CCTV CHALLENGES IN AI

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CCTV SYSTEM
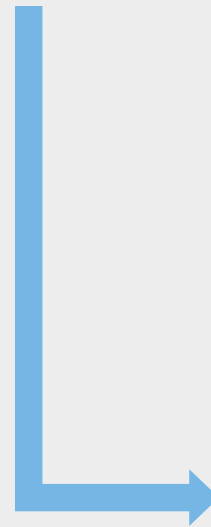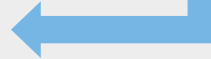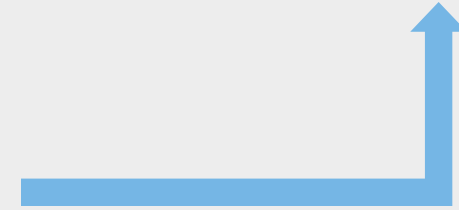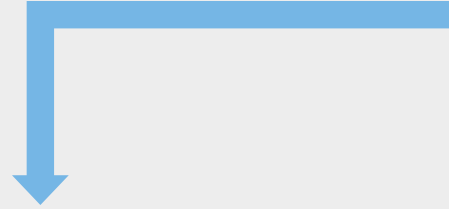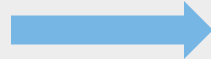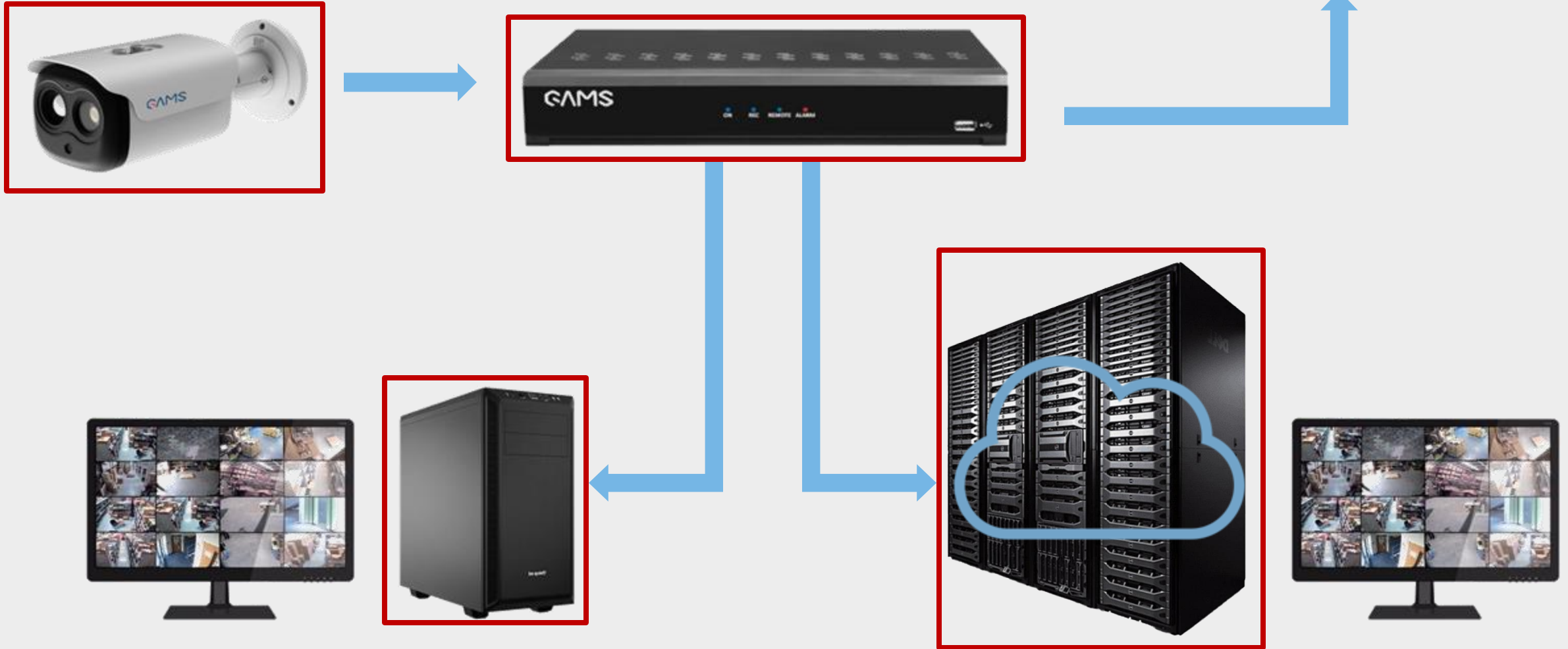
CCTV SYSTEM: WHERE'S AI?
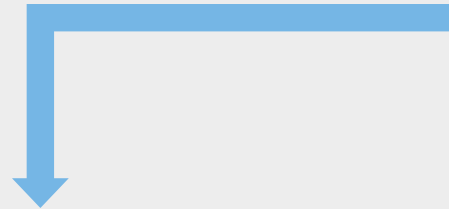
CCTV SYSTEM: WHERE'S AI?

