

This homework is to implement head tracking based on three different template-matching methods.

I separated this task to two basic tasks:

1. Initialization

I first read the 0001image and manually draw a circle around the girl's head. I found the center of the circle by show the image several times and play with the parameters. Store this processed first image as the old_image.

2. Apply image matching method&search method:

I applied three matching methods and got 3 videos. The application for the three methods are very similar. I made a fixed search window for all the three methods, the center of circle for the next frame is the point that satisfied the method inside the search window.

1) SSD: sum of squared difference

I wrote a SSD function that takes the old image, the next image and the center of circle of the old image , then return the center of circle of the next image. To find the center of circle of the next image, I searched all the points within the search window and compute the D value, the center I found has the minimum value of D.

2) CC: cross-correlation

Similar to the implementation of SSD method, I wrote a CC function which finds the coordinate that holds that maximum C value.

3) NCC: normalized cross-correlation

Similar to the implementation of methods above, the NCC function finds the coordinate that maximize the N value.

All methods above also draw circle on the colored image and write that image to the video. The image then become the old image.

Result:

The output video using SSD method turns out to be the best, the circle always follow the head even though there's partial occlusion.