeepinView NVR to create accurate human and face comparisons.
- PanoVu

**Scenario**
Intersections/airports/public/squares

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**iDS-2VS235-F836**
DeepinView Parking Violation Detection Camera

**DeepinView**

- Traffic event detection PTZ
- Vehicle parking detection
- PTZ

**Scenario**
Streets

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**DS-2DF8xxxIX**
**DS-2DF6xxxX**
DeepinView Perimeter Detection Cameras

**DeepinView**

**DarkFighter**

- Primeter detection
- False alarm filter; line crossing detection, intrusion detection, region entry/exit
- PTZ

**Scenario**
Public/squares/streets

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**DS-2CD7xxxG0**
DeepinView Perimeter Detection Cameras

**DeepinView**

**DarkFighter**

- Primeter detection
- False alarm filter; line crossing detection, intrusion detection, region entry/exit

**Scenario**
Public/squares/streets

### DS-2CD7126G0/L-I
DeepinView Dual-Lens Queue Detection Camera

**DeepinView**

- Dual-lens queue detection
- Line-up queue detection
- Stereo vision

**Scenario**
Stores

### iDS-86XX
DeepinView Crowd Density Detection Bullet Camera

**DeepinView**

- Crowd density bullet
- Crowd density detection and alarm

**Scenario**
Public squares

### iDS-2CD8426G0/B
DeepinView Dual-Lens Behavior Analysis Camera

**DeepinView**

- Dual-lens behavior analysis
- Loitering, fall down, etc.
- Stereo vision

**Scenario**
Banks, hospitals, schools

### iDS-TCD200-A
DeepinView Video Vehicle Detector

**DeepinView**

- Video Vehicle Detector
- 9 kinds of traffic data collection
  lane flow/average vehicle speed/time headway/space headway/time occupancy/space occupancy/lane queue length/vehicle type (large, small, motorcycle)/lane traffic status
- Three congestion levels: smooth/slow/in queue

**Scenario**
Expressways/elevated roads/urban roads/tunnels/bridges

### iDS-TCV300/700
DeepinView Traffic Capture Unit

**DeepinView**

- Traffic Capture Unit
- ANPR
- H.265
- Support radar speed measurement
- Wrong-way detection
- Vehicle type detection
- Vehicle color detection

**Scenario**
Expressways/elevated roads/urban roads/tunnels/downhill slopes/bridges

### iDS-TCE300/700
DeepinView Traffic Capture Unit

**DeepinView**

- Traffic Capture Unit
- ANPR
- H.265
- Five kinds of traffic violation detection: red light violation/wrong-way driving/illegal lane change detection/driving against guidance detection

**Scenario**
Crossings/t-junctions

DeepinMind

| Model | Picture | Human body detection analysis (line crossing detection, intrusion detection, etc.) to improve alarm accuracy | Secondary analysis of human bodies to improve alarm accuracy | Human Analysis | Face detection and facial recognition, facial image modeling and comparison, alarm linkage, search by facial image | Event detection and capture. Detection types: traffic jam, parking, over lane line, U-turn, reverse driving, pedestrian, throwing object, illegal line change. | Traffic data collection, including types: traffic flow, speed, space headway, time headway, lane-time occupation rate, lane-space occupation rate, queue length, traffic traveling status. | Search by facial image and comparison, identity confirmation | Blacklist alarm |
|---|---|---|---|---|---|---|---|---|---|
| iDS-96064NXI-I16 | | • | • | • | • | | | | • |
| iDS-96128NXI-I16 | | • | • | • | • | | | | • |
| iDS-9632NXI-I8/16S | | • | • | • | | | | | |
| iDS-9632NXI-I8/8S | | • | • | • | | | | | |
| iDS-9632NXI-I8/4F | | | | | • | | | | • |
| iDS-7716NXI-I4/8S | | • | • | • | | | | | |
| iDS-7716NXI-I4/16P/8S | | • | • | • | | | | | |
| iDS-7732NXI-I4/8S | | • | • | • | | | | | |
| iDS-7732NXI-I4/16P/8S | | • | • | • | | | | | |
| iDS-TP40-16B | | | | | | • | • | | |
| DS-IE6308/16/32/64-E/FA | | | | | | | | • | • |
| DS-IC0116-F | | | | | | | | • | • |

### iDS-96064NXI-I16
DeepinMind 16-ch Facial Recognition & Analysis Embedded NVR

**DeepinMind**

- Up to 16-ch IP cameras analysis, face detection and face recognition.Face pictures modeling and comparison, alarm linkage actions.Search People by face pictures
- Powerful face pictures library management, up to 100,000 Face list
- Coopration with iVMS-4200
- Human Body Detection analytics (line crossing detection, intrusion detection, etc.) to improve the alarm accuracy rate effectively
- Like the Rain/Leaf/Cat/Bird/Light/Human Body, All of these things may trigger line crossing or instruction alarm,DeepinMind NVR(16S) can realize the secondary analysis of human body, improving the alarm accuracy
- Search by human features and similarity
- More precise facial recognition and analytics based on Deep Learning algorithm
- More precise Human body detection. Analytics based on Deep Learning algorithm
- Alarm accuracy at least 90%.(After processing by DeepinMind NVR(/S), the false alarms would be Filtered)