Basic analytics
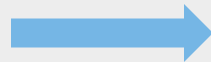
Intrusion detection
People counting
Smoke and fire

Intrusion detection
People counting
Smoke and fire
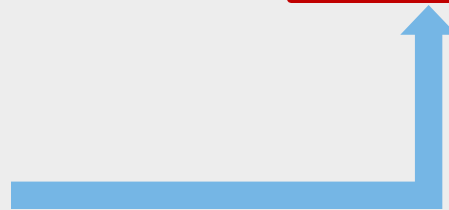
Metadata
forensics

Aggregate
analytics

Metadata
forensics

Aggregate
analytics

PEOPLE CRAWLING

EDGE DEVICES

ON-PREMISE

LACK OF SAMPLE VIDEOS

CCTV CHALLENGES
IN AI

REAL-TIME COMPUTATION

SMOKE AND FIRE

THERMAL CAMERAS
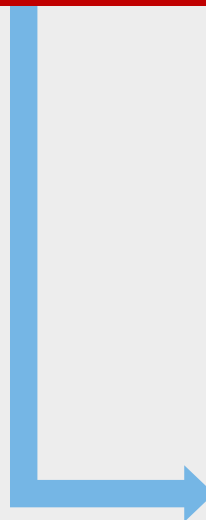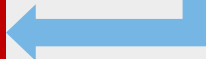
BEHAVIOUR ANALYSIS
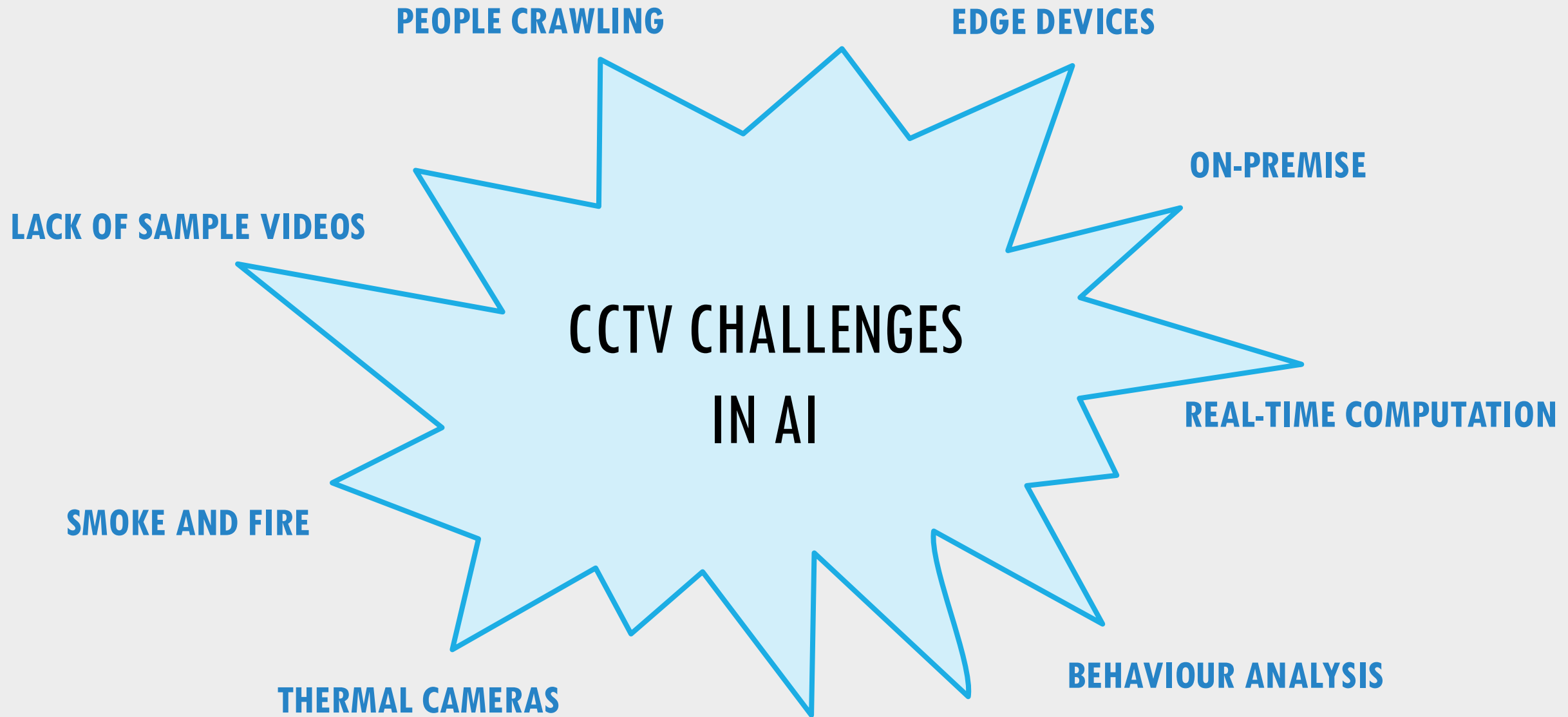
LACK OF SAMPLE VIDEOS

Due to **privacy concerns,** it is hard to collect videos or images from customers.

