Building training samples for a short video

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For a short video whose length is less than the training sample, its own video frame duplications can be linked to the beginning of the video to estimate background model as shown in Fig. 1, which illustrates the process to construct the training samples of a short video clip.
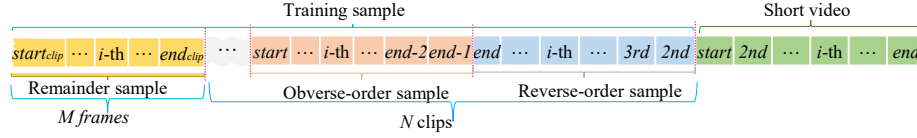

Figure 1: Building training samples for a short video.

The green frame series in Fig. 1 indicates the start to the end frames of an original time-lapse zebrafish larvae microscopic short video $\mathbb{V}$. The rest of the other frames in front of this video clip are its training sample $\mathbb{S}$ images to estimate the background model parameters of $\mathbb{V}$. The training sample $\mathbb{S}$ is consisting of video clips in obverse order within $[start, end-1]$ frames S_{obv} shown by the pink series, in reverse order within $[end, 2nd]$ frames S_{rev} as per the light blue series, and video fragment S_{frg} as per the orange series. The observe order sample clip S_{obv} and reverse order sample clip S_{rev} is linked to each other alternatively to construct the training sample, and the last sample to connect to the original video is the reverse order sample to ensure the smooth background transit by the $2nd$ frame, which is the last frame in the reverse order clip sample, to the start frame, which is the first frame of the studied microscopic video.

The required number of sample clips N and the frame number of the video fragment S_{frg} M are calculated using Eq. (1) and Eq. (2).

$$N = \text{idivide}(L_{sample}, N_{frames},' floor') \tag{1}$$

where idivide is a MATLAB built-in integer division function with fractional quotients being rounded toward negative infinity to the nearest integers.

$$M = L_{sample} - \text{idivide}(L_{sample}, N_{frames},' floor') \tag{2}$$

1

Based on the required number of video clips N (in obverse order and reverse order), the video fragment S_{frg} to build the training sample is selected using Eq. (3).

$$S_{frg} = \begin{cases} \{S_{rev}(i) \mid i = M + 1 \ , \ \ldots \ , \ 3, \ 2\}, & \frac{N}{2} \ is \ even \\ \{S_{obv}(i) \mid i = 2 \ , \ \ldots \ , \ 3, \ M + 1\}, & \frac{N}{2} \ is \ odd \end{cases} \qquad (3)$$