#### Scenario
- Applied to all kinds of smalls and medium-sized faces project, can meet the demand of various industries face application
- Such as casino/residential buildings/schoolyard/mall

### iDS-96128NXI-I16
DeepinMind 32-ch Facial Recognition Embedded NVR

**DeepinMind**

- Up to 32-ch IP cameras analysis, face Detection and face Recognition.Face pictures modeling and comparison, alarm linkage actions.Search People by face pictures
- Powerful face pictures library management, up to 100,000 Face list
- Coopration with iVMS-4200
- Human Body Detection analytics (line crossing detection, intrusion detection, etc.) to improve the alarm accuracy rate effectively
- Like the Rain/Leaf/Cat/Bird/Light/Human Body, All of these things may trigger line crossing or instruction alarm,DeepinMind NVR(16S) can realize the secondary analysis of human body, improving the alarm accuracy
- Search by human features and similarity
- More precise facial recognition and analytics based on Deep Learning algorithm
- More precise Human body detection. Analytics based on Deep Learning algorithm
- Alarm accuracy at least 90%.(After processing by DeepinMind NVR(/S), the false alarms would be Filtered)

#### Scenario
- Applied to all kinds of smalls and medium-sized faces project, can meet the demand of various industries face application.
- Such as casino/residential buildings/schoolyard/mall

### DS-9632NXI-I8/8S(16S)
DeepinMind 8/16-ch Human Detection & Analysis Embedded NVR

**DeepinMind**

- High accuracy human body detection analysis (line crossing detection, intrusion detection); up to 8/16 channels of IP camera analysis available
- DeepinMind NVRs (16S) runs a secondary analysis and filters out objects that may trigger false alarms such as rains, leaves, cats, birds, and light variations
- More precise human body detection based on Deep Learning algorithm
- Alarm accuracy at 90%+

#### Scenario
- Applies to any scenario that requires high alarm accuracy for perimeter precaution, such as casinos, office buildings, industry parks, hotels, and banks

### iDS-9632NXI-I8/4F
DeepinMind 4-ch Facial Recognition Embedded NVR

**DeepinMind**

- Up to 4 channels of IP cameras analysis, face detection and facial recognition. Facial image modeling and comparison, alarm linkage actions. Search for persons by facial images
- Powerful facial image library management; stores up to 50,000 faces
- Integrates with iVMS-4200
- More precise facial recognition and analysis based on Deep Learning algorithm

#### Scenario
- Applies to all-size facial recognition projects and all industries, such as casinos, residence, schools, and shopping malls

**iDS-7716/32NXI-I4/(16P)8S**
DeepinMind 8-ch Human Detection & Analysis Embedded NVR

**DeepinMind**

- Human Body Detection analytics (line crossing detection, intrusion detection, etc.) to improve the alarm accuracy rate effectively.Up to 8-ch IP cameras analysis
- Like the Rain/Leaf/Cat/Bird/Light/Human Body, All of these things may trigger line crossing or instruction alarm,DeepinMind NVR(8S) can realize the secondary analysis of human body, improving the alarm accuracy
- Search by human features and similarity
- More precise Human body detection. Analytics based on Deep Learning algorithm
- Alarm accuracy at least 90%.(After processing by DeepinMind NVR(/S), the false alarms would be Filtered)

**Scenario**
- All kinds of scenarios(for example:perimeter precaution)that require high alarm accuracy, such as casino/building/industry park/hotel/bank



**iDS-TP40-16B**
DeepinMind Server
Traffic Incident Detection Server

**DeepinMind**

- Up to 16 channels of 3 MP IP cameras for traffic incident detection and traffic data collection.
- Traffic incident detection type: congestion, parking violation, driving on a lane line, wrong-way driving, pedestrians, falling objects, illegal lane change, roadblocks, construction, occupying the emergency lane.
- Traffic data collection: vehicle type, lane flow, average speed, space headway, time headway, time occupancy, space occupancy, lane queue length, lane traffic status

**Scenario**
- Expressways/tunnels/elevated roads/bridges



**DS-IE6308/16/32/64-E/FA**
DeepinMind Facial Recognition Server

**DeepinMind**

- Supports for up to 16 MP uploaded images for comparison
- Supports for up to 8 MP camera for real-time computing and comparison
- 1-to-1 facial comparison for identity confirmation
- Blacklist alarm supports 300K blacklist targets
- Stores 1 million captured images
- Facial recognition and blacklist comparison, identity confirmation, blacklist alarm, independent working mode support

**Scenario**
- Airport/customs/public squares/government offices



**Coming Soon**

**DS-IC0116-F**
DeepinMind Facial Recognition Server

**DeepinMind**

- Supports for up to 16 MP uploaded images for comparison
- Supports for up to 8 MP camera for real-time computing and comparison
- Blacklist alarm supports 300K blacklist targets
- Supports server clustering for large-scale projects; provides more facial recognition applications via integration with Hikvision VMS platform
- Facial recognition and comparison blacklist, identity confirmation, blacklist alarm

**Scenario**
- Airport/customs/public squares/government offices

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