

C2P2: Content-Centric Privacy Platform for Privacy-Preserving Monitoring Services

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Abstract

Motivated by ubiquitous surveillance cameras in a smart city, a monitoring service can be provided to citizens. However, the rise of privacy concerns may disrupt this advanced service. Yet, the existing cloud-based services have not clearly proven that they can preserve Wth-privacy in which the relationship of three types of information, i.e., who requests the service, what the target is and where the camera is, does not leak. We address this problem by proposing a content-centric privacy platform (C2P2) that enables the construction of a Wth-privacy-preserving monitoring service without cloud dependency. C2P2 uses an image classification model of a target serving as the key to access the monitoring service specific to the target. In C2P2, communication is based on information-centric networking (ICN) that enables privacy preservation to be centered on the content itself rather than relying on a centralized system. Moreover, to preserve the privacy of bystanders, C2P2 separates the sensitive information (e.g., human faces) from the non-sensitive information (e.g., image background), while the privacy-aware forwarding strategies in C2P2 enable data aggregation and prevent privacy leakage resulting from false positive of image recognition. We evaluate the privacy leakage of C2P2 compared to that of the cloud-based system. The privacy analysis shows that, compared to the cloud-based system, C2P2 achieves a lower privacy loss ratio while reducing the communication cost significantly.

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