Super Star

CS5245 Project Presentation

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Outline

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Storyline

- Initially, four persons are playing tennis
- One of them need to leave because of time
- It is difficult for three persons to play
- Roger splits himself into two, then the “four” guys keep playing

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Main Steps

1. From the four persons vedio, replace the player who is going to leave by the background
2. Shoot vedio clips of Roger acting individually
3. Segment Roger out from the individually acting vedio clips
4. Composite the results of step 1 and 3, putting Roger to the right position based on the motion of tennis ball

Outline

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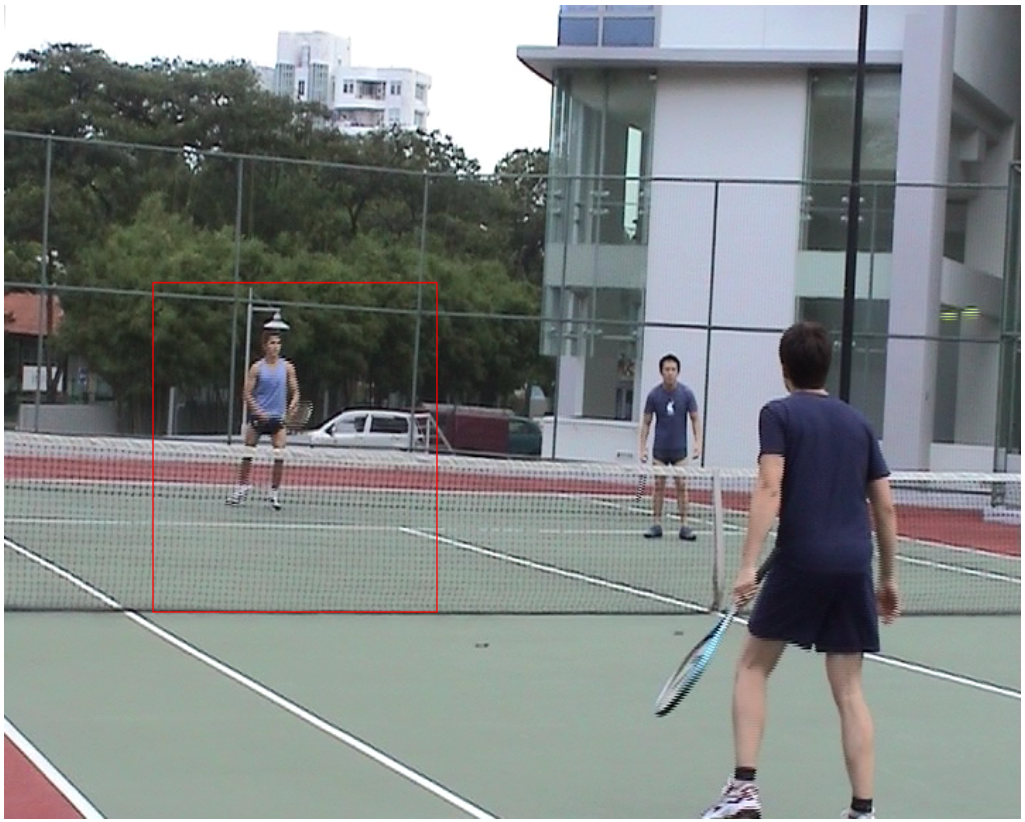
Removal of Original Player

- Extract the region which encloses the original player



Removal of Original Player

- Replace the extracted region by the background with α-blending.

Outline

Sequence Adjusting

If the palyer hit the ball twice in a round, both the hitting moments should be consistent between the original player and the virtual Roger. This constrain cannot be guaranteed in video shooting, so we need to adjust roger's motion with the original player's.

1. Adjust the first hit moment, and cauculating the time difference of the second hit moment.
2. Manully select a short video (about 30 consecutive frames) from roger's single video, which can be periodically played seamlessly.
3. Repeat this clip in the roger's single video until the second hit moment is adjusted.

