Detect tampering of video surveillance camera

Background

When setting up an area to be under video surveillance, it is not always possible to keep the cameras in a non-reachable distance. This means that if a person does not want to be captured on video, he might be able to turn the camera away, cover it somehow (e.g. with spray paint) or maybe change the focus so that everything is blurred. Since there might not be a guard watching the video all the time, it can take a significant time before the tampering is noticed and looking at the recorded video will not help much in identifying who did what.

A solution to this problem is to have the system analyze all incoming video and automatically from this detect if someone is tampering the camera. If detected, an alarm should be triggered so that a guard can take action immediately.

The project

In this project, we want to investigate how to make an algorithm that automatically can detect tampering, here defined as a person that intentionally turns the camera, covers it or adjusts the focus.

Today typically one server can handle up to 100 camera feeds and if enabling the tamper detection means that only 50 cameras can be handled, then this also means that the customer needs to buy twice the amount of hardware to be able to run the same number of cameras as without the tamper detection enabled. For this reason, it is very important that the algorithm is fast.

For every alarm triggered, a guard will need to take action. This means that there is a significant cost associated with every alarm including false positives. It is thus also important that the number of false positives are kept as low as possible.

Finally, it is also important to avoid too many steps in setting up the tamper detection. Ideally, it should just be something you can enable and there should be no need for any calibration. This is important to avoid an extra cost when setting up new systems with many cameras (think 1000 of cameras).

It is expected that a standalone prototype of the proposed algorithm is implemented and that both accuracy and performance is measured.

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