

Introduction

Concern for how personally identifying data is being collected and used has led to checks on the use of cameras and associated technologies, including recent action in Alabama (AL SB56 2022) to limit the use of AI and facial recognition by state and local entities.

There is a growing demand for transparency and accountability (including oversight measures) around data collected by smart city technologies, which is complicated by competing public and private stakeholder interests.

Research Goals

Create a versatile set of visual feature extractors, each of which has different trade-offs between: (1) the extracted feature's utility expectation (e.g., how sophisticated a task it will be used for); (2) the privacy leak risk incurred by sharing it (e.g., what privacy attributes a third party may be able to probe by accessing).

Goals for Being Watched White Paper included (1) researching city surveillance practices, (2) recommend best practices for city policy.

Methods

- As we showcase in our White Paper, our multi-disciplinary team was engaged in a multi-level analysis about public use of surveillance technologies. We assembled six focus groups.
- We apply the following "transformations" to public datasets and also self-collected videos, to understand the trade-off between the utility and the privacy budget:
 - Spatial-temporal interest point (STIP) features
 - Optical Flows (TVL1)
 - Skeleton (OpenPose)
 - Color Jitters (Contrast, Saturation, Hue)
- We then measure the **utility** (i.e., accuracy) on the unseen samples and also the **privacy budget** metric (i.e., the accuracy when predicting the private attributes)
- The private attributes we are interested in are skin color, gender, and nudity. An example is shown below:

Frame	Action	Privacy Attributes
	Brush hair	- skin color: white - face: invisible - gender: female - nudity: semi-nudity - relationship: unrevealed
	Situp	- skin color: black - face: completely visible - gender: male - nudity: semi-nudity - relationship: unrevealed

Original Video Skeleton -based Original Video Optical Flow -based



Being Watched: Technical & Ethical Solutions To Smart Cities Monitoring & Surveillance

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Project 1: Figures and Results

Experiment Results On HMDB51

Transformation	Strength	Pri. Budget (Gender)	Pri. Budget (Skin Color)	Pri. Budget (Nudity)	Utility (top 1 / 5 accuracy)
No Transformation	-	100%	100%	100%	50.9% / 74.3%
STIP features	-	25.10%	33.64%	33.49%	15% / -
Optical Flow	-	47.71%	70.27%	43.58%	50.4% / 72.9%
Skeleton	-	25.10%	33.64%	33.49%	15.8% / 40.8%
Contrast	0.5	92.2%	91.0%	91.6%	50.1% / 73.1%
Contrast	1.0	80.0%	80.1%	79.2%	46.2% / 69.0%
Saturation	0.5	98.6%	99.3%	99.1%	50.8% / 73.7%
Saturation	1.0	93.2%	94.7%	92.0%	49.9% / 73.1%
Hue	0.25	81.0%	90.6%	81.3%	50.3% / 73.2%
Hue	0.5	71.0%	76.7%	66.5%	50.2% / 73.2%

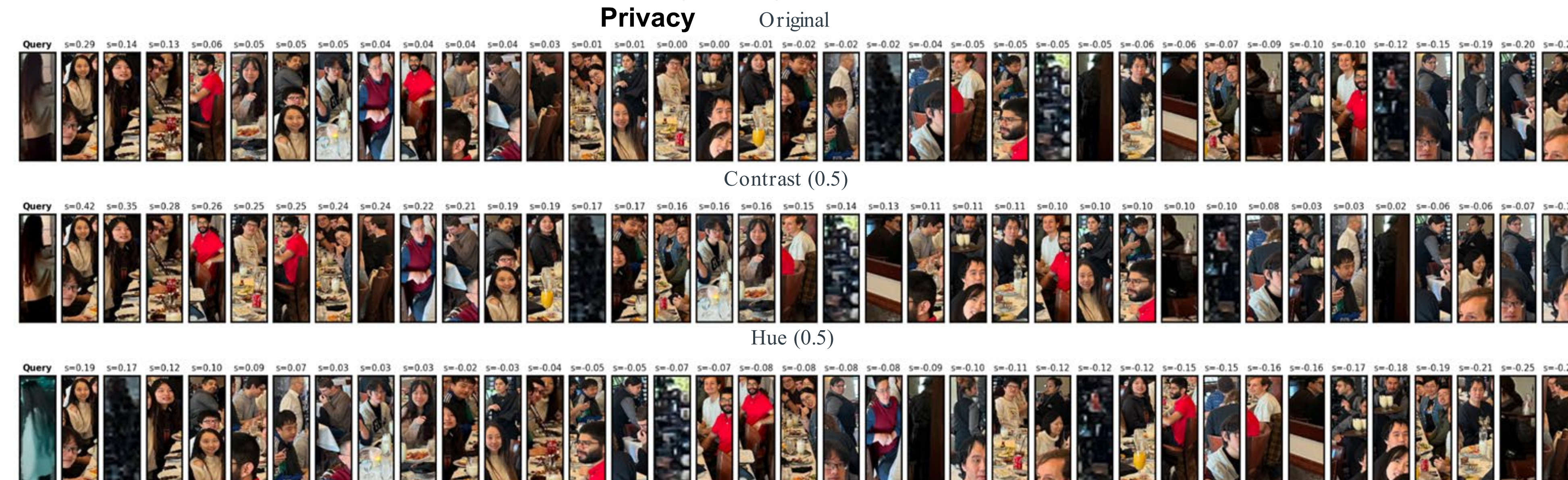
Experiment results : Self-Collected Videos