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Difficulties

- Background is not static
- Two clips ((a) and (b)) are not well aligned
- The net is moving because of wind

(a)

(b)

Absolute Difference

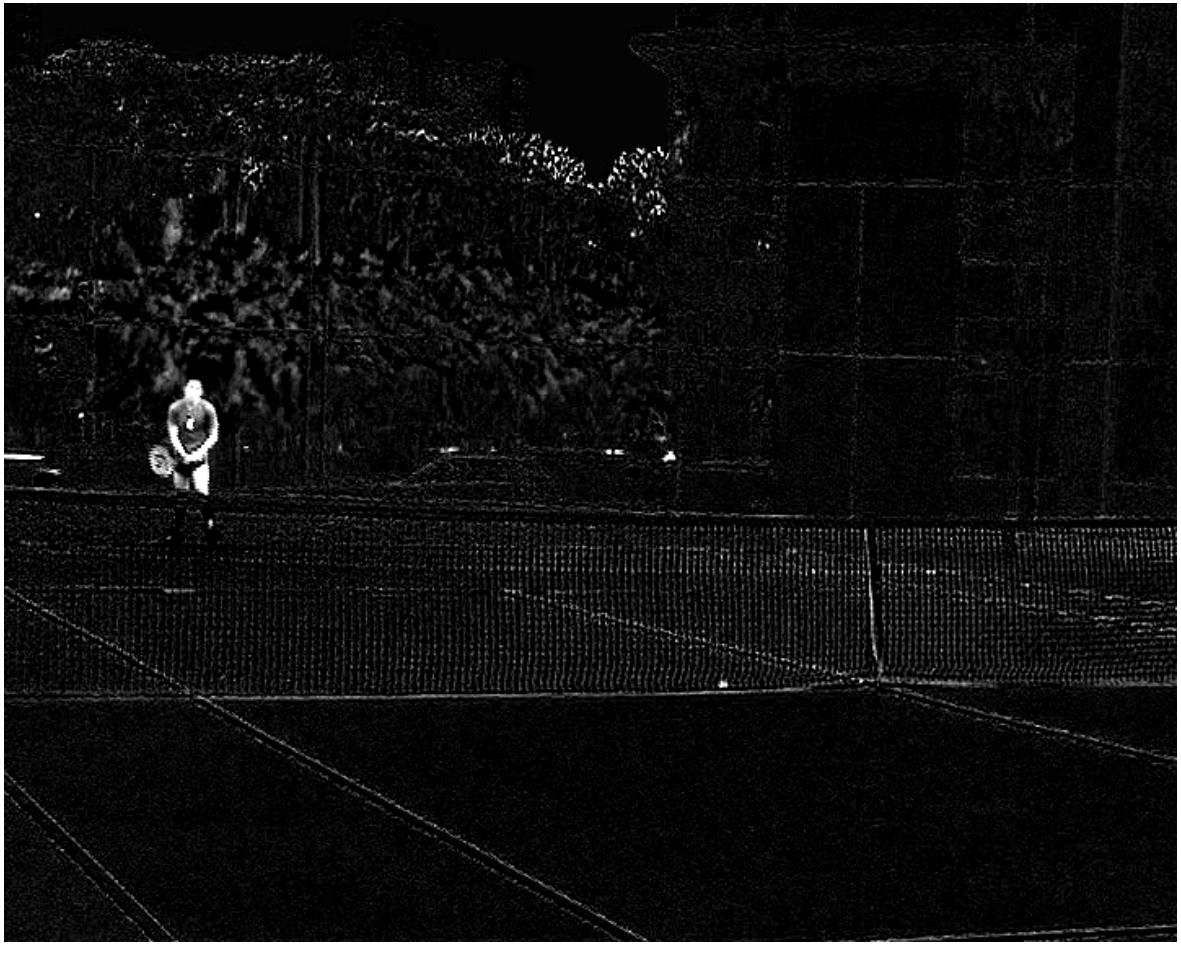


Figure: absolute difference between foreground and background — net is still around, and legs are missing

