Project for video tracking

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AIM:

The objective of this project is to track an object in a video based on a given template using a matched filter.

INTRODUCTION:

A video of RGB images is of four dimensions. The first, second and the third dimension is related to space while the fourth one moves with time. Thus for each time, an image with the fourth dimension is called the frame. Each frame is different from one another as the objects in the video move as times go by. Computer vision is a wonderful field of teaching computers to see. This tracking algorithm would help the computer to learn the tracking method based on correlation. The correlation measures the relationship between the template of the object to be tracked and each block of the image in the next frame based on similarity measure. This is the idea behind the matched filter. Referring to wiki[edia, it is a means to measure the relationship between blocks of image to the given template based on stochastic processes. The main component here is the peak value of the correlation in the row and column dimension. Thus we track the object in each frame.

STEPS:

1. The initial image is taken as the reference.
2. Then we get the template by their axes after cropping.
3. We find the normalized correlation for each block of the next image. Each block is of the same size as the template.
4. We find the maximum correlating along the row and the column. This shows which best block that is matching well with the template.
5. Then we construct a box around the detected target.
6. This continues for each frame.
7. For each time, the plot of the frame with the tracker is saved in a video variable.
8. Thus we write the video variable as the mp4 video.

RESULTS:

The algorithm gave a successful output. The video is a bouncing ball of 48 frames. The results are given below:

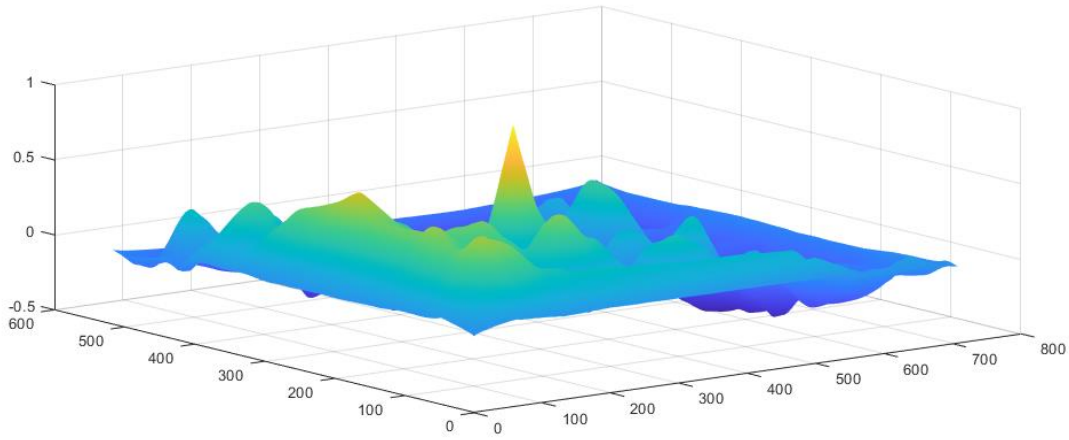

Fig 1: Typical correlation map [1]

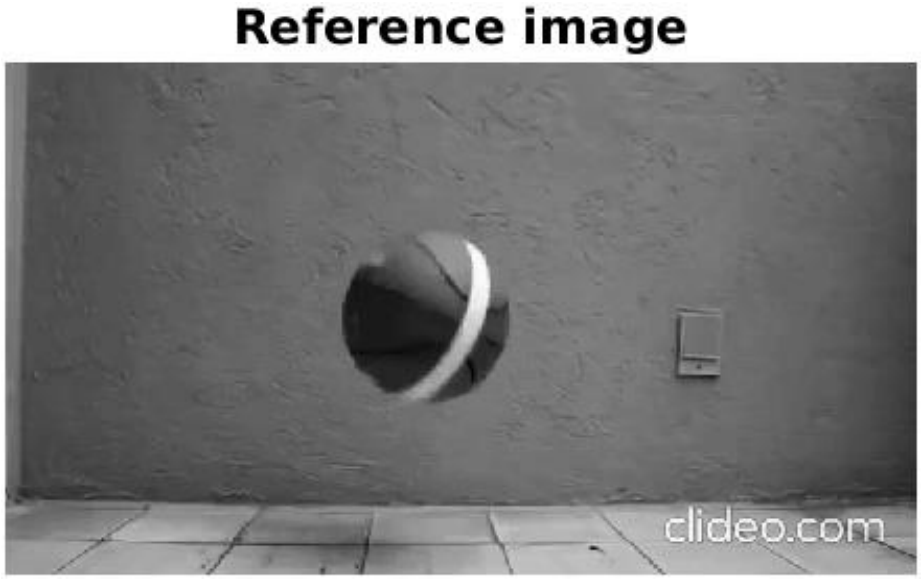

Fig 2: The reference image(The first frame)

