

Computer Vision- Project 3

Automatic darts scoring system

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For the first two tasks the approach was very similar, with very minor adjustments for better suiting the datasets for each of them.

The main idea was aligning each test image with the template image for the respective task and after processing the images (adding Gaussian blur, using thresholding, etc.) a much cleaner image of the darts could be obtained by computing the difference of the two images.

Because the middle part of the dart had a very similar color to the dartboard sometimes this operation could cause the arrows to be split in half. For easier recognition I applied different transformations to the processed image with the darts, like dilation or closing on different kernels. In some cases this would re-connect the dart parts back together but not in every case.

The next step was to find the contours of the darts and I checked the 6 largest contours found to accommodate for the cases where the darts were split in half. The verification of the shapes was focus on finding either a large area (a complete dart) or the tip of the arrow (a smaller area but with a bigger width than height).

After finding a dart's location I would compare it to a pixel mask I prepared in advance using thresholding on the template image with some adjusting in a picture editing software. For the first task the value of the pixels inside a circle would correspond to it's number (for example the inner circle with number 9 was filled with value 9 pixels).

Similarly I made pixel masks for the second task but these included the multiplier regions and the number of the segment on the board.

For the third task the approach was a bit different. After taking the first and last frame of the video I used template matching to detect the different scenarios and I used a different scoring pixel mask for each of those cases. In this case computing the difference between the first and last frame was easier and resulted in a cleaner dart image, but finding the location of the arrow and applying the correct scoring mask proved more difficult.