



New method based on Image processing to enhanced the Accuracy and Precision Of table tennis player's performance

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ABSTRACT

Table tennis is one of the most popular sports in Olympic, Which leads to the high interest of it. Talent identification based on technologies play an effective role in sports. One of the essential technology in the sports is image processing and the use of this technology can improve the quality of the field from Talent identification pathway to be championship. The purpose of this paper is to present a method based on image processing, which leads to increased levels of accuracy and precision blows table tennis players in each Rally. This analysis also is important in talent identification and in professional competitions. Here is a video filmed by four cameras at a rate of 100 frames per second was used and for processing those images used from MATLAB image processing toolbox.

Keyword:

table tennis, Image processing, player performance, accuracy, 4 camera, ball detection

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INTRODUCTION

The use of educational technologies to achieve increased performance, along with raising the level of education and training systems, is also effective in the effectiveness and efficiency to be able to increased levels of Athletic Performance(1). Table tennis is also not an exception and always will be using more sports technology in facilitate different tasks in the sport and benefited from talent identification and refereeing in the international matches. One of the most effective technology for sports affairs is image processing which can be achieved the routing of the ball in different locations in Raleigh table. In this paper, to achieve this goal, with the help of 4 cameras simultaneously captures 100fps from the table (on four sides of the table), movements and intentions the ball for each player's was found. To do this the foundations for the installation of cameras height of 65 cm from the surface of the table and In fact, 141 cm from ground level and a length of 35 cm was designed and built to be placed in the center of each of 4 section of the table. Bases installed around the table above are net to not only cause loss of vision or positive in trace of player impact, but at another point also does not reduce the player concentration. On the other hand, although the materials needed in this design is not so much importance, but it is possible to stroke the ball with a possible sudden and stands vertical or horizontal camera, device out from calibration, and imaging faced with the problem. To prevent from this happening, not only is the camera lens was fitted at the circular base of the circular camera lens with radius of equal than radius of the camera lens, and horizontally legs was fixed (Fig. 1). It was used the materials with high strength in the design, and at the end, each camera were in a frame. The other main point, is calibrate cameras at the top of the table, in this experiment, to achieve the coordinates (x, y), from the camera view of where the ball had stroke them, not requires very precise calibration of the coordinates. However, try to maximize the routing precision ball in stroke relevant areas. To do this not only a label width of five centimeters from the midpoint of each side of the table with Size (68.5,76.25) is allocated for each camera on each side of the table, but also was used the chessboard of 18 in 25 (cm) based on the method " checker board for 2D camera calibration" in the MATLAB environment. Important reason for the use of four cameras is completely covered surface of table by the cameras. In such a way, there will be blindness point in looking for shootout players.

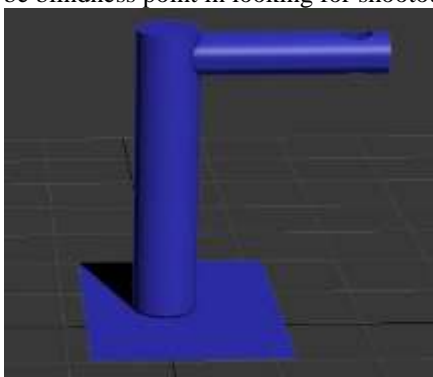


Fig1. The CAD of camera's Stands. With Height "141" Cm and "35" length.(2)

Methodology

Now were placed four cameras on four sides tour at a height of 65 cm above the table, attempts to trace the balls on each side of the table. This important done after movie recording by the camera in the image processing Toolbox MATLAB environment (3) for tracking object and object detection. Usually this imaging is faced with problems. Two facing challenges in the ball recognition at fast rally and racing can be said: 1: The relative size balls in each frame than other moving objects, like the back of the field and players that creates the blur in the imaging. The second challenge could be blocked in high-speed ball movement by merging with the foreground or background of the same size in shape and volume.(4) which obstacles will be lost with the help of high frame rate imaging cameras in an acceptable level. In another part of the research method, use 12 professional player (6 left-hand players and 6 right-hand Player) which in a standard game (5) (Three sets of twelve points) were exploited. The players were asked to focus and precision in playing style and as a professional simulation game and not give a test or practice in their agenda. Their game according to the example (Figure 2) has been crossed and players have been marked with the numbers 1 to 12 which players 1 to 6 were left-hand and players 7 to 12 are right-hand. During the game he tried to make greater use of all opponent's ground. The aim of this study was to assess the point of desk with Cartesian coordinates which are most stroke of the ball. According to which any table tennis match lasts 30 minutes or more (6), 1080 minutes was set by the 12 players. Videos were read in MATLAB and next step to find an algorithm for finding the ball consecutive frames were used in the film. After this stage to summarize and say comment about performance of each athlete, production a correlation of various level in stroke of ball with table which aims to show the greatest area of the ball on the opponent's field by a player is sent. It's important with distinguish between right and left films into two categories with the numbers 1 and 2 took place. With this definition which film that was as straight 1 in a game, In fact, was place of the balls which left player with attack or defense replied that which landed in the middle ground (Fig. 3) and conversely. It is noteworthy that need to take place the bed of ball was not feeling to the ground horizontally. And all cameras took from the area (top). Because the superficial solidarity of bed-places the ball from the ground level with an approximate area allocated to the balls place and our aim is to explore the region and not exact location of the ball from the coordinates (x, y) than the origin coordinate of image which forms background to the table, table tennis.