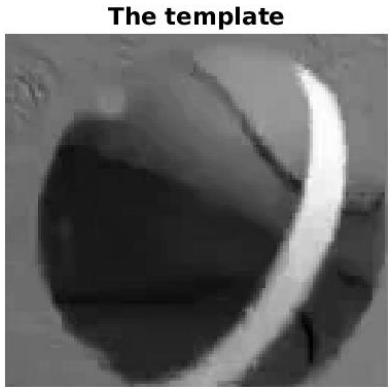

Fig 3: The template extracted from the reference image

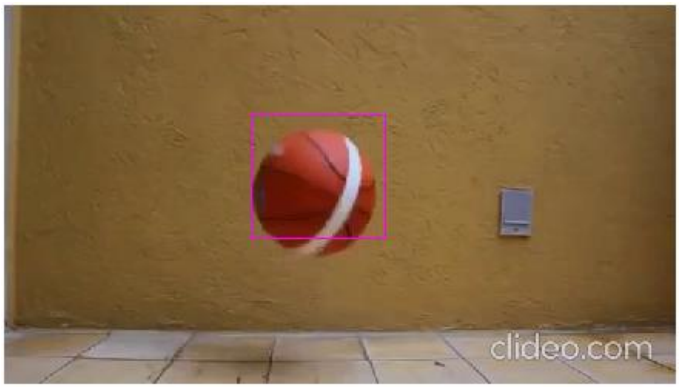

Fig 3: The target tracked at the first frame

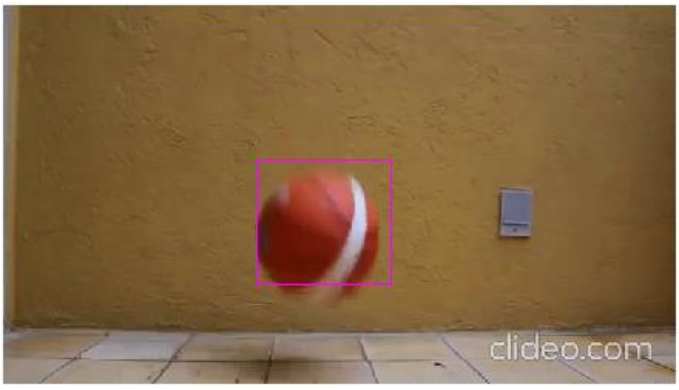

Fig 4: This is the fourth frame tracked

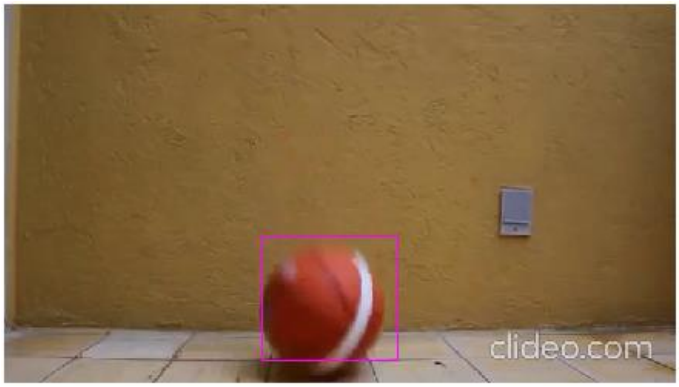

Fig 5: The sixth frame

NOTE: The video of the target being tracked is given in the video ‘testmovie2.mp4’

CONCLUSION:

The tracking algorithm is useful for many purposes like tracking a car to know about its moment. This could prevent accidents. Likewise in the medical field for robotic surgery, this can be applied to track the organ being operated upon overcoming the challenge of aliasing, other noises.

REFERENCE:

1. https://www.mathworks.com/help/images/ref/normxcorr2.html