Video I/O and Editing

Task

Overlap a transparent logo on a video.

Requirements

◆ The transparency of the logo periodically varies overtime, generating an effect of gradual showing up and gradual fading away;

◆ The first dozens frames (say, 25 frames, about 1 second) are the cover frames of your generated video file, and should include your portrait, your name, and your TJU student ID;

◆ The cover frames should gradually change to the edited video, using the same principle as overlapping the transparent logo on the video;

◆ Write the edited video back to a video file of the same format;

◆ Encapsulate this operation into a function;

◆ The inputs of the function includes the name of the video file, the name of the logo, and other parameters such as the position and the transparency of the logo;

◆ You are only allowed to upload one file. So, please includes all necessary files such as programs, data, and documents in a directory, and make a RAR or ZIP package. After decompression, your programs should be run correctly without any modification.

Materials

◆ **Data:** A video sequence Funfair (352x288, 250frames) is accessible from the e-Classroom. The color space of the video file is YUV420, and we provide a Matlab script to convert an YUV420 image to an RGB image. Details about the storage format of a YUV420 video can be found at http://www.fourcc.org/yuv.php. A logo of Peiyang University can be downloaded from our e-Classroom. You can use other video sequences; and you are encouraged to create your own logo.

◆ **Transparent overlapping**: Let I be a frame, $I(x, y)$ the pixel value at (x, y). Similarly, L denotes the logo image and $L(x, y)$ represents the pixel value at (x, y). The overlapping of the logo onto the frame with a transparency of $\alpha \in [0,1]$ is described by

$$I^{'}(x, y) = \begin{cases} I(x, y)\alpha + L(x, y) \cdot (1-\alpha), & (x, y) \in \Omega, \\ I(x, y), & (x, y) \notin \Omega, \end{cases}$$

where Ω is the logo region.

Tools

◆ **Environment:** Matlab is preferable, other platforms are also acceptable;

◆ **File I/O:** fopen(…), fread(…), fwrite(…), fclose(…); (in Matlab)

◆ **Some image operations:** Imresize(…), imshow(…) (in Matlab)

◆ **Color space converter:** yuv2rgb420(…) (accessible from e-Classroom)

◆ **Video playback:** YUVTools (accessible from e-Classroom)

Example

Figure 1   A cover frame contain your name and your portrait.

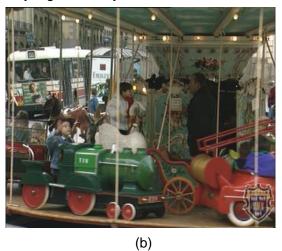Figure 2　The logo of Peiyang University

|(a)|(b)|

Figure 3　(a) Original frame and (b) the edited one by overlapping a logo at the bottom-right corner with a transparency of 0.3.