

LAPD Project:

Change-point Detection for Police Body-Worn Video

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Introduction

Body-worn video (BWV) or on-body cameras provide a novel means to collect very fine-grained information about police-public interactions. The general use model requires officers to initiate recording of video whenever there is an encounter with a member of the public. During such interactions, BWV is recorded in real-time. Recording is terminated at the officer's discretion. BWV is not streamed or reviewed in real-time, but rather is uploaded to a secure cloud storage system at the end of an officer's shift.

BWV is designed to provide another line of evidence for the actions of individuals and the outcomes of interactions between police and members of the public. BWV is therefore evidence relevant to legal proceedings like any other form of evidence collected by police. In a limited number of studies, BWV has been shown to reduce the likelihood that situations escalate to a point requiring use of force.

There are considerable challenges facing wide-spread use of BWV. Even small scale deployments are expected to lead to massive volumes of video data that will quickly outstrip the ability of law enforcement agencies to analyze. The resulting fallback position will be to review BWV footage only when it corresponds to adverse outcomes (e.g., use of force). Most video will go unused. Many of the potential benefits of BWV may therefore go unrealized.

The 2016 LAPD-RIPS Project

The 2016 RIPS-LAPD team will work to develop change-point detection methods for use with BWV. Change point detection represents a general class of mathematical problems that seek to identify significant shifts in the behavior of a temporal stochastic process. The process itself is often hidden and therefore changes in process can only be observed indirectly. For example, you might be interested in detecting whether an individual's disposition has changed from friendly (or neutral) to antagonistic given observations of their outward actions such as body position, direction of motion, arm gestures. Detecting changes is a necessary precursor to taking actions. For example, detecting changes in the disposition of an individual captured on video could be used for automated labeling or tagging of the video and, in some cases, automated initiation of some action. A key challenge is to produce change point detection methods that minimize false alarm rates.

The project will rely on a range of data types BWV metadata (e.g., time stamps), BWV audio, and the video images themselves. Computations may be done in Matlab, Mathematica, C, C++, R, Java, or other appropriate computational language.

Key Milestones:

1. Statistical assessment of LAPD BWV and other associated data.
2. Develop change point detection methods.
3. Testing of efficacy of methods.
4. Present to LAPD.

References

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