Privacy-Preserving Face and Human Filtering in Event Streams

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***Abstract*—Event cameras capture dynamic visual information with high temporal resolution and minimal latency, making them ideal for applications in autonomous driving, surveillance, and robotics. However, privacy concerns arise when such cameras capture identifiable human features. This project aims to develop a deep learning solution that anonymizes human faces and body positions by blurring these features in event camera data and transmitting only the anonymized information. Building on the Faces in Event Streams repository, we propose to expand this capability beyond face detection to include body position tracking and effective anonymization, ensuring privacy compliance while retaining useful non-human data for downstream applications.**

***Index Terms*—Event cameras, high temporal resolution, anonymization, deep learning, privacy preservation, face detection, body position tracking, human feature blurring, data transmission.**

I. Introduction

Event cameras record changes in a scene as asynchronous events, detecting intensity variations at each pixel individually rather than capturing an entire frame at once. This unique capability enables event cameras to handle fast-moving scenes with minimal motion blur, making them highly suitable for continuous monitoring and real-time applications. However, privacy concerns arise when these cameras capture sensitive human data, such as faces and body positions.

Existing research has introduced methods like the Faces in Event Streams (FES) dataset to enhance face detection in event-based data [4]. However, anonymization of broader human features, including body positions, remains limited. Recent work has focused on privacy-preserving techniques, such as event encryption to mitigate privacy risks by anonymizing data at the event level [1]. Furthermore, person re-identification techniques demonstrate that privacy can be preserved without compromising the effectiveness of surveillance systems [2]. Perturbation methods like EV-Perturb offer privacy-preserving classification for event-stream data, particularly in dynamic vision sensor applications [3].

Building upon these methods, this project aims to extend anonymization beyond facial data to include body position tracking. By adapting privacy measures specifically for the characteristics of event cameras, we aim to develop a comprehensive anonymization solution that ensures privacy protection while maintaining compatibility with real-time processing requirements.

II. Objective

The primary objective of this project is to develop a deep learning model that can detect and anonymize human features, specifically faces and body positions, within event camera data to ensure privacy protection. Building on the Faces in Event Streams repository, the project will:

- Implement a deep learning model to filter human features, focusing specifically on face detection.
- Extend existing capabilities to include body position detection, enabling comprehensive human feature tracking and anonymization.
- Apply an effective blurring mechanism to mask human features, preserving only non-human data for secure transmission.
- Run and compare models: Test various available models and compare their outputs with ours.
- Optimize for accuracy and efficiency: Attempt to improve our model in terms of accuracy and computational efficiency to support diverse, privacy-critical applications.

References

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