Smoking Detection in Video Footage

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2018

The goal of this project is to develop an automated system that can detect instances of smoking in video footage.

To identify instances of smoking, the system relies on the probability that a person smoking will be in close proximity to cigarette smoke. The system classifies a smoking event by searching for smoke near a person's hand or face.

The system first identifies faces within each frame. The system then takes a sample of each face's colour to find areas of the same skin colour within the frame. The largest area of skin outside of the identified face region is presumed to be the hand. The system then searches the face and hand areas it has identified for smoke. If smoke is found in these areas, that particular frame of the video is classified as a potential smoking frame. If a significant proportion of frames in a video are potential smoking frames, the video itself is deemed by the system to contain an instance of smoking.

The final system was designed to work with short sequences, typically less than 10 seconds in length. Additionally, it is limited to footage shot with a stationary camera.

A selection of short films clips, indicative of modern films, were chosen to test the system's performance. The system's final results were mixed, partially due to the variety and complexity of the footage used (an issue inherent with testing on footage from modern films). The large variation present in the footage makes it difficult to optimise the system, as the range of input is extremely broad. Calibrating the system to properly classify as many positive samples as possible will introduce many false positives, and vice-versa.