Transformation	Strength	Pri. Bud. (Gender)	Pri. Bud. (Skin Color)	Pri. Bud. (Nudity)	Utility (top 1 / top 5)
Contrast	0.5	92.2%	91.0%	91.6%	50.1% / 73.1%
Contrast	1.0	80.0%	80.1%	79.2%	46.2% / 69.0%
Saturation	0.5	98.6%	99.3%	99.1%	50.8% / 73.7%
Saturation	1.0	93.2%	94.7%	92.0%	49.9% / 73.1%
Hue	0.25	81.0%	90.6%	81.3%	50.3% / 73.2%
Hue	0.5	71.0%	76.7%	66.5%	50.2% / 73.2%

Examples of collected videos



Identity Recognition as Privacy

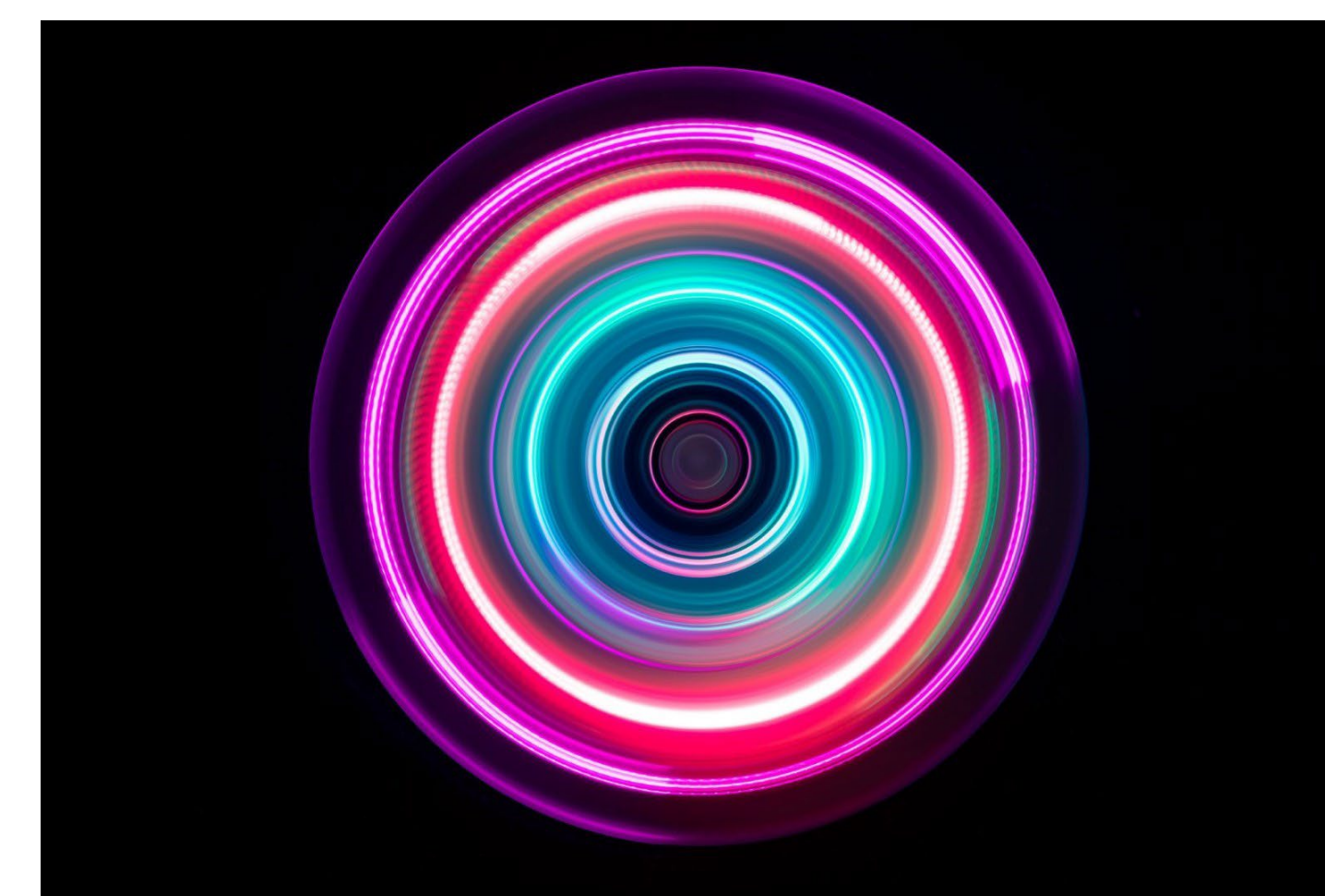


Project 2: Ethics, transparency and data policies

The presence of cameras in our society and what to do with the data captured as a result is a complex interests.

As the use of public cameras increases, the need to develop and promulgate robust policies regarding their use is taking on new urgency. This white paper serves as an advisory framework to help municipal entities create a balanced response to the retention and disposition of smart city camera data that acknowledges the needs of smart city stakeholders.

In particular, the white paper presents emerging best practices that foreground issues and principles of transparency, accountability, and ethics. In government settings, data retention policies are operationalized through records retention schedules, emphasizing the administrative, legal, and compliance drivers for what must be retained and destroyed. The need to broaden perspectives on data retention to include a specific ethical lens is borne out by examples of scattershot camera policy updates that look to prevent situations and conditions where the experiences and outcomes of data retention could result in harm to the public and instead find solutions where transparency and suitability of purpose come to the fore.



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Conclusion



- Explore additional city units' use of monitoring technologies to assess how their processes bear on Austin's latest resolution on privacy (20240215-024). Work with the Austin Public Library yielded insights into the ways in which city departments and stakeholders are working with camera technologies and how their engagement with the public might be improved.
- Publish annual reports on technologies used by the City
- Implement an aggregated, deidentified data collection policy
- Keep citizens in the loop by supporting Privacy Advisory Boards
- Undertake Risk Mitigation, Functional, and Stakeholder analyses to transparently link data policies to city goals.



References

See our working manuscript and White Paper for references.