Video Reading

Description:

Video Reading - Extract frames from given input video and process each frame separately to form a new image containing a streak of images made from the processed frames.

Procedure:

1. Select a column in video for which we want to see the changes across time.
2. Select every other frame and process.
3. For each of the selected frames:
   a. Extract the column of interest and copy it to output image column location k.
   b. $k = k + 1$
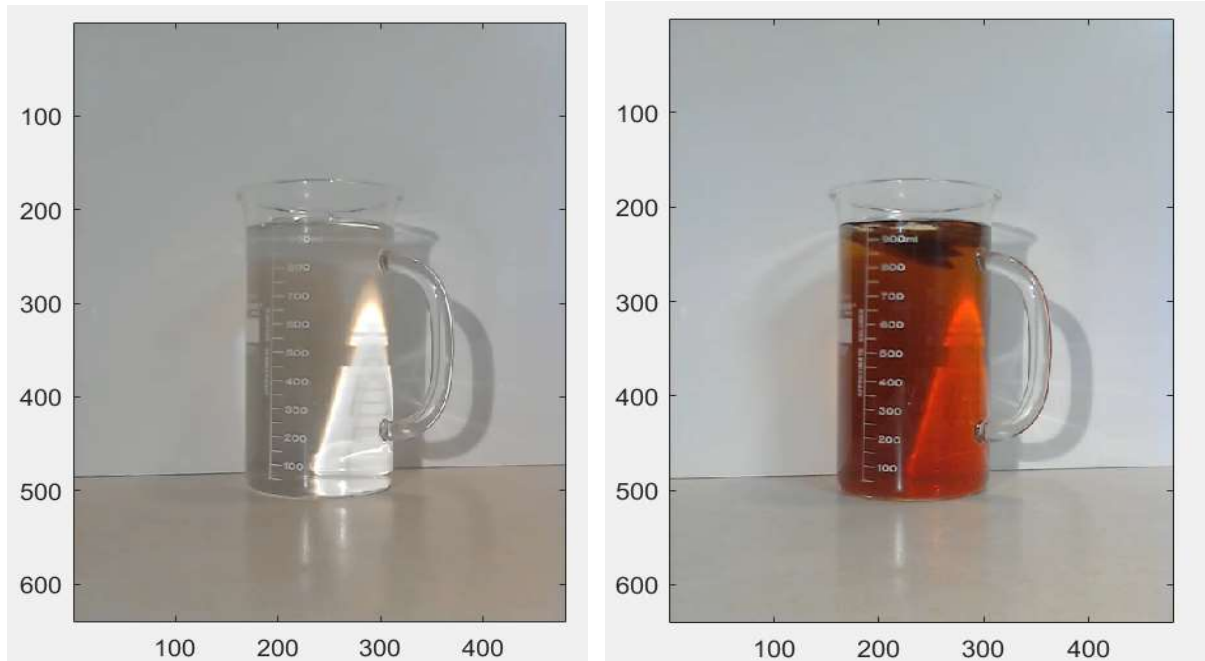4. Write the output image to a file.

Output image:

Fig. Initial frame(left) – beaker only has water, Final frame(right) – tea mixed with water.
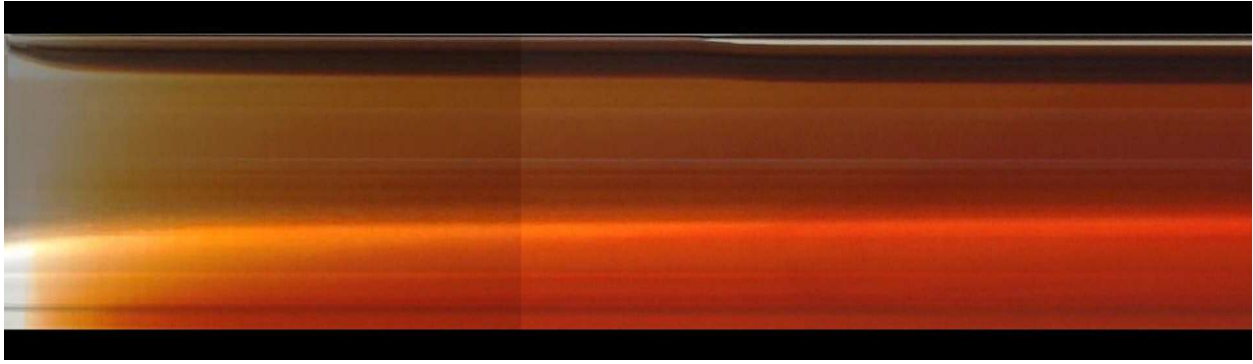
Fig. Streak of images extracted from the video

Observations:

- We can observe the changes through every other frame in video separately using this streak of images. We can use this information to reconstruct the video as the changes seem to be very smooth.
- Also, we see a clear vertical line in the mid frames of video which tells us that some luminance is introduced while processing the frames after that line.
- This effect is caused because of the Auto White Balance algorithm running in camera.
- The initial frames had enough white light so the AAA algorithm did not add any luminance to those frames. However, as soon as we add tea, the amount of whiteness in the scene starts reducing. When the amount of whiteness in the scene goes below a threshold, the Auto white balance algorithm introduces some white light to balance the whiteness in the scene.
- That's the reason we see a flash of light in the input video after few seconds from adding tea to water.
- Along with Auto white balancing, the camera also employs auto focus algorithm to find the regions of highest contrast in the scene and auto exposure algorithm to adjust the exposure of frames using histogram equalization techniques (under-exposed and over-exposed frames are brought to correct exposure).

Learnings:

- Matlab doesn't allow us to call hasFrame() or readFrame() on a video object if we query any other property(like 'Number of Frames') on that video object.
- The number of frames we skip may have important information which is not captured in our image streak.