

Feature Tracking

The goal of the project is to track the location of a particular feature in a continuous video segment. One or possibly multiple features must be selected in the first frame of the video and the algorithm will track the location (with a box) of the feature(s) over the rest of the video segment. The feature(s) will be selected by the user by drawing a rectangular box with the mouse over the area of interest in the first frame. Since the relative size or orientation of the feature can change through the video segment (zoom or rotation of the camera), the size of the box that tracks the image will be scaled and shifted according to the number of pixels the feature contains.

The algorithm will not necessarily be designed for real-time videos but will take the whole video segment as an input and output the same video with the desired feature being tracked.

The algorithm will be designed to perform the following tasks:

- Should be able to find the most likely location of the original feature in a consecutive frame when changes are not too drastic (not an entirely new scene of a movie).
- Should be invariant to changes in lighting or intensity by performing appropriate color balancing/filtering.
- Should be able to track the location of the original feature under rotations or zooms.
- The algorithm must recognize if the feature is no longer present in the video segment.
- The algorithm must be able to distinguish between similar objects in a video if multiple features are selected (Ex. If multiple football players in a game are selected, the algorithm should be able to discern them as the video evolves).

References:

- 1) <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=378195&tag=1>
(Automatic Feature Point Extraction and Tracking in Image Sequences for Unknown Camera Motion)
- 2) <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4177730>
(Selection and Fusion of Color Models for Image Feature Detection)
- 3) <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4177730&tag=1>
(Multiple Hypothesis Tracking in Generalized Hough Transformed Images)
- 4) <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=540588>
(An Image Tracking Algorithm Using Reduced Sufficient Statistics)