CLAIMS

1. A method, comprising:

receiving reconstructed video data associated with a block boundary between two coding blocks in a video coding system, the block boundary having N lines of samples crossing the block boundary from a P side of the boundary to a Q side of the boundary;

determining whether to apply a first filter set to reduce block artifacts at the block boundary, the determining whether to apply the first filter set to reduce block artifacts at the block boundary including:

determining whether to apply the first filter set to two consecutive lines of samples among the N lines of samples according to whether the two consecutive lines of samples each satisfy a same set of conditions, the same set of conditions comprising at least one of an inter-side difference of the respective one of the two consecutive lines of samples is greater than an inter-side difference threshold and an intra-side difference of the respective one of the two consecutive lines of samples is smaller than a second intra-side difference threshold;

determining a filter length of a filter in the first filter set based on a first side length (len_p) of samples in each line of samples at the P side, and a second side length (len_q) of samples in each line of samples at the Q side, the first side length (len_p) being a width or height of one of the two coding blocks at the P side, the second side length (len_q) being a width or height of one of the two coding blocks at the Q side; and

applying at least one filter in the first filter set with the determined filter length on the block boundary.

2. The method of claim 1, wherein the intra-side difference of the first line of the N lines of samples is determined according to:

$$\sum_{s=0}^{len_p-1}(m_s \times |p_s - p_x|) + \sum_{t=0}^{len_q-1}(n_t \times |q_t - q_y|),$$

where s, x, t and y are integers, $0 < x < len_p - 1$, $0 < y < len_q - 1$, p_k(k=s or x) or q_k (k=t or y) represents a sample value for a sample at the P side or Q side respectively, k indicates a position of the respective sample in the first line of samples at the Q side or P side, m_s is 0 or 1, and n_t is 0 or 1.

3. The method of claim 1, wherein the determining whether to apply the first filter set to reduce block artifacts at the block boundary further includes:

when the block boundary is a region boundary associated with a line buffer having a size of M lines, determining a filter length of a filter in the filter set that is smaller than the size of the line buffer for the P side or Q side the samples of which are stored in the line buffer.

4. The method of claim 1, wherein the first filter set is selected from a set of candidate filters that includes a filter having a filter length in a range from 1-tap to 16-tap.

5. The method of claim 1, wherein an inter-side difference of the first line of the N lines of samples is determined based on one of:

$|p_0 - q_0|$,

$(m \times |p_0 - q_1| + n \times |p_1 - q_0|)/(m + n)$,

$|m \times (p_0 - q_1) + n \times (p_1 - q_0)|/(m + n)$,

$(m \times |p_0 - q_0| + n \times |p_1 - q_1|)/(m + n)$, or

$\left|\sum_{s=0}^{len_p - 1}(m_s \times p_s) - \sum_{t=0}^{len_q - 1}(n_t \times q_t)\right|$,

where m and n are integers, p_k or q_k (k=0, 1, s, or t) represents a sample value of the sample at a position indicated by k in the first line of the N lines of samples at the P side or Q side, respectively, m_s or n_t represents a weight corresponding to the respective sample value p_s or q_t respectively, $\sum_s m_s = 1$, and $\sum_t n_t = 1$.

6. The method of claim 1, wherein the determining whether to apply the first filter set to reduce block artifacts at the block boundary further includes:

determining whether to apply the first filter set to reduce block artifacts at the block boundary according to one or more of:

reference picture difference between the P side and Q side,

motion vector difference between the P side and Q side,

prediction types of the P side and Q side,

residual difference between the P side and Q side,

color component of the N lines of samples, or

whether a picture, slice, or blocks at P side and Q side including the bock boundary is intra coded.

7. The method of claim 1, wherein the inter-side difference threshold, the first intra-side difference threshold, and/or the second intra-side difference threshold is one of:

a value selected from values predefined for each quantization parameter (QP) used at the video coding system,

a value derived from threshold values t_C and β as specified in High Efficiency Video Coding (HEVC) standards,

a value selected from values predefined for each QP plus a picture level offset value,

a value indicated in a video parameter set (VPS), a sequence parameter set (SPS), a picture parameter set (PPS), a slice header, or a coding unit (CU), or

a just-noticeable-difference (JND) value calculated based on neighboring samples along the block boundary.

