# Assignment 2 writeup

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1. **Single target**

In this experiment, we chose 5 poker cards as our target images. For single target, we selected one of the five poker cards as our template. The card we chose for this experiment was Heart J. Firstly we prepared a picture containing 5 cards as our target image. Then turn on the computer's camera, let Heart J appear in the shot and capture three images as the target we want to identify.

From our tests. The algorithm CV\_TM\_CCOEFF\_NORMED, CV\_TM\_CCORR\_NORMED and CV\_TM\_SQDIFF\_NORMED had better performance in matching. Because these algorithms are normalized, which means they had a normalized operation on images and templates. This normalization ensures that the similarity does not change when the brightness of each pixel of the template and image is multiplied by the same coefficient, removes the influence of brightness linear variation on similarity computation.

But in fact, the performance of these three algorithms is not perfect. In our experiment, they did not achieve 100% accurate matching. But compared with the other three algorithms, they have higher accuracy.

1. **Multiple targets**

We tested each of the six algorithms in turn. The method we test is to identify the suits in five poker cards (clubs, hearts, and spades). We captured three pictures from the camera, and the suit order is hearts, clubs, and spades. In view of all the recognition methods, CCOEFF\_NORMED is the only algorithm that can recognize objects relatively accurately, but it's not perfect. From the three suits, the club is the best, it can recognize most of clubs but not all of them. But its advantage is that there is no wrong identification, that is, no recognition of other suits such as spades and hearts. Spades performed worse than spades. Most of the spades in the picture can be recognized but not all of them as well. But it's not just spades that are recognized only, there are clubs and other objects besides the poker cards that were considered similar as well. The hearts had the same situation. Hearts are identified, but similarly spades and clubs were also considered similar.

Except for TM\_CCOEFF\_NORMED, other algorithms cannot accurately match the target.

Finally, we want to choose CV\_TM\_CCOEFF\_NORMED algorithm in out presentation. Because in our experiment, this method has the best overall performance. It has a relatively good performance in matching single target and multiple targets.

Because this algorithm is the most complex that OpenCV can support. Its main principle is to let the image and template subtracted the average of their pixels and divided by their variances. After these two steps, the image and template are normalized, and the matching results are not affected by lighting conditions.