

Paper Critique: Design & Implementation of a Wireless Video Surveillance System

Name: Wenqi Xu ID: 400156647

Video Surveillance is pervasive and useful. More and more wireless surveillance cameras coming into the market recently. The questions is how do we build a large wireless video surveillance network. The key challenge comes from the fact that wireless is a shared medium in scarce spectrum. Video cameras can quickly overwhelm the wireless capacity.

To solve this problem, vigil was built. Vigil is a wireless video surveillance system. The article set the following goals: The first is maximize surveillance application accuracy; The second is minimize wireless capacity usage. To achieve these goals, the article used three techniques: edge computing, redundancy suppression, and content-aware traffic scheduling.

First, considering edge computing. The survey shows that useful video content is very sparse in surveillance videos. Edge Computing Node detects queried objects. The key idea is that Vigil only uploads relevant frames to the user generated query. Vigil's edge computing provides at least 5x reduction in frames to be uploaded.

Second, redundancy suppression is the question about how to compress frames from multiple cameras. The article use 3-step redundancy suppression algorithm to solve this problem: Step 1, set frame utility equal to number of queried objects in frame; Step 2, re-identify objects from camera 2 in camera 1; Step 3, Upload only change frames. To evaluate this solution, the article use single cluster, 3 cameras, medium and high activity of people to do experiment. Vigil's redundancy suppression provides 1.7x surveillance accuracy when available wireless capacity is limited.

Third, content-aware traffic scheduling prioritizes camera clusters with objects relevant to query. And reuse bandwidth savings to provide Wi-Fi access & recoup the surveillance network cost. Vigil's content-aware traffic scheduling uploads 25% more objects relevant to the user's query.

Improvements of video compression algorithms and vision analytic algorithm, further increasing Vigil's utility can be future work.