1↔12	12↔7
2↔11	11↔8
3↔10	10↔9
4↔9	1↔6
5↔8	2↔5
6↔7	3↔4

Fig2. Demonstrate the Game Schedule of 12 elite players for three times. This plan created randomly.

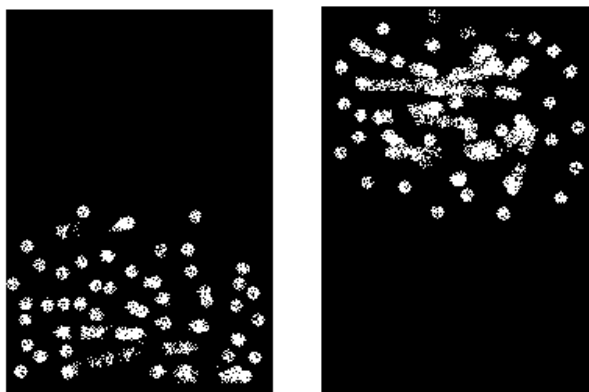


Fig3. Demonstrate the match between 2 players (left picture for strike of right player and right picture for left players strike)

Discussion

The purpose of this paper is present a model-based image processing where checked the accuracy of blows table tennis players. It results used in increase their function. In this study, a variety of kicks divided into three categories, 1: Exactly behind the Tour 2: the stroke exactly opposite the opponent and 3: pass transfer to opponent. Which classified between the 12 tested players. The objectives of this paper are as follows:

1: Identify blind spots in the table which players do not care it or routine points of batting with the highest number of get or answer from the players. And are allowed to get the correct answer and not seek privileges for none. 2: receiving batting routing pattern in the landing site and orientation the ball 3: Analysis differences between left and right hand players, such left-hand or right-hand players more to which any of the three aforementioned stroke ball. In addition, players with help this test will be able to know the points of land that is not used and use them to send the ball or routine point which too much uses and always encountered with get the ball and reduce points which do not get score and effort to use the entire surface of the table. Not only can improve the performance of the players at Championship level, but also to increase their confidence in the use of all parts of the playing field. It is worth noting tips in this article are balls that are out the table, or do not clash with table or due to stroke the net in the service are ignored. Therefore, all results of this research in successive Rally of players.

Result

According to the results of this article, So far, there is no similar cases it, players who habitually or low level of concentration in the send balls or any other disabilities are exactly try to answer the opposite received ball point, have a limited capability to victory. This result was obtained in compliance of full results of the 12 players tested (totaling approximately 1080 minutes). In this category, these players won only 9 games. However the players in other group using all over the ground and they have more functionality and chance to win. The main results of the paper can be noted which to earn victory, should be used all over the table. Other results of this research show, left-hand player due to greater activity in the right side of their brains have more features in use all over the ground. According to the results, only 7 in 10 of every 100 people are left-hand (7); which they can be due to greater activity in the right side of

brain, more accurate prediction of their opponent's reaction and against right-hand opponent use greater amount of surface. This can have a significant role in talent finding. In contrast, right-hand players in the area dictated the form of a training Rally, trying to manage the game. Another point, less use of space behind the Tour which causes weakness in reply to the opposing player. In this study, only 4 players on the 74 picture frames equivalent to 74 strokes were trying to use the space just behind the opponent Tour and they challenged player by sending the ball back of the net.

Suggestion

at the end, suggested this system also used for processing at a higher level (competition) so while using the speed in processing and analyzing data, with help MATLAB or openCV libraries environment, improve the quality of this sport and imaging technology is also entering the sport.

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