Sensor networks

video surveillance and privacy a solvable paradox?

Belainesh Mehari

UNIVERSITÄT KLAGENFURT

Introduction

UNIVERSITÄT KLAGENFURT

- Video surveillance concerns models,techniques,and systems for acquiring and processing video about the external world
- Video surveillance privacy are incompatible and form an intrinsic paradox

Video serveillance vs privacy

UNIVERSITÄT KLAGENFURT

- Surveillance means control
- Privacy concerns the possibilitty to recognize and use the data of a single individual
- Video surveillance has been and still is involved in privacy issues
- In 21th century computer vision advancements made

Automatic processing effective both in surveillance and privacy preserving solutions

continue

UNIVERSITÄT KLAGENFURT

- Technological were achieved after September 11 when many researchers put effort in to human detection ,tracking reidentification and action recognition
- In the past decade of artificial intelligence season with combination of computer vision and deep learning have positive results in human behaviour understanding without affecting privacy

Privacy Regulation

UNIVERSITÄT KLAGENFURT

- EU GDPR,2018
- EU artificial intelligence act,2021
- California consumer privacy act ,2020
- China cybersecurity law, 2017 and personal information security specification ,2020
- Japan act of protection of personal information 2017

THE 2000s: The boom of computer vision video surveillance

UNIVERSITÄT KLAGENFURT

- **Three main reasons**

  -Hardware availability

  -Computer vision improvement and

  -The need of social security

RESEARCH FEATURE

Video surveillance needs have driven two important computer vision achievements

1.the development of background suppression techniques

2. the formulation of people detection

People detection started to be formulated by considering people target models

Recognizable by two class classifiers (human presence vs non human presence)

Continue

UNIVERSITÄT KLAGENFURT

Birth of people detection started probably with seminal work of dalai and triggs in 2008

Hundred approaches ,can be categorized three different aspects

1,handcraft features to employ? Several generalpurpose descriptors were proposed, such as histogram of oriented gradients covariance and structured part-based descriptors

Continue

2.Which classifier? Detectors should be coupled with suitable classifiers,

such as neural networks showing a true boom in pattern recognition techniques for people detection

3.Which search space? searching everywhere is not necessary many proposals focused on improving both efficiency and precision

PRIVACY PRESERVING ACTION RECOGNITION

UNIVERSITÄT KLAGENFURT

- Detects and classifies human actions in video data
- Utilizes deep learning models for real-time analysis
- Detecting suspicious activities in public places without compromising individuals' identities

PRIVACY PRESERVING IMAGE TEXTUAL DESCRIPTION

UNIVERSITÄT KLAGENFURT

- Generates natural language descriptions of images.
- Utilizes large pretrained models.
- Networks can be trained on anonymized visual data and reduce the loss in performance by using knowledge distillation

PRIVACY PRESERVING ACTION RECOGNITION AND IMAGE TEXTUAL DESCRIPTION

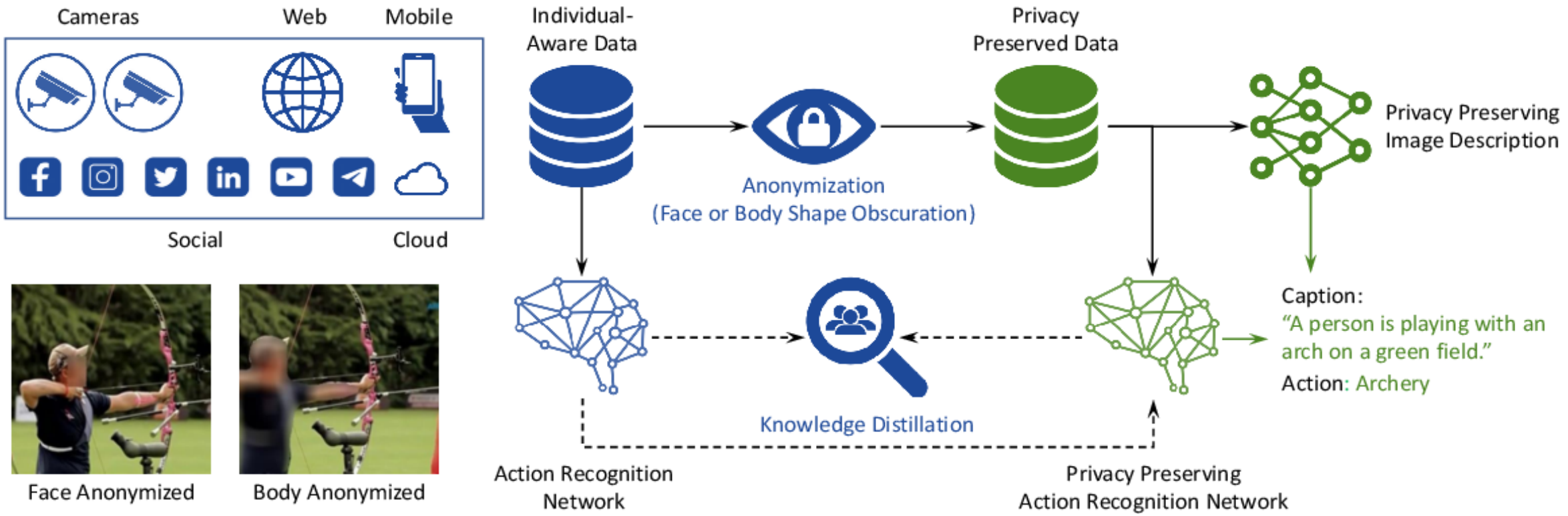

FIGURE 1. The privacy-preserving action recognition and image description pipeline. Networks are trained on anonymized data collected from multiple sources and by distilling knowledge from networks trained on sensitive data

conculusion

UNIVERSITÄT KLAGENFURT

1 Video understanding can now be effectively provided by machine learning approaches No need for continuous human monitoring.

2 To understand what people do, we do not need information about their identity, their face, or their appearance

3.privacy for pretrained networks, constraining them to give answers in both privacy-by-design and privacy-by-default methods. New attempts show that this could be achievable, and hope this will be the future of AI-based systems

REFRENCE

UNIVERSITÄT KLAGENFURT

1. S. Rodotà, “La privacy tra individuo e collettività,”

2. S. Warren and L. Brandeis, “The right to privacy,”

3. C. R. Wren, A. Azarbayejani, T. Darrell, and A. P. Pentland, “Pfinder: Real-time tracking of the human body,

4. K. W. Bowyer, “Face recognition technology: Security versus privacy,”

5. A. Elgammal, D. Harwood, and L. Davis, “Non-parametric model for background subtraction,”

6. N. Dalal and B. Triggs, “Histograms of oriented gradients for human detection

7. P. Dollár, Z. Tu, P. Perona, and S. Belongie, “Integral channel features,”

8. G. Gualdi, A. Prati, and R. Cucchiara, “Multistage particle windows for fast and accurate object detection,”

Thanks For Your Attention!!