Hybrid markerless tracking of complex articulated motion in golf swings

Abstract

Sports video tracking is a research topic that has attained increasing attention due to its high commercial potential. A number of sports, including tennis, soccer, gymnastics, running, golf, badminton and cricket have been utilised to display the novel ideas in sports motion tracking. The main challenge associated with this research concerns the extraction of a highly complex articulated motion from a video scene. Our research focuses on the development of a markerless human motion tracking system that tracks the major body parts of an athlete straight from a sports broadcast video. We proposed a hybrid tracking method, which consists of a combination of three algorithms (pyramidal Lucas-Kanade optical flow (LK), normalised correlation-based template matching and background subtraction), to track the golfer's head, body, hands, shoulders, knees and feet during a full swing. We then match, track and map the results onto a 2D articulated human stick model to represent the pose of the golfer over time. Our work was tested using two video broadcasts of a golfer, and we obtained satisfactory results. The current outcomes of this research can play an important role in enhancing the performance of a golfer, provide vital information to sports medicine practitioners by providing technically sound guidance on movements and should assist to diminish the risk of golfing injuries.