8. The method of claim 1, further comprising:

signaling a flag indicating whether to apply the first filter set; and

signaling a length value as a threshold, wherein whether to apply the first filter set is determined based on whether a number of consecutive lines each satisfying a set of conditions is greater than or equal to the threshold.

9. The method of claim 1, wherein the determining the filter length of the filter in the first filter set based on the first side length (len_p) and the second side length (len_q) includes:

determining the filter length of the filter that is to be applied at the P side, the filter length being in a range between 1 and len_p, or

determining the filter length of the filter that is to be applied at the Q side, the filter length being in a range between 1 and len_q,

where filter lengths of filters to be applied at the P side and the Q side are the same or different.

10. The method of claim 1, wherein the determining the filter length of the filter in the first set based on the first side length (len_p) and the second side length (len_q) includes:

determining the filter length of the filter to be applied at the P side to be a filter length assigned to a side length range that includes the first side length (len_p), or

determining the filter length of the filter to be applied at the Q side to be a filter length assigned to a side length range that includes the second side length (len_p),

wherein, for the P side or Q side, a side length range including larger side length values is assigned with a larger filter length than a side length range including smaller side length values.

11. The method of claim 1, wherein the determining the filter length of the filter in the first set based on the first side length (len_p) and the second side length (len_q) includes:

determining a filter length for the P side or Q side based on the first side length (len_p), the second side length (len_q), and an inter-side difference of the first line of the N lines of samples.

12. The method of claim 1, wherein the applying the at least one filter in the first filter set with the determined filter length on the block boundary comprises:

applying the first filter set to a subset of samples at the P side or Q side to reduce block artifacts at the block boundary.

13. The method of claim 1, wherein the determining the filter length of the filter in the first set based on the first side length (len_p) and the second side length (len_q) includes:

determining a first filter tap length for the P side and a second filter tap length for the Q side according to a look-up table that specifies a pair of filter tap lengths for the P side and Q side, respectively, for each combination of a possible side length of the Q side and a possible side length of the P side of the block boundary.

14. An apparatus, comprising circuitry configured to:

receive reconstructed video data associated with a block boundary between two coding blocks, the block boundary having N lines of samples crossing the block boundary from a P side of the boundary to a Q side of the boundary;

determine whether to apply a first filter set to reduce block artifacts at the block boundary based on determination of whether to apply the first filter set to two consecutive lines of samples among the N lines of samples according to whether the two consecutive lines of samples each satisfy a same set of conditions, the same set of conditions comprising at least one of an inter-side difference

of the respective one of the two consecutive lines of samples is greater than an inter-side difference threshold and an intra-side difference of the respective one of the two consecutive lines of samples is smaller than a second intra-side difference threshold;

determine a filter length of a filter in the first filter set based on a first side length (len_p) of samples in each line of samples at the P side, and a second side length (len_q) of samples in each line of samples at the Q side, the first side length (len_p) being a width or height of one of the two coding blocks at the P side, the second side length (len_q) being a width or height of one of the two coding blocks at the Q side; and

apply at least one filter in the first filter set with the determined filter length on the block boundary.

15. A non-transitory computer-readable medium storing instructions that, when executed by processing circuitry, cause to the processing circuitry to perform a method, the method comprising:

receiving reconstructed video data associated with a block boundary between two coding blocks in a video coding system, the block boundary having N lines of samples crossing the block boundary from a P side of the boundary to a Q side of the boundary;

determining whether to apply a first filter set to reduce block artifacts at the block boundary, the determining whether to apply the first filter set to reduce block artifacts at the block boundary including determining whether to apply the first filter set to two consecutive lines of samples among the N lines of samples according to whether the two consecutive lines of samples each satisfy a same set of conditions, the same set of conditions comprising at least one of an inter-side difference of the respective one of the two consecutive lines of samples is greater than an inter-side difference threshold and an intra-side difference of the respective one of the two consecutive lines of samples is smaller than a second intra-side difference threshold;

determining a filter length of a filter in the first filter set based on a first side length (len_p) of samples in each line of samples at the P side, and a second side length (len_q) of samples in each line of samples at the Q side, the first side length (len_p) being a width or height of one of the two coding blocks at the P side, the second side length (len_q) being a width or height of one of the two coding blocks at the Q side; and

applying at least one filter in the first filter set with the determined filter length on the block boundary.