Method

- Distill blue channel from original image
- Use median filter to reduce the influence of the net
- Compute the difference between the two images
- Use morphological operation to remove noises
- Select the required region while discarding the unwanted region using Matlab
- Use photoshop to manually adjust some frames

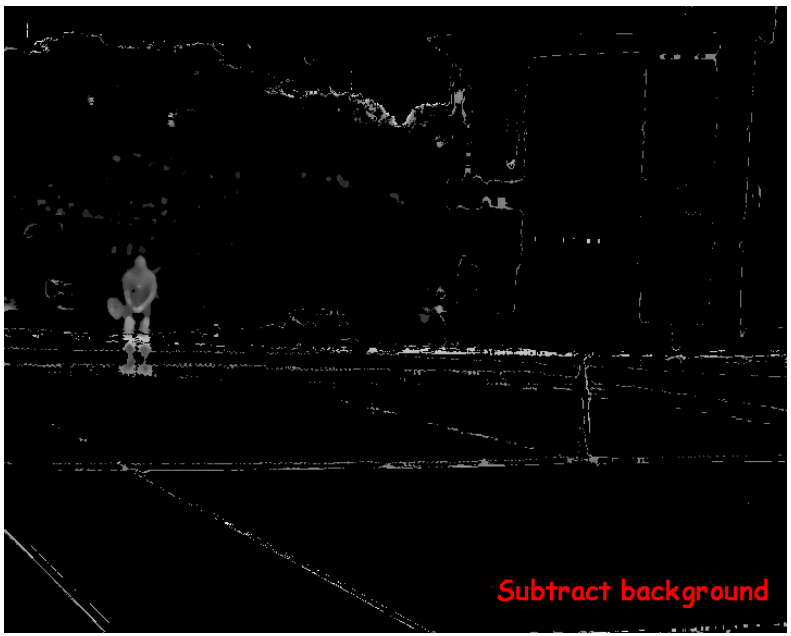
Median Filter

(a)

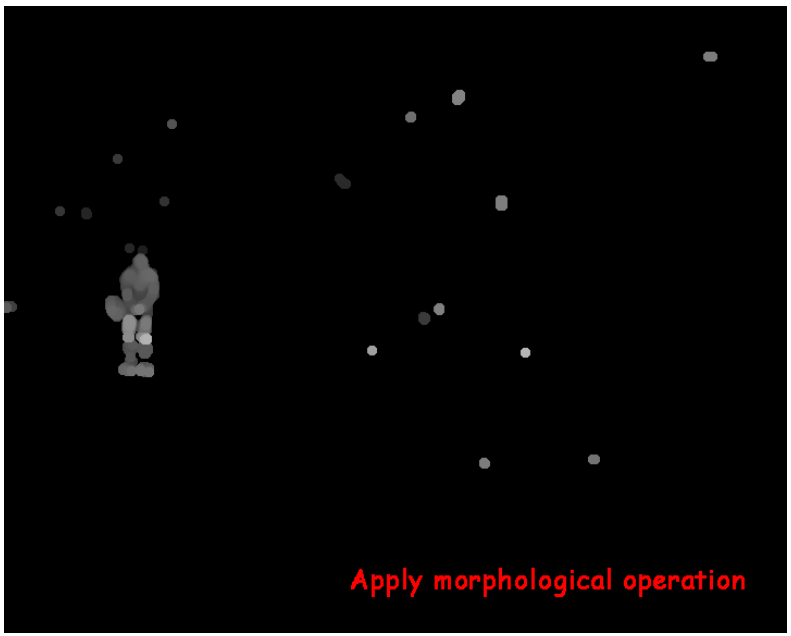
(b)

Figure: (a): median filter applied on the blue channel of the background image; (b): median filter applied on the blue channel of the foreground image.

Subtraction and Morphological Op.