Videos are mainly obtained from **test recordings** during installation procedures.

PEOPLE CRAWLING

Publicly available datasets show people in **usual poses,** such as standing or sitting.

Thieves often act differently in order to avoid security obstacles, so they may be undetected.

Proprietary data are important to integrate such poses inside training set and avoid false positive.
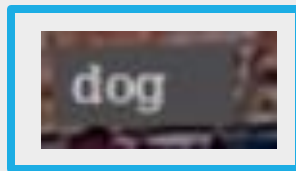
EDGE DEVICES

Cameras and AI boxes are edge devices based on **embedded systems.**
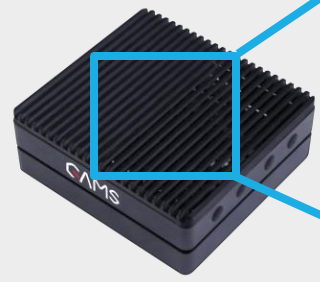
Low computational power, low FLOPS, low memory are hard requirements for Artificial Intelligence.

Lightweight and quantized neural networks are needed.
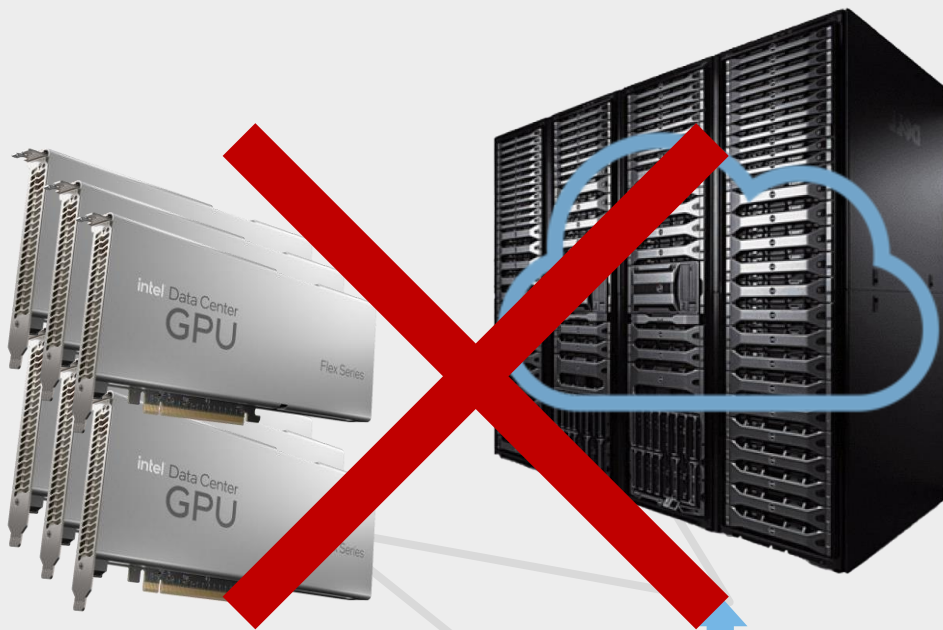
ON-PREMISE

Every analysis, also the forensics, should be performed on-premise.

Less performant computers need more **optimized algorithms.**

Customers want their security systems to be **unreachable from outside** the building

Visual Transformers (ViT)

High accuracy and precision (less false alarms!)

Slow to process frames

Convolutional Neural Networks (CNN)

Less accuracy and precision (more **false alarms!**)

Really **fast** to process frames

REAL-TIME COMPUTATION

The bounding box around the person is not enough

Skeleton estimation is needed

Some behaviours also require focusing on **many consequent frames** (i.e. shoplifting)

Hands up

Shoplifting

Falling

Aggression

BEHAVIOUR ANALYSIS

With respect to the those in the optical field, thermal images have:

Different **colors**
Missing **shadows**
Poor **resolution**
Harder estimation of **perspective**

THERMAL CAMERAS

Fire is quite **easy** to detect, thanks to its peculiar colors and brightness.

Smoke has many different colors, shapes and densities that make it much **harder** to detect.

SMOKE AND FIRE

Black smoke

Gray smoke

White smoke

High density

Low density

Q&A TIME