Producing a Tennis Shot Placement Report by Detecting Bounce Points in Tennis Shots

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This project presents a system that provides tennis players with a shot placement report. It does this by tracking the shots of the tennis player and detecting the bounce points of these shots. The intention is for this system to be used in a mobile application. The tennis shots therefore need to be tracked using a single mobile phone’s camera. The majority of systems used for tracking tennis balls make use of multiple high-speed cameras. There are difficulties in tracking tennis balls in videos due to the size of the ball as well as the speed it is moving at.

In this project, a literature review of previous techniques used to track tennis ball was carried out. It was found that previous solutions were similar in the steps that they did in order to track the tennis balls. However, it was also found that none of the systems had the intention of working on a mobile application. The design and implementation of the system for tracking tennis balls, detecting bounce points and generating a shot placement report is then discussed.

The system also needed to be tested and evaluated as a part of this project. Footage of tennis shots recorded with a mobile phone’s camera needed to be obtained. Ground truth for the bounce points in these videos also needed to be obtained manually. Finally, a testing framework was implemented in order to automatically test and evaluate the solution. Testing metrics were determined and were then calculated during this automatic evaluation process. 51% of the bounce points were detected by the solution, with an average of error of 9.97 pixels for the distance. Although not all of the bounce points were detected, the tracking of the tennis balls was generally successful, demonstrating that the system could be used in order to provide tennis players with a shot placement report.