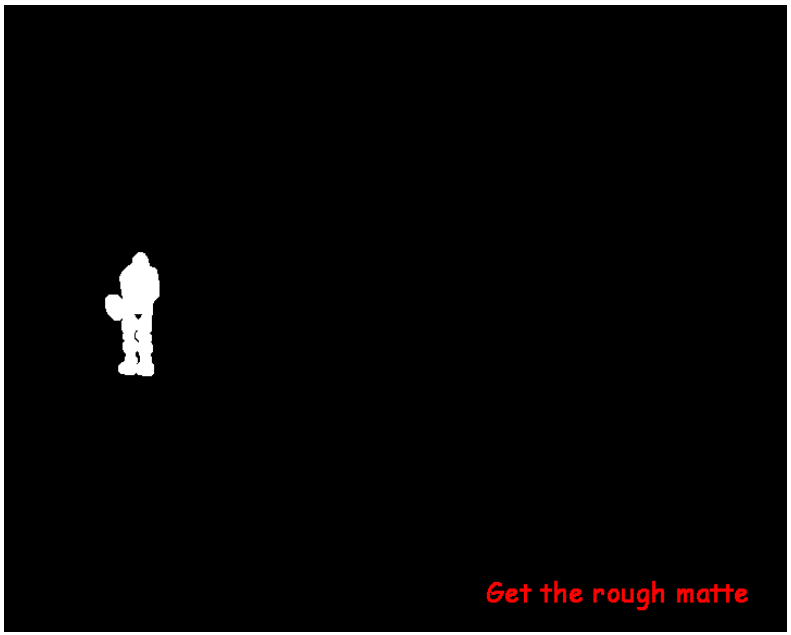
(a)



(b)

Figure: (a): subtraction result; (b) result after morphological close operation.

Final Matte



(a) rough matte

(b) edge-smoothed matte

Compositing

After segmenting Roger out, he is composited into the four persons video, his position depends on:

- x-axis: the position of tennis ball during hitting moment
- y-axis: the white line on the net

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White Screen Shooting

- Splitting video is shot with a white screen
- Segmenting Roger out is simply done by thresholding

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Method

- Constantly shifting Roger to the right
- For overlapping region, the pixel value $p = 0.5a + 0.5b$, where a is the pixel value of the left person, b is the pixel value of the right person.

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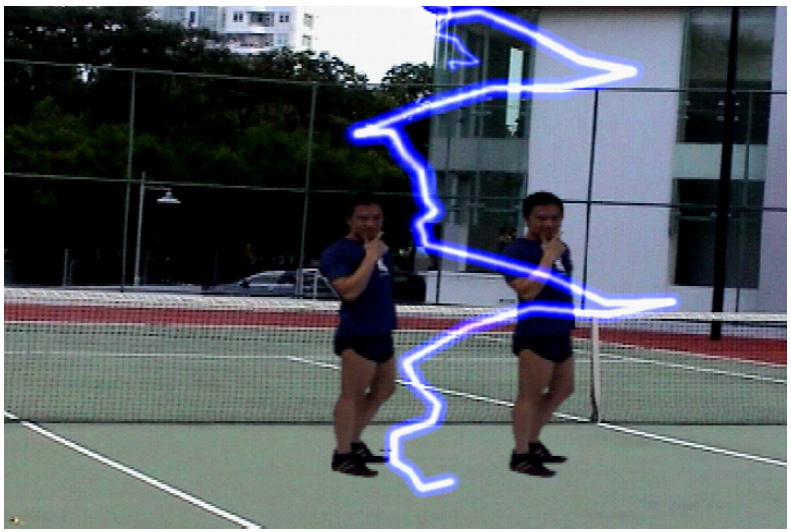
Lightning Effect

- Use After Effect to create dark background by changing brightness and contrast, this is to hide the compositing effect
- Add in virtual lightning using After Effect at the selected moment, this attempts to hide the white outline left behind by keying.

(e) darkness



